July 20, 2026
File: PE7096-LET.01R

Consulting Engineers
9 Auriga Drive
Ottawa, Ontario
K2E 7T9
Tel: (613) 226-7381

Geotechnical Engineering
Environmental Engineering
Hydrogeology
Materials Testing
Building Science
Rural Development Design
Temporary Shoring Design
Retaining Wall Design
Noise and Vibration Studies
Energy and Sustainability
Temporary Shoring Design
Pile Dynamic Analysis and Testing

patersongroup.ca

W.O. Stinson & Son Ltd.
4728 Bank Street
Ottawa, Ontario
K1T 0K5

Attention: **Mr. Scott Stinson**

Subject: **Phase I – Environmental Site Assessment Update**
301 Somme Street
Ottawa, Ontario

Dear Sir,

Further to your request, Paterson Group (Paterson) has carried out a Phase I Environmental Site Assessment (ESA) Update for the aforementioned property. This report updates a previous Phase I ESA Update entitled, *"Phase I Environmental Site Assessment Update, 301 Somme Street, Ottawa, Ontario"* prepared by Paterson Group Inc. (Paterson), dated July 26, 2022.

This report is intended to meet the requirements for an updated Phase I ESA, as per Ontario Regulation (O. Reg.) 153/04, as amended, and is to be read in conjunction with the 2022 report.

Site Information

The Phase I Property is located on the north side of Somme Street, at the intersection of Somme Street and Sappers Ridge, in the City of Ottawa. The subject site is vacant with a large gravel pad on the western portion of the property. While the site is referred to as 301 Somme Street, the property also includes part of 331 Somme Street and part of 3748 Rideau Road. Please refer to the Site Plan for the property limits.

The Phase I Property is an irregular shaped lot with an area of approximately 61,000 m^2. The Phase I Property is situated in a rural heavy industrial area that relies on private wells and septic systems. Refer to Figure 1 – Key Plan, following the text of this letter report, for site contextual information.

Previous Engineering Reports

- ❑ *"Phase I Environmental Site Assessment, Part Lot 26 & 27 Concession 6, Ottawa, Ontario, prepared by CRA, dated July 2008*.

The 2008 Phase I ESA was carried out for a larger tract of land than the current Phase I Property. The 2008 Phase I ESA indicated that a former waste disposal site (x.9013) was documented on the northern portion of the lands that they were assessing, however, they found no evidence of the waste disposal site through a review of the aerial photographs or through on-site observations including test pits. CRA concluded that the designation of part of the lands as a waste disposal site was an error.

The Ontario Ministry of Environment (MOE) approved the placement of non-recyclable asphalt and waste road building materials more than 30 years ago (MOE letter, 1990). The placement of waste road building materials (granular materials, non-recyclable asphalt and presumably concrete) on site in the past was considered by CRA to represent a potential environmental concern on the subject site. CRA recommended a Phase II ESA to assess the site conditions due to the former handling of waste road building materials on site.

- ❑ *"Phase I Environmental Site Assessment, Northern Part of 5123 Hawthorne Road (formerly) and now readdressed 301 Somme Street, Ottawa, Ontario,"* prepared by Paterson Group Inc. (Paterson), dated November 20, 2020.

A Phase I ESA was carried out by Paterson Group in November of 2020 in general accordance with the Ontario Regulation (O.Reg.) 153/04, as amended. The Phase I ESA identified the following on site PCA that generated an APEC on the Phase I Property:

- PCA 30 – *"Importation of Fill Material of Unknown Quality"* associated with handling and placement of fill material across the majority of the Phase I Property (APEC 1).

A Phase II ESA was recommended to address the aforementioned APEC on the Phase I Property.

- ❑ *"Phase II Environmental Site Assessment, Northern Part of 5123 Hawthorne Road (formerly) and now readdressed 301 Somme Street, Ottawa, Ontario,"* prepared by Paterson Group Inc. (Paterson), dated November 30, 2020.

The Phase II ESA was carried out to assess the quality of the fill material that had been placed on site by the owner of the property, R.W. Tomlinson. The field program consisted of placing three (3) boreholes on the subject site. It should be noted that a previously drilled well from 2008 (MW7-08) was sampled as part of the program. The boreholes were placed to obtain a general coverage of the area. The soil profile generally consisted of a layer of fill, overlying native clayey silt/silty clay and/or a silty fine sand with traces of gravel. Practical refusal was reached at depths ranging from 5.28 to 10.67m below the existing grade on inferred bedrock. The fill material consisted of a mix of clay, silt, sand and gravel with varying amounts of asphaltic concrete and concrete. The fill varied in thickness from 2.3 to 5.8m.

Six (6) soil samples were submitted for metals, PHCs (fraction 2 to 4), PAHs, electrical conductivity (EC), sodium adsorption ratio (SAR) and pH analysis. All soil samples complied with the MECP Table 2 Commercial standards. A comparison of the soil data to the MECP Table 1 Industrial standards, indicated that the petroleum hydrocarbon fraction 4 concentrations in several soil samples exceed the Table 1 standards, as well as molybdenum and chromium concentrations.

Groundwater samples were recovered from the monitoring wells BH1, BH2 and MW7-08 on May 28 and June 7, 2019 and November 10, 2020. No visual or olfactory signs of contamination were noted in the groundwater. The groundwater samples were submitted for PHCs (F1-F4), PAHs, VOCs and sodium and chloride analysis. Concentrations of PHCs and VOCs in the groundwater samples analyzed were not detected above the laboratory detection limits. VOC and PHC test results complied with the MECP Table 2 standards.

Detectable PAH parameters were identified in all of the groundwater samples analyzed for the May 28, 2019 sampling event. All PAH parameters in the groundwater from MW7-08 were in compliance with the MECP Table 2 standards. Benzo[a]pyrene concentrations in BH1 and BH2 were in excess of the selected standards. Benzo[b]fluoranthene and chrysene concentrations in BH2 were also in excess of the selected MECP standards.

It was speculated that some sediment was present in the groundwater samples, and as such, BH1 and BH2 were resampled on June 7, 2019 and November 10, 2020.

Based on the last two (2) sampling events, the analytical test results showed that the groundwater complied with the MECP Table 2 standards.

The apparent discrepancies between these analytical results, are considered to be a result of sediment present in the first groundwater samples analyzed.

- ❑ *"Phase I Environmental Site Assessment Update, 301 Somme Street, Ottawa, Ontario,"* prepared by Paterson Group Inc. (Paterson), dated July 26, 2022.

Based on the findings of the Phase I ESA Update, no new on or off-site PCAs were identified and as such, no new APECs were present on the subject property.

- ❑ *"Phase II Environmental Site Assessment Update, 301 Somme Street, Ottawa, Ontario,"* prepared by Paterson Group Inc. (Paterson), dated September 26, 2022.

A water supply well (A342117) and observation well (MW22-1) was installed on the Phase II Property on July 29, 2022. The previously sampled wells were unable to be resampled as they were decommissioned prior to recent grading and compaction that took place on site; thus, a groundwater sample was collected from MW22-1 on August 12, 2022. No visual or olfactory signs of contamination were noted in the groundwater. The groundwater sample was submitted for PAH and VOC analysis. Concentrations of PAHs and VOCs in the groundwater sample analyzed were not detected above the laboratory detection limits.

Based on the findings of the Phase II ESA Update, no further investigative work was required on the Phase II Property.

Historical Records Update

Environment Canada

A search of the National Pollutant Release Inventory (NPRI) database was conducted as part of this assessment. The Phase I Property was not listed in the NPRI database. No records of pollutant release were listed in the database for properties located within the Phase I Study Area.

Ministry of the Environment, Conservation and Parks (MECP) Instruments

As part of the current assessment, a request was submitted to the MECP Freedom of Information office for information with respect to certificates of approval, permits to take water, certificates of property use or any other similar MECP issued instruments for the Phase I Property. The response from the MECP indicated that no relevant records were identified on the Phase I Property. The MECP FOI response has been included in Appendix 2.

According to the ERIS report, two (2) environmental certificates of approval were issued for the Phase I Property. The ECAs were issued for Municipal and Private Sewage Works. One (1) additional environmental certificate of approval was issued for a property within the Phase I Study Area. The ECA was issued for Industrial Sewage Works. Based on the nature of these approvals, they are not considered to represent a potentially contaminating activity to the Phase I Property.

Several provisional Certificates of Approval (CAs) and Environmental Compliance Approval (ECA) records were issued for the historical address 5123 Hawthorne Road, associated with the waste treatment facility (Orgaworld Canada Ltd. / Convertus Canada Ltd.) located approximately 500m south of the Phase I Property. Based on the overall separation distance of these records, they are not considered to represent a potentially contaminating activity or an area of potential environmental concern to the Phase I Property.

MECP Submissions

As part of the current assessment, a request was submitted to the MECP Freedom of Information office for information with respect to reports related to environmental conditions for the Phase I Property. The response from the MECP indicated that no relevant records were identified on the Phase I Property. The MECP FOI response has been included in Appendix 2.

Based on a review of the ERIS report, which contains records from various Ministry databases and is further discussed below, no records pertaining to MECP submissions were identified for the Phase I Property or other properties within the Phase I Study Area.

Annual groundwater and surface water monitoring programs have been carried out for the historical address 5123 Hawthorne Road, associated with the waste treatment facility (Orgaworld Canada Ltd. / Convertus Canada Ltd.) located approximately 500m south of the Phase I Property. Based on the overall separation of the monitoring area, these records are not considered to represent a potentially contaminating activity or an area of potential environmental concern to the Phase I Property.

MECP Incident Reports

As part of the current assessment, a request was submitted to the MECP Freedom of Information office for information with respect to records concerning environmental incidents, order, offences, spills, discharges of contaminants, or inspections maintained by the MECP for the Phase I Property or any of the neighbouring properties. The response from the MECP indicated that no relevant records were identified on the Phase I Property. The MECP FOI response has been included in Appendix 2

According to the ERIS report, no pertinent information was reported for the Phase I Property or other properties within the Phase I Study Area.

Incident reports were identified for the historical address 5123 Hawthorne Road, associated with the waste treatment facility (Orgaworld Canada Ltd. / Convertus Canada Ltd.) located approximately 500m south of the Phase I Property. The incident records were limited to air, administrative non-compliance and minor equipment failure resulting in small spills. In addition, several inspection reports related to the operation of the 5123 Hawthorne Road facility were identified, documenting compliance with the facility's ECAs. Based on the overall separation distance and nature of these records, they are not considered to represent a potentially contaminating activity or an area of potential environmental concern to the Phase I Property.

MECP Waste Management

As part of the current assessment, a request was submitted to the MECP Freedom of Information office for information with respect to waste management records for the Phase I Property. The response from the MECP indicated that no relevant records were identified on the Phase I Property. The MECP FOI response has been included in Appendix 2.

According to the ERIS report, no waste management records were found for the Phase I Property.

The MECP FOI identified a waste transfer facility located at 5123 Hawthorne Road (Orgaworld Canada Ltd. / Convertus Canada Ltd.) that is approved to accept solid non-hazardous domestic waste, commercial, institutional or industrial organic waste from the provinces of Ontario and Quebec. The approved organic waste consists of food wastes, paper fibres, leaf and yard wastes, and similar organic materials. Based on the overall separation distance and nature of these records, they are not considered to represent a potentially contaminating activity or an area of potential environmental concern to the Phase I Property.

The ERIS report identified one waste generator documented since 2024 within the Phase I Study Area. The waste generator is associated with the newly developed property to the south, addressed 300 Somme Street. The waste class documented was waste oil and lubricants. Due to its cross-gradient orientation relative to the subject land, the waste generator is not considered to pose a potential environmental concern on the Phase I Property.

MECP Brownfields Environmental Site Registry

A search of the MECP Environmental Site Registry was conducted as part of this assessment for the site, neighbouring properties and general area of the site. No Records of Site Condition (RSCs) were filed for the Phase I Property or for properties within the Phase I Study Area.

OMNRF Areas of Natural and Scientific Interest (ANSI)

A search for ANSI sites situated within the Phase I Study Area was conducted electronically via the Ontario Ministry of Natural Resources and Forestry (OMNRF) website as part of this assessment. A review of the available mapping information did not identify any ANSI sites situated on the Phase I Property or within the Phase I Study Area.

Technical Standards and Safety Authority (TSSA)

The TSSA Fuels Safety Branch in Toronto was contacted electronically as part of this assessment to inquire about current and former fuel storage tanks, spills, and historical incidents for the Phase I Property as well as the neighbouring properties within the Phase I Study Area. The response from the TSSA indicated that no records were identified associated with the Phase I Property, and no pertinent records were identified in the neighbouring addresses searched within the Phase I Study Area.

A copy of the correspondence with the TSSA has been appended to this report.

City of Ottawa HLUI

As part of the 2020 Phase I ESA, a request was submitted to the City of Ottawa for information from the Historical Land Use Inventory (HLUI) database for any environmental records pertaining to the Phase I Property as well as any properties situated within the Phase I Study Area. The response from the City identified one historical on-site activity, specifically the use of the Phase I Property as an MOE registered waste disposal site, Site X1102. However, based on the MOE waste disposal inventory, the former waste site identified was situated off Glebe Avenue, west of Bank Street. This waste disposal site was identified in error and does not apply to the Phase I Property. A copy of the original HLUI response is appended to this report.

No other former waste disposal sites or other HLUI activities were identified on the Phase I Property or on properties within the Phase I Study Area, with the exception of the known disposal of road building material waste (gravel, limited concrete and asphalt) on the Phase I Property.

ERIS Database Report

A database report, prepared by ERIS (Environmental Risk Information Services Ltd.), dated June 24, 2025, was acquired and reviewed as part of this assessment. This report provides a compilation of various provincial and federal environmental related records pertaining to any properties situated within the Phase I Study Area. The complete ERIS report has been included in the appendix of this report.

The ERIS report identified two (2) records pertaining to an Anderson Waste Disposal Site and Waste Disposal Sites – MOE 1991 Historical Approval Inventory records for the Phase I Property. As discussed in the Previous Reports section, CRA in 2008 concluded that the designation of a former waste disposal site on the Phase I Property was an error.

The ERIS report identified three (3) records pertaining to Environmental Registry and Environmental Compliance Approval on the Phase I Property. The records were limited to municipal and private sewage works and are not considered to represent a potentially contaminating activity (PCA) on the Phase I Property.

The ERIS report identified a total of 11 records for properties within the 250 m radius of the Phase I Property (2 of which are previous ERIS searches), as detailed below:

The ERIS report identified 1 Waste Generator record for properties within 250 m of the Phase I Property. The record was associated with the property addressed 300 Somme Street, located approximately 30m south of the Phase I Property, associated with the newly constructed Copart facility. The waste classes identified in the record pertain to waste oil and lubricants. Based on its cross-gradient orientation, this property poses no potential environmental concern to the Phase I Property.

The ERIS report identified one (1) record pertaining to an Environmental Compliance Approval record associated with the property addressed 300 Somme Street, located approximately 30m south of the Phase I Property. This record was limited to industrial sewage works and is not considered to represent a potentially contaminating activity (PCA) on the Phase I Property.

The ERIS report identified 6 well records within the Phase I Study Area, which are further discussed in the MECP Water Well Records section of this report.

Aerial Photographs

The latest aerial photograph reviewed as part of the original Phase I ESA was from 2019. A 2022 and 2024 aerial photograph were reviewed for this update. In the 2022 aerial photograph, the subject property is undergoing the initial stages of site development. The neighbouring properties to the south were also observed to be undergoing the initial stages of site development. In the 2024 aerial photograph, the subject property is observed to have a large gravel pad on the western half of the property. The neighbouring properties to the south have been developed with a large automotive auctioning facility, mainly used for parking.

No potentially contaminating activities were identified on the Phase I Property or adjacent lands during the aerial photo review.

Well Records

A search of the MECPs website for all drilled well records within a 250 m radius of the Phase I Property was conducted as part of this assessment. Five (5) well records were identified for the Phase I Property. The records identified on the Phase I Property pertain to wells installed between 2008 and 2022 and have been used for groundwater observation purposes

The search identified six (6) monitoring well records within the Phase I Study Area. These records pertain to wells installed between 1950 and 2021 and were used for water supply and groundwater observation purposes.

According to the well records, the subsurface stratigraphy in the general area of the Phase I Property consists of fill material overlying glacial till. Fill material generally consisted of silty sand to sandy silt with clay and gravel. Bedrock was not encountered in the wells.

A copy of the water well records are appended to this report.

Property Owner Representative Interview

As part of the previous investigation, Mr. Craig Bellinger of R.W. Tomlinson, a representative of the former owner of the property was interviewed. Mr. Bellinger stated that R.W. Tomlinson have owned the property for more than 35 years, during which, it has remained undeveloped. From the 1990s to 2014, R.W. Tomlinson have used the property to dispose of waste road building materials, approved by the MOE in 1992. Since 2014, the property has been vacant and unutilized land. The site was acquired by a new landowner in 2020, Fastrate (Ottawa) Holdings Inc.

At the time of the previous update, Mr. Pierre Courteau of CBRE Ltd., acting on behalf of the property owners was interviewed. Mr. Courteau stated that nothing had changed to the property since its acquisition in 2020, with the exception of some minor earthworks, such as site grading and compaction.

Based on our knowledge of the site and the lack of activity on-site since the previous interview, an updated interview was not considered likely to provide any additional information and was not completed as part of this report.

Site Reconnaissance

A site visit was conducted for the Phase I Property on June 11, 2025. Weather conditions were sunny, with a temperature of approximately 24°C. Mr. Grant Paterson from the Environmental Department of Paterson Group conducted the site assessment. In addition to the site, the uses of neighbouring properties within the Phase I Study Area were also assessed at the time of the site visit.

Site Description

The Phase I Property is an undeveloped vacant lot with a large gravel pad on the western portion of the subject property. The remainder of the Phase I Property is occupied by grassed areas with some small piles of waste road building materials.

The site topography is relatively flat and at grade with neighbouring properties, while the regional topography gently slopes downward to the southeast. The Phase I Property is situated in an area where private wells and septic systems are relied upon.

Site drainage consists of infiltration throughout the property. No ponded water, stressed vegetation, or any other indication of potential subsurface contamination were observed at the time of the site inspection. No new potentially contaminating activities were identified on the Phase I Property, at the time of the site visit.

A depiction of the Phase I Property is illustrated on Drawing PE7096-1 – Site Plan, appended to this report.

Neighbouring Properties

A visual inspection of the neighbouring properties was conducted from publicly accessible roadways at the time of the site inspection. Land use adjacent to the subject site was recorded as follows:

North:	Rideau Road, followed by vacant land;
East:	Vacant land, followed by agricultural land;
West:	Somme Street, followed by vacant parcel of land;
South:	Somme Street, followed by Copart vehicle auctioning and vehicle storage yard.

No environmental concerns were identified with respect to the current use of the neighbouring properties.

The neighbouring land use within the Phase I Study Area is illustrated on Drawing PE7096-2 – Surrounding Land Use Plan, appended to this report.

Review and Evaluation of Information

Land Use History

Based on a review of available historical information, the Phase I Property has historically been vacant land and never officially developed.

Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available mapping information, bedrock in the area of the site consists of sandstone of the Nepean Formation. Overburden soils reportedly consist of a combination of sand, reworked glaciofluvial deposit and organic deposits, with a drift thickness ranging from 0 to 2 m.

Fill Placement

Based on the historical review in combination with the site visit and the previous Phase II ESA, the subject land was used for fill placement from 2002 to 2014. The unknown quality of the fill material imported on site represents an APEC on the Phase I Property.

Existing Buildings and Structures

No buildings or structures are present on the Phase I Property.

Drinking Water Wells

One potable water well is present on the Phase II Property.

Subsurface Structures and Utilities

No subsurface structures or utilities are expected to be present on the Phase I Property.

Water Bodies and Areas of Natural and Scientific Interest

No areas of natural and scientific interest are present within the Phase I Study Area. The nearest named water body with respect to the Phase I Property is a tributary of the North Castor River, located approximately 330m to the southeast.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of industrial properties, agricultural or vacant lands. Current land use is shown on Drawing PE7096-2 – Surrounding Land Use Plan.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

Based on the findings of this Phase I ESA Update, one on-site PCA was considered to result in an APEC. This APEC is summarized in Table 1, along with its respective location and contaminants of potential concern (CPCs) on the Phase I Property.

Table 1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Resulting from fill material of unknown quality	Across the Phase I Property	PCA 30 – "*Importation of Fill Material of Unknown Quality*"	On-site	VOCs PHCs PAHs Metals EC and SAR	Soil Groundwater

Contaminants of Potential Concern

As per the identified APEC in Table 1, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

- ❑ Volatile organic compounds (VOCs)
- ❑ Petroleum hydrocarbons (PHCs, Fractions F1-F4)
- ❑ Polycyclic aromatic hydrocarbons (PAHs)
- ❑ Metals
- ❑ Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)

The CPCs are expected to be present in the soil and/or groundwater of the Phase I Property.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA Update is considered to be sufficient to conclude that there is an on site PCA that has resulted in an APEC on the Phase I Property. A variety of independent sources were consulted as part of this assessment, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

Conclusion

A review of more recent environmental records, in conjunction with a visual inspection of the property, generally confirmed the information and findings contained in the 2022 Phase I ESA report completed by Paterson. Since that time, the Phase I Property has remained unchanged, and no new potential environmental concerns were identified with respect to the use of the site or the neighbouring properties, however, the current Phase I Property includes some additional lands. As a result, it is our opinion that **a Phase II – Environmental Site Assessment Update is required for the Phase I Property** for site plan application purposes.

Statement of Limitations

This Phase I – Environmental Site Assessment Update report has been prepared in general accordance with O. Reg. 153/04, as amended, and CSA Z768-01 (reaffirmed 2022). The conclusions presented herein are based on information gathered from a limited historical review of readily available geological, historical, and regulatory information, as well as a cursory review made at the time of the field assessment. The historical research relies on information supplied by others, such as local, provincial, and federal agencies, and was limited within the scope-of-work, time, and budget of the project herein. Should any conditions be encountered at the site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of W.O. Stinson & Son Ltd. Permission and notification from the above noted party and Paterson will be required prior to the release of this report to any other party.

We trust that this submission satisfies your current requirements. Should you have any questions please contact the undersigned.

Regards,

Paterson Group Inc.



Joshua Dempsey, B.Sc.





Mark D'Arcy, P.Eng., QP$_{ESA}$

Attachments

- ❑ Figure 1 – Key Plan
- ❑ Figure 2 – Topographic Plan
- ❑ Aerial Photographs (c. 2022, 2024)
- ❑ Site Photographs (June 11, 2025)
- ❑ MEP FOI Response
- ❑ MECP Well Records
- ❑ TSSA Correspondence
- ❑ City of Ottawa HLUI Response – 2020
- ❑ ERIS Database Report
- ❑ Drawing PE7096-1 – Site Plan
- ❑ Drawing PE7096-2 – Surrounding Land Use Plan

Report Distribution

- ❑ W.O. Stinson & Son Ltd.
- ❑ Paterson Group Inc

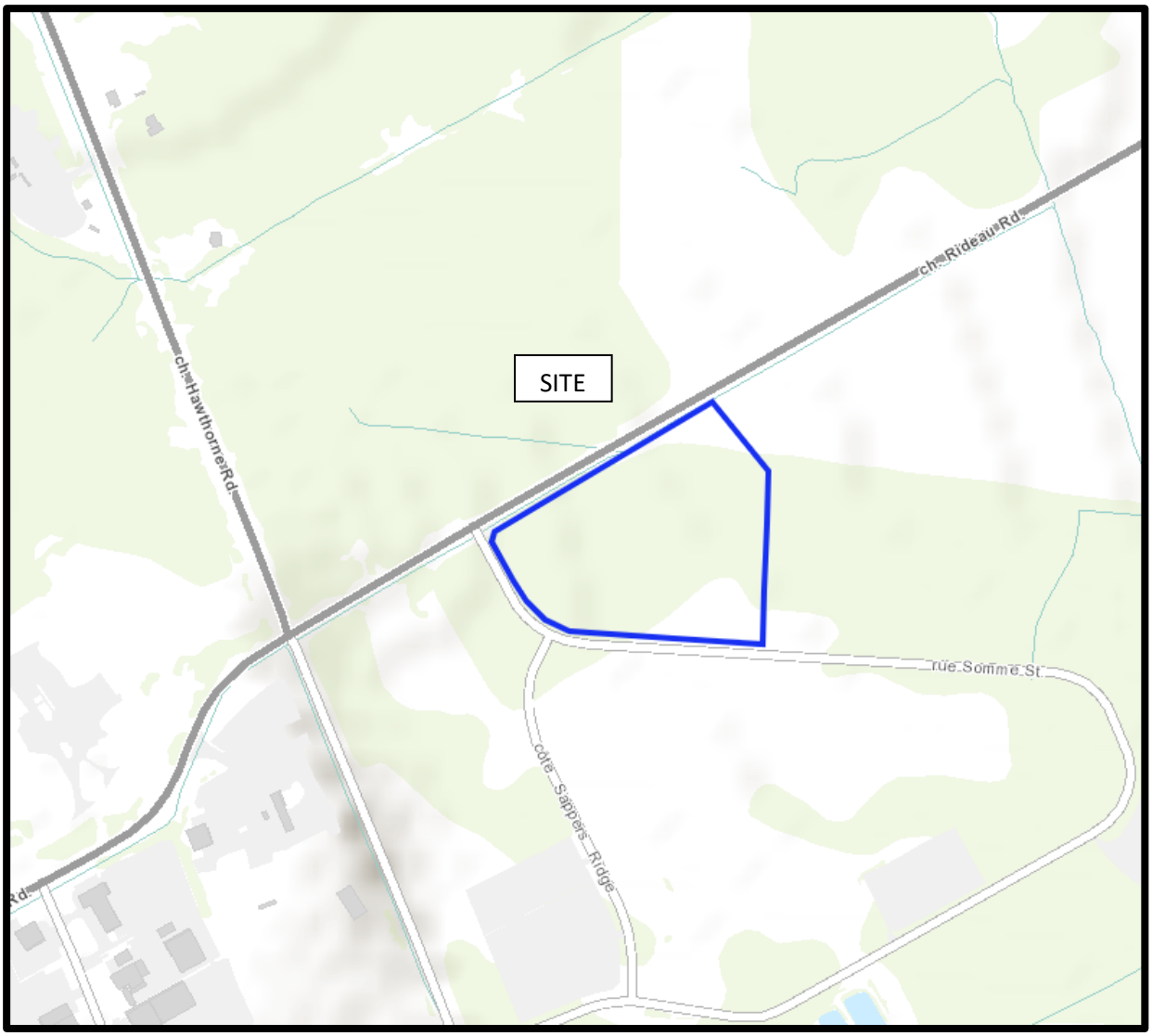


FIGURE 1

KEY PLAN

PATERSON GROUP

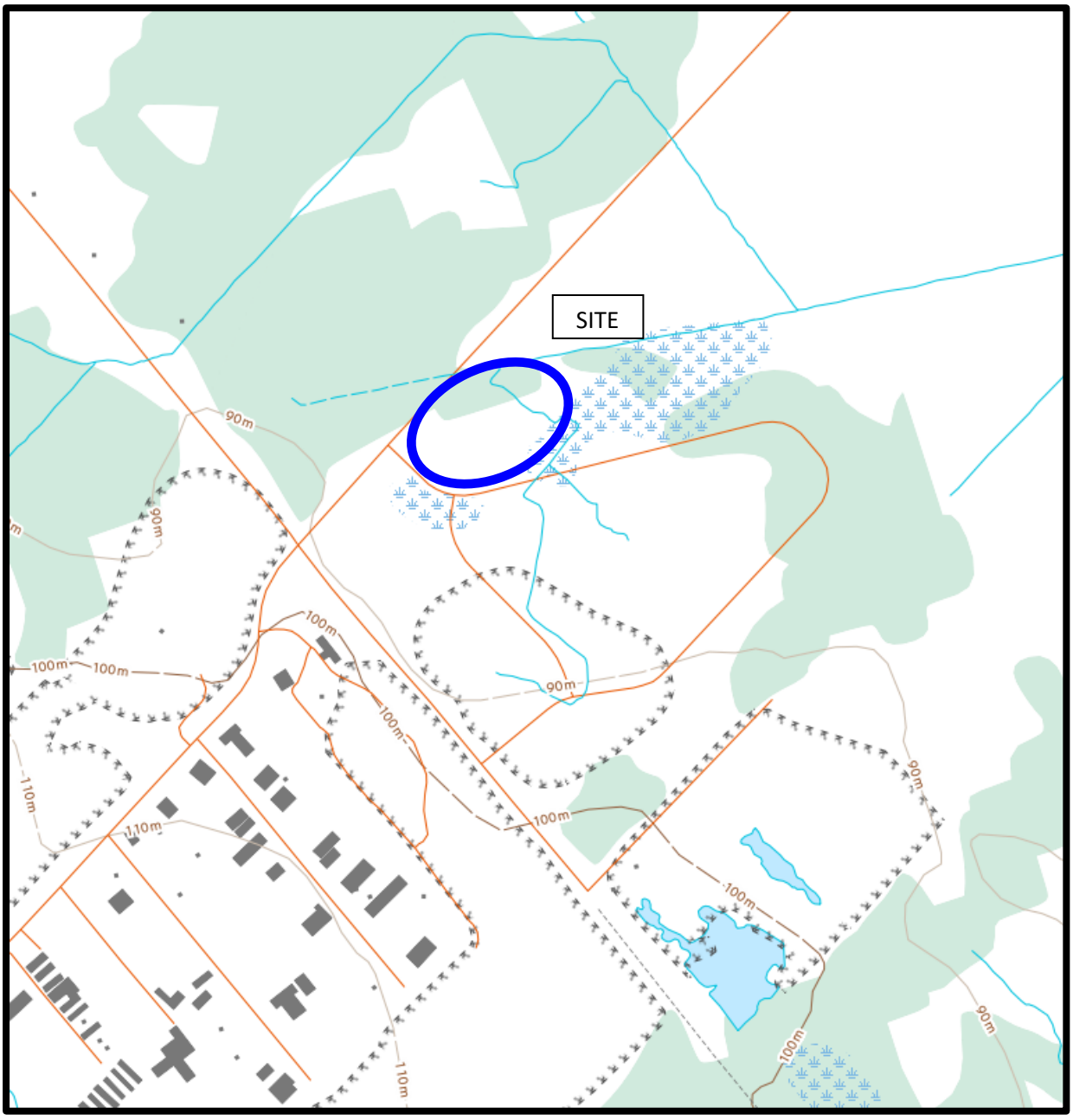


FIGURE 2

TOPOGRAPHIC MAP



AERIAL PHOTOGRAPH
2022

PATERSON GROUP



AERIAL PHOTOGRAPH
2024

PATERSON GROUP

Site Photographs

PE7096 301 Somme Street, Ottawa ON June 11, 2025



Photograph 1: View looking east, from the south side of the subject site.



Photograph 2: View looking west, from the center of the subject site.

Site Photographs

PE7096 301 Somme Street, Ottawa ON June 11, 2025



Photograph 3: View looking south, from within the subject site.



Photograph 4: View looking north, from within the subject site.

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity: CONVERTUS CANADA LTD.
Inspection Start Date: March 29, 2022
Inspection End Date: March 29, 2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE

The following item(s) have been identified as non-compliance, based on a "No" response captured for a legislative question(s). For additional information on each question see the Inspection Details section of the report.

Ministry Program: WASTE | **Regulated Activity:** Landfills

Item	Question	Compliance Response/Corrective Action(s)
NC-1	**Question ID:** NOL 3 Does the holder of the landfill ECA own the entire site?	No

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Landfills

Question ID	NOL 1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the Open landfill site have an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility has an ECA #2766-7HEPSZ

Question ID	NOL 3	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 3;

Question:
Does the holder of the landfill ECA own the entire site?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

The facility is a tenant on the property upon which the facility operates.

Question ID	NOL 2	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is this landfill on Crown land?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 4	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the landfill have a Contaminant Attenuation Zone (CAZ)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

This unique waste disposal site does not require a CAZ as material is not permanently land applied. The waste brought to the site is processed and then removed from the site. Conditions in the ECA are included to ensure that the Site is operated and maintained in an environmentally acceptable manner which does not result in a negative impact on the natural environment or any person.

Question ID	NOL 11	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 5;

Question:
Has the holder of the ECA notified the Director in writing within 30 days of a change in holder's status, identity, ownership, or CAZ property rights?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 12	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have a large enough Buffer Area as specified in the ECA or Regulation 232/98?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility is a "Processing" waste disposal site for the temporary storage, transfer, and processing of solid non-hazardous waste.

Question ID	NOL 13	**Question Type**	Information

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

During the inspection, access roads were clear, well organized, and had sufficient space.

Question ID	NOL 14	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is site access limited to times when an attendant is on duty?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility complies with the hours set in their ECA, and an attendant is always available.

Question ID	NOL 15	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the site only receive waste from within its approved service area?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The service area is limited to the Province of Quebec and Ontario.

Question ID	NOL 16	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to have a ground water monitoring program by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 18	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 25;

Question:
Are monitoring well samples taken and tested to determine the quality of the ground water?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The samples are collected not as a condition of this waste ECA, but rather as a condition of the facility's sewage works ECA.

Question ID	NOL 20	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there ongoing abatement to address any concerns the ministry has with the ground water monitoring?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Abatement is undergoing under the sewage works ECA #2844-9YNGZC, not this waste ECA.

Question ID	NOL 21	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to manage leachate by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 25	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there ongoing abatement to address any concerns the ministry has with the leachate monitoring?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 26	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to manage landfill gas by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 30	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there ongoing abatement to address any concerns the ministry has with landfill gas at this site?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 31	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to have a surface water monitoring program by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 36	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is proper equipment available for the compaction of waste and applying cover material?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 37	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill able to accurately determine the amount of waste received?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The mass balance for the 2021operating year was reviewed. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in the ECA.

Question ID	NOL 38	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are all disposal operations at the site adequately and continually supervised?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Trained personnel inspect the loads and supervise the unloading of waste at the facility. Where waste is deemed to not be acceptable, there is a procedure in place to reject that waste load.

Question ID	NOL 39	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the landfill operator have a site inspection program as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Trained personnel conduct routine inspections and ensure that any identified deficiencies are promptly corrected.

Question ID	NOL 40	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill operator have a procedure in place to address issues identified by staff

during the site inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 43	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are procedures implemented to control rodents or other animals and insects at the site?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 44	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is site access restricted by use of a gate, fence, or physical barrier when the site is not operating?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 45	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the waste disposal area adequately screened from public view?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 46	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 21;

Question:
Are daily records of site operations available at the site for at least the past 2 years or as otherwise required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 47	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the annual operations report been submitted to MECP or available on site as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 48	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 23;

Question:
Is scavenging being prevented?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 51	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill only accepting the types of waste that they are approved to receive?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:
(a) Source-separated Organic Waste limited to the following:
(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The annual reports confirm that the Facility is in compliance with Condition 2(1) by only accepting
waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA.

No hazardous waste is being received at the site.

Question ID	NOL 52	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the landfill have a waste refusal procedure in place to manage waste that arrives at the site that the site is not approved the accept?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

There was one rejected load on February 11, 2021. The rejected material was sent to landfill for disposal. MECP was notified.

Question ID	NOL 53	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
is the waste refusal procedure being followed?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 54	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have a procedure in place to address and document spills and fires?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 55	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have emergency contingency plan as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility's Emergency Response and Contingency Plan for Spills, Odours, Process Upsets, Fires, Power Failure, and Labour disruptions is in place and in effect.

Question ID	NOL 56	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there an ECA condition requiring financial assurance?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 57	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the financial assurance been submitted, as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 59	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have a procedure in place to address complaints?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility conducted an odour investigation as a result of a complaint on July 24, 2021. The facility response process was effective.

Question ID	NOL 58	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the company provided financial assurance re-evaluation estimates in compliance with the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 61	Question Type	Information

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the landfill operator developed a Design and Operations Manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 62	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the Design and Operations Manual up to date?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 63	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill operator have training procedures for site personnel?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 64	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill operator following the established training procedures?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	949100	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Question ID	NOL 60	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the landfill operator addressed the complaints to the satisfaction of the ministry?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Ontario

Convertus Ottawa Processing Facility
5123 HAWTHORNE RD, OTTAWA, ON, K0A 1V0

Inspection Report

System Number:
Entity: CONVERTUS CANADA LTD.
Inspection Start Date: 03/29/2022
Inspection End Date: 03/29/2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Operations

Question ID	NOL 3	**Question Type**	Legislative
Question: Does the holder of the landfill ECA own the entire site?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 3;		
Observation/Corrective Action(s)			
No The facility is a tenant on the property upon which the facility operates.			

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Landfills

Question ID	NOL 1	**Question Type**	Legislative
Question: Does the Open landfill site have an Environmental Compliance Approval (ECA)?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The facility has an ECA #2766-7HEPSZ			

Question ID	NOL 3	**Question Type**	Legislative
Question: Does the holder of the landfill ECA own the entire site?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 3;		
Observation			
No The facility is a tenant on the property upon which the facility operates.			

Question ID	NOL 2	**Question Type**	Information
Question: Is this landfill on Crown land?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 4	**Question Type**	Information
Question: Does the landfill have a Contaminant Attenuation Zone (CAZ)?			
Legislative Requirement	Not Applicable		

Observation
No This unique waste disposal site does not require a CAZ as material is not permanently land applied. The waste brought to the site is processed and then removed from the site. Conditions in the ECA are included to ensure that the Site is operated and maintained in an environmentally acceptable manner which does not result in a negative impact on the natural environment or any person.

Question ID	NOL 11	Question Type	Legislative
Question: Has the holder of the ECA notified the Director in writing within 30 days of a change in holder's status, identity, ownership, or CAZ property rights?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 5;		
Observation			
Yes			

Question ID	NOL 12	Question Type	Legislative
Question: Does the landfill have a large enough Buffer Area as specified in the ECA or Regulation 232/98?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The facility is a "Processing" waste disposal site for the temporary storage, transfer, and processing of solid non-hazardous waste.			

Question ID	NOL 13	Question Type	Information
Question: Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes During the inspection, access roads were clear, well organized, and had sufficient space.			

Question ID	NOL 14	Question Type	Legislative
Question: Is site access limited to times when an attendant is on duty?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The facility complies with the hours set in their ECA, and an attendant is always available.			

Question ID	NOL 15	Question Type	Legislative
Question: Does the site only receive waste from within its approved service area?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The service area is limited to the Province of Quebec and Ontario.			

Question ID	NOL 16	Question Type	Information
Question: Is the site required to have a ground water monitoring program by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 18	Question Type	Legislative
Question: Are monitoring well samples taken and tested to determine the quality of the ground water?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 25;		
Observation			
Yes The samples are collected not as a condition of this waste ECA, but rather as a condition of the facility's sewage works ECA.			

Question ID	NOL 20	Question Type	Information
Question: Is there ongoing abatement to address any concerns the ministry has with the ground water monitoring?			
Legislative Requirement	Not Applicable		
Observation			
Yes Abatement is undergoing under the sewage works ECA #2844-9YNGZC, not this waste ECA.			

Question ID	NOL 21	Question Type	Information
Question: Is the site required to manage leachate by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 25	Question Type	Information
Question: Is there ongoing abatement to address any concerns the ministry has with the leachate monitoring?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 26	Question Type	Information
Question: Is the site required to manage landfill gas by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 30	Question Type	Information
Question: Is there ongoing abatement to address any concerns the ministry has with landfill gas at this site?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 31	Question Type	Information
Question: Is the site required to have a surface water monitoring program by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
No			

Question ID	NOL 36	Question Type	Legislative
Question: Is proper equipment available for the compaction of waste and applying cover material?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 37	Question Type	Legislative
Question: Is the landfill able to accurately determine the amount of waste received?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The mass balance for the 2021operating year was reviewed. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in the ECA.			

Question ID	NOL 38	Question Type	Legislative
Question: Are all disposal operations at the site adequately and continually supervised?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes Trained personnel inspect the loads and supervise the unloading of waste at the facility. Where waste is deemed to not be acceptable, there is a procedure in place to reject that waste load.			

Question ID	NOL 39	Question Type	Information
Question: Does the landfill operator have a site inspection program as required by the ECA?			
Legislative Requirement	Not Applicable		
Observation			
Yes Trained personnel conduct routine inspections and ensure that any identified deficiencies are promptly corrected.			

Question ID	NOL 40	Question Type	Legislative
Question: Does the landfill operator have a procedure in place to address issues identified by staff during the site inspection?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 43	Question Type	Legislative
Question: Are procedures implemented to control rodents or other animals and insects at the site?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 44	Question Type	Legislative
Question: Is site access restricted by use of a gate, fence, or physical barrier when the site is not operating?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 45	Question Type	Legislative
Question: Is the waste disposal area adequately screened from public view?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 46	Question Type	Legislative
Question: Are daily records of site operations available at the site for at least the past 2 years or as otherwise required by the ECA?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 21;		
Observation			
Yes			

Question ID	NOL 47	Question Type	Legislative
Question: Has the annual operations report been submitted to MECP or available on site as required by the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 48	Question Type	Legislative
Question: Is scavenging being prevented?			
Legislative Requirement	EPA | 27 | (1); EPA | O. Reg. 232/98 | 23;		
Observation			
Yes			

Question ID	NOL 51	Question Type	Legislative
Question: Is the landfill only accepting the types of waste that they are approved to receive?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste: (a) Source-separated Organic Waste limited to the following: (i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters; (ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials; (iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding. (b) Organic Waste from the food processing industry and other industries that produce food wastes; (c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes; (d) Leaf & yard waste; (e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids. The annual reports confirm that the Facility is in compliance with Condition 2(1) by only accepting waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA. No hazardous waste is being received at the site.			

Question ID	NOL 52	**Question Type**	Information
Question: Does the landfill have a waste refusal procedure in place to manage waste that arrives at the site that the site is not approved the accept?			
Legislative Requirement	Not Applicable		
Observation			
Yes There was one rejected load on February 11, 2021. The rejected material was sent to landfill for disposal. MECP was notified.			

Question ID	NOL 53	**Question Type**	Legislative
Question: is the waste refusal procedure being followed?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 54	**Question Type**	Legislative
Question: Does the landfill have a procedure in place to address and document spills and fires?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 55	**Question Type**	Legislative
Question: Does the landfill have emergency contingency plan as required by the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The facility's Emergency Response and Contingency Plan for Spills, Odours, Process			

Upsets, Fires, Power Failure, and Labour disruptions is in place and in effect.

Question ID	NOL 56	**Question Type**	Information
Question: Is there an ECA condition requiring financial assurance?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 57	**Question Type**	Legislative
Question: Has the financial assurance been submitted, as specified in the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 59	**Question Type**	Legislative
Question: Does the landfill have a procedure in place to address complaints?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes The facility conducted an odour investigation as a result of a complaint on July 24, 2021. The facility response process was effective.			

Question ID	NOL 58	**Question Type**	Legislative
Question: Has the company provided financial assurance re-evaluation estimates in compliance with the ECA?			
Legislative Requirement	EPA | 27 | (1);		
Observation			

Yes

Question ID	NOL 61	Question Type	Information
Question: Has the landfill operator developed a Design and Operations Manual?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 62	Question Type	Information
Question: Is the Design and Operations Manual up to date?			
Legislative Requirement	Not Applicable		
Observation			
Yes			

Question ID	NOL 63	Question Type	Legislative
Question: Does the landfill operator have training procedures for site personnel?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	NOL 64	Question Type	Legislative
Question: Is the landfill operator following the established training procedures?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Question ID	949100	Question Type	Legislative
Question: Were the inspection questions sufficient to address other identified non-compliance items?			
Legislative Requirement	Not Applicable		
Observation			

Question ID	NOL 60	Question Type	Legislative
Question: Has the landfill operator addressed the complaints to the satisfaction of the ministry?			
Legislative Requirement	EPA | 27 | (1);		
Observation			
Yes			

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity: CONVERTUS CANADA LTD.
Inspection Start Date: March 29, 2022
Inspection End Date: March 29, 2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE

The following item(s) have been identified as non-compliance, based on a "No" response captured for a legislative question(s). For additional information on each question see the Inspection Details section of the report.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Item	Question	Compliance Response/Corrective Action(s)
NC-1	**Question ID:** WW_IMPAIRMENT_200000 Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?	No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Question ID	CQ_PREV_NON_COMPLIANCE_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Have there been any required or recommended actions as a result of non-compliance identified during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There were no required or recommended actions as a result of a previous inspection.

The Ministry of the Environment, Conservation and Parks previously conducted an Industrial Sewage Works inspection at Convertus Canada on February 27, 2020 to assess compliance with issued Environmental Compliance Approval No. 2844-9YNGZC. No Compliance issues were identified.

Question ID	CQ_COMPLAINTS_100000	**Question Type**	BMP

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have documented procedures for receiving, recording and responding to public complaints?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has adequate documented procedures for receiving, recording, and responding to public complaints.

Question ID	CQ_COMPLAINTS_200000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any complaints received by the site or ministry regarding the operations of the sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Complaints applicable to the sewage works were not received since the last inspection.

Question ID	WW_APPROVAL_100000	Question Type	Information

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is an Environmental Compliance Approval (ECA) required for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is subject to the ECA requirement.

Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC
- issued February 1, 2017

Question ID	WW_APPROVAL_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Do all sewage works currently being inspected have a valid Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There is currently a valid ECA for the sewage works.

Question ID	WW_APPROVAL_111000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is the sewage works constructed in accordance with the Environmental Compliance Approval

(ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works is currently constructed in accordance with the ECA.

On site observations confirm that the sewage works is constructed in accordance with the ECA. Stormwater is collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Question ID	WW_FINANCIAL_ASSURANCE_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there existing Financial Assurance for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This site may require FA and does not have any at this time.

Question ID	WW_RECORDS_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to keep records associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has record keeping requirements.

Condition 5(5) of the ECA requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2. Condition 10 requires these records to be available to

Ministry staff. Records were available.

Question ID	WW_RECORDS_110000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Were all records kept as required during this inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All record keeping requirements were met during the inspection period.

Question ID	WW_REPORTS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to create any reports associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is required to create reports.

The owner shall prepare a performance report on an annual basis, following the end of the reporting period.

Question ID	WW_REPORTS_110000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been prepared as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been prepared as required.

Question ID	WW_REPORTS_120000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted to the ministry if required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted to the ministry as required.

Question ID	WW_REPORTS_121000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted on time?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted on time

To date, every report has been submitted on time.

Question ID	WW_SPCP_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This facility is not currently subject to O. Reg 224/07.

he Facility is not required under Ontario Regulation 227/07 to develop a Sills Prevention and Contingency Plan.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations.

Question ID	WW_SPCP_110000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Has the SPCP been developed as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The Spill Prevention and Contingency Plan has been developed

Question ID	WW_SPCP_111000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Has the SPCP been implemented?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The Spill Prevention and Contingency Plan has been implemented as required

Question ID	WW_SPCP_112000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Does the SPCP contain all the required information as outlined in the Regulation?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP contains all required information

Question ID	WW_SPCP_114000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Is the SPCP retained and available at the facility?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP is retained at the facility as required

Question ID	WW_SPCP_115000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Is a SPCP summary available upon request?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: A SPCP summary was available upon request

Question ID	WW_SPCP_117000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Is the annual written statement about the effectiveness of the SPCP held and retained for five years?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: An annual written statement about the effectiveness of the SPCP has been held and retained for five years

Question ID	WW_SPCP_118000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Are spill response records for reportable and/or non-reportable spills retained for five years, as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Spill response records for reportable and/or non-reportable spills have been retained for five years, or as required

Question ID	WW_SPCP_119000	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Has each portion of the facility's operations been tested at least once during a five-year period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Each portion of the facility's operations has been tested at least once during a five-year period, or as required

Question ID	WW_OPERATIONS_MAINTENANCE_000000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This facility is required to have an operations and maintenance manual.

Required by condition 5.

Question ID	WW_OPERATIONS_MAINTENANCE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has an operations and maintenance manual.

Question ID	WW_OPERATIONS_MAINTENANCE_110000	Question Type	BMP

Legislative Requirement(s):
Not Applicable

Question:
Does the operations and maintenance manual meet any specified requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The operations and maintenance manual meets specified requirements.

Question ID	WW_OPERATIONS_MAINTENANCE_200000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is all equipment maintained as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All equipment has been maintained as required.

Question ID	WW_OPERATIONS_MAINTENANCE_400000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Has all equipment been calibrated as required (other than flow meters)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All equipment had been calibrated as required.

Question ID	WW_FLOW_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to monitor flow at this site?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There is a requirement to monitor flow at this site.

Question ID	WW_FLOW_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all flow monitoring requirements been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Flow monitoring requirements have been met.

Condition 4 of the ECA outlines the requirements for the Facility to conduct monitoring on a monthly basis, the water quality of the Stormwater Management Pond.
The facility has also complied with Condition 5 for monitoring requirements - set out in table 2 of the ECA - prior to discharge from the storm water management pond to the natural environment.

The facility is in compliance with the ongoing monitoring requirements to date.

Question ID	WW_CAPACITY_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the sewage works have a defined design capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has a defined design capacity.

Question ID	WW_CAPACITY_110000	**Question Type**	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the sewage works operate within design capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operate within design capacity.

Question ID	WW_CAPACITY_210000	**Question Type**	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Has the sewage works operated within its listed peak flow rate during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operated within its peak flow rate during the inspection period.

Question ID	WW_SOILS_SLUDGE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any biosolids and/or sludge generated by the sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Biosolids and/or sludge are not generated by the sewage works.

Question ID	WW_ENVIRONMENTAL_MONITORING_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there any monitoring well(s) on site related to the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There are monitoring wells onsite related to the sewage works.

Question ID	WW_ENVIRONMENTAL_MONITORING_110000	Question Type	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Are monitoring well(s) maintained in a manner sufficient to prevent the entry of surface water and other foreign materials?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Monitoring wells on site are maintained in a manner sufficient to prevent the entry of surface water and other foreign materials.

Question ID	WW_ENVIRONMENTAL_MONITORING_200000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there any additional monitoring locations (other than effluent, flow or biosolids/sludge) on

site related to the sewage works? (eg influent, surface water)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There are additional monitoring locations onsite related to the sewage works.

The additional monitoring wells are for groundwater monitoring.

Question ID	WW_ENVIRONMENTAL_MONITORING_210000	**Question Type**	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Has monitoring been conducted at all additional locations (other than effluent, flow or biosolids/sludge) as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Monitoring at additional locations has been conducted as required.

Question ID	WW_SPILLS_100000	**Question Type**	BMP

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the facility have appropriate contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility does have contingency plans and procedures for dealing with abnormal situations.

These contingency plans were reviewed during inspection.

Question ID	WW_SPILLS_200000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the facility had any spills during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: The facility has not had spills during the inspection period.

Question ID	WW_SAMPLING_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have sampling requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has sampling requirements.

Sampling is a requirement for both surface water and groundwater. The facility has complied with all sampling requirements.

Condition 4. SURFACE WATER MONITORING AND RECORDING
(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the SWM Pond at a monthly frequency and analyzed for the following parameters listed in Table 1.

The monthly samples were collected by the Facility and sent for analysis for the parameters listed in Table 1 - Effluent Monitoring SWM Pond.

Condition 9 of the ECA outlines the requirement for the Facility to implement the groundwater monitoring program for the unconfined shallow aquifer and deep bedrock aquifer. As part of the ECA requirements, the Facility must complete an annual report outlining the completion of the groundwater monitoring program and the findings of the program of the operating year.

MECP is still awaiting the 2021 Groundwater and Surface Water Monitoring Report. Once it is received it will be reviewed. During the inspection, it was identified that there is an increase in ammonia concentrations within the groundwater. Once the annual report is received and reviewed, the Ministry will determine what actions are required to address the increased ammonia levels.

Question ID	WW_SAMPLING_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with all sampling requirements since during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has complied with all sampling requirements during the inspection period.

Question ID	WW_AUDIT_SAMPLE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Were Ministry audit samples collected during this inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Audit samples were not collected during this inspection.

Question ID	WW_LIMITS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have effluent limits set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has effluent limits set by an ECA.

The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the SWM Pond at a monthly frequency and analyzed for the parameters listed in Table 1 of the ECA.

Question ID	WW_LIMITS_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all effluent limits set by the Environmental Compliance Approval (ECA) been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All effluent limits set by an ECA have been met.

Question ID	WW_OBJECTIVES_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have effluent objectives set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This sewage works does not have effluent objectives set by an ECA.

Question ID	WW_LIMITS_400000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have limits somewhere other than the effluent discharge (e.g., raw sewage, groundwater)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has limits in locations other than the effluent discharge.

The facility has groundwater monitoring requirements or trigger levels that must be adhered to. The facility has adhered to these trigger level monitoring requirements.

Question ID	WW_LIMITS_410000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have limits at locations other than the effluent discharge been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All applicable limits have been met.

Question ID	WW_IMPAIRMENT_100000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 30 | (1);

Question:
Were there no indications of a known or anticipated human health impact during the inspection and/or review of relevant material ?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There were no indications of a known or anticipated human health impact associated with the operation of the sewage works.

Question ID	WW_IMPAIRMENT_200000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 30 | (1);

Question:
Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

It was discussed that the ammonia concentration in the shallow groundwater aquifer has increased. This indicates the potential for an onsite ammonia source. Upon receipt of the 2021 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.

Question ID	949100	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Ontario

Convertus Ottawa Processing Facility
5123 HAWTHORNE RD, OTTAWA, ON, K0A 1V0

Inspection Report

System Number:
Entity: CONVERTUS CANADA LTD.
Inspection Start Date: 03/29/2022
Inspection End Date: 03/29/2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

The following item(s) have been identified as non-compliance/non-conformance, based on a "No" response captured for a legislative or best management practice (BMP) question (s), respectively.

Question Group: Water Quality Assessment

Question ID	WW_IMPAIRMENT_200000	**Question Type**	Legislative
Question: Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?			
Legislative Requirement	OWRA | 30 | (1);		
Observation/Corrective Action(s)			
No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works. It was discussed that the ammonia concentration in the shallow groundwater aquifer has increased. This indicates the potential for an onsite ammonia source. Upon receipt of the 2021 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.			

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Question ID	CQ_PREV_NON_COMPLIANCE_100000	**Question Type**	Information
Question: Have there been any required or recommended actions as a result of non-compliance identified during the inspection period?			
Legislative Requirement	Not Applicable		
Observation			
No: There were no required or recommended actions as a result of a previous inspection. The Ministry of the Environment, Conservation and Parks previously conducted an Industrial Sewage Works inspection at Convertus Canada on February 27, 2020 to assess compliance with issued Environmental Compliance Approval No. 2844-9YNGZC. No Compliance issues were identified.			

Question ID	CQ_COMPLAINTS_100000	**Question Type**	BMP
Question: Does the facility have documented procedures for receiving, recording and responding to public complaints?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The facility has adequate documented procedures for receiving, recording, and responding to public complaints.			

Question ID	CQ_COMPLAINTS_200000	**Question Type**	Information
Question: Were there any complaints received by the site or ministry regarding the operations of the sewage works during the inspection period?			
Legislative Requirement	Not Applicable		
Observation			

No: Complaints applicable to the sewage works were not received since the last inspection.

Question ID	WW_APPROVAL_100000	**Question Type**	Information
Question: Is an Environmental Compliance Approval (ECA) required for this sewage works?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: This sewage works is subject to the ECA requirement. Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT - issued September 16, 2009 Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA - issued September 7, 2010 Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD - issued May 30, 2011 Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC - issued February 1, 2017			

Question ID	WW_APPROVAL_110000	**Question Type**	Legislative
Question: Do all sewage works currently being inspected have a valid Environmental Compliance Approval (ECA)?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: There is currently a valid ECA for the sewage works.			

Question ID	WW_APPROVAL_111000	**Question Type**	Legislative
Question: Is the sewage works constructed in accordance with the Environmental Compliance Approval (ECA)?			
Legislative Requirement	OWRA | 53 | (1);		

Observation
Yes: The sewage works is currently constructed in accordance with the ECA. On site observations confirm that the sewage works is constructed in accordance with the ECA. Stormwater is collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system. Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Question ID	WW_FINANCIAL_ASSURANCE_100000	Question Type	Information
Question: Is there existing Financial Assurance for this sewage works?			
Legislative Requirement	Not Applicable		
Observation			
No: This site may require FA and does not have any at this time.			

Question ID	WW_RECORDS_100000	Question Type	Information
Question: Is there a requirement to keep records associated with the sewage works?			
Legislative Requirement	Not Applicable		
Observation			
Yes: This sewage works has record keeping requirements. Condition 5(5) of the ECA requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2. Condition 10 requires these records to be available to Ministry staff. Records were available.			

Question ID	WW_RECORDS_110 000	Question Type	BMP
Question: Were all records kept as required during this inspection period?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All record keeping requirements were met during the inspection period.			

Question ID	WW_REPORTS_100 000	Question Type	Information
Question: Is there a requirement to create any reports associated with the sewage works?			
Legislative Requirement	Not Applicable		
Observation			
Yes: This sewage works is required to create reports. The owner shall prepare a performance report on an annual basis, following the end of the reporting period.			

Question ID	WW_REPORTS_110 000	Question Type	BMP
Question: Have all reports been prepared as required?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All reports have been prepared as required.			

Question ID	WW_REPORTS_120 000	Question Type	BMP
Question: Have all reports been submitted to the ministry if required?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All reports have been submitted to the ministry as required.			

Question ID	WW_REPORTS_121000	Question Type	BMP
Question: Have all reports been submitted on time?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All reports have been submitted on time To date, every report has been submitted on time.			

Question ID	WW_SPCP_100000	Question Type	Information
Question: Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?			
Legislative Requirement	Not Applicable		
Observation			
No: This facility is not currently subject to O. Reg 224/07. he Facility is not required under Ontario Regulation 227/07 to develop a Sills Prevention and Contingency Plan. As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response. At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations.			

Question ID	WW_SPCP_110000	Question Type	Legislative
Question: Has the SPCP been developed as required?			

Legislative Requirement	Not Applicable
Observation	
Yes: The Spill Prevention and Contingency Plan has been developed	

Question ID	WW_SPCP_111000	**Question Type**	Legislative
Question: Has the SPCP been implemented?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The Spill Prevention and Contingency Plan has been implemented as required			

Question ID	WW_SPCP_112000	**Question Type**	Legislative
Question: Does the SPCP contain all the required information as outlined in the Regulation?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The SPCP contains all required information			

Question ID	WW_SPCP_114000	**Question Type**	Legislative
Question: Is the SPCP retained and available at the facility?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The SPCP is retained at the facility as required			

Question ID	WW_SPCP_115000	**Question Type**	Legislative
Question: Is a SPCP summary available upon request?			
Legislative Requirement	Not Applicable		

Observation
Yes: A SPCP summary was available upon request

Question ID	WW_SPCP_117000	Question Type	Legislative
Question: Is the annual written statement about the effectiveness of the SPCP held and retained for five years?			
Legislative Requirement	Not Applicable		
Observation			
Yes: An annual written statement about the effectiveness of the SPCP has been held and retained for five years			

Question ID	WW_SPCP_118000	Question Type	Legislative
Question: Are spill response records for reportable and/or non-reportable spills retained for five years, as required?			
Legislative Requirement	Not Applicable		
Observation			
Yes: Spill response records for reportable and/or non-reportable spills have been retained for five years, or as required			

Question ID	WW_SPCP_119000	Question Type	Legislative
Question: Has each portion of the facility's operations been tested at least once during a five-year period?			
Legislative Requirement	Not Applicable		
Observation			
Yes: Each portion of the facility's operations has been tested at least once during a five-year period, or as required			

Question ID	WW_OPERATIONS_MAINTENANCE_000	Question Type	Information

	000		
Question: Is the facility required to have an operations and maintenance manual?			
Legislative Requirement	Not Applicable		
Observation			
Yes: This facility is required to have an operations and maintenance manual. Required by condition 5.			

Question ID	WW_OPERATIONS_MAINTENANCE_100000	**Question Type**	Information
Question: Does the facility have an operations and maintenance manual?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The facility has an operations and maintenance manual.			

Question ID	WW_OPERATIONS_MAINTENANCE_110000	**Question Type**	BMP
Question: Does the operations and maintenance manual meet any specified requirements?			
Legislative Requirement	Not Applicable		
Observation			
Yes: The operations and maintenance manual meets specified requirements.			

Question ID	WW_OPERATIONS_MAINTENANCE_200000	**Question Type**	BMP
Question: Is all equipment maintained as required?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			

Yes: All equipment has been maintained as required.

Question ID	WW_OPERATIONS_MAINTENANCE_400000	Question Type	BMP
Question: Has all equipment been calibrated as required (other than flow meters)?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All equipment had been calibrated as required.			

Question ID	WW_FLOW_100000	Question Type	Information
Question: Is there a requirement to monitor flow at this site?			
Legislative Requirement	Not Applicable		
Observation			
Yes: There is a requirement to monitor flow at this site.			

Question ID	WW_FLOW_110000	Question Type	Legislative
Question: Have all flow monitoring requirements been met?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: Flow monitoring requirements have been met. Condition 4 of the ECA outlines the requirements for the Facility to conduct monitoring on a monthly basis, the water quality of the Stormwater Management Pond. The facility has also complied with Condition 5 for monitoring requirements - set out in table 2 of the ECA - prior to discharge from the storm water management pond to the natural environment. The facility is in compliance with the ongoing monitoring requirements to date.			

Question ID	WW_CAPACITY_100000	Question Type	Information

Question: Does the sewage works have a defined design capacity?	
Legislative Requirement	Not Applicable
Observation	
Yes: The sewage works has a defined design capacity.	

Question ID	WW_CAPACITY_110000	**Question Type**	BMP
Question: Does the sewage works operate within design capacity?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: The sewage works operate within design capacity.			

Question ID	WW_CAPACITY_210000	**Question Type**	BMP
Question: Has the sewage works operated within its listed peak flow rate during the inspection period?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: The sewage works operated within its peak flow rate during the inspection period.			

Question ID	WW_SOILS_SLUDGE_100000	**Question Type**	Information
Question: Were there any biosolids and/or sludge generated by the sewage works during the inspection period?			
Legislative Requirement	Not Applicable		
Observation			
No: Biosolids and/or sludge are not generated by the sewage works.			

Question ID	WW_ENVIRONMENTAL_MONITORING_100000	Question Type	Information
Question: Are there any monitoring well(s) on site related to the sewage works?			
Legislative Requirement	Not Applicable		
Observation			
Yes: There are monitoring wells onsite related to the sewage works.			

Question ID	WW_ENVIRONMENTAL_MONITORING_110000	Question Type	BMP
Question: Are monitoring well(s) maintained in a manner sufficient to prevent the entry of surface water and other foreign materials?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: Monitoring wells on site are maintained in a manner sufficient to prevent the entry of surface water and other foreign materials.			

Question ID	WW_ENVIRONMENTAL_MONITORING_200000	Question Type	Information
Question: Are there any additional monitoring locations (other than effluent, flow or biosolids/sludge) on site related to the sewage works? (eg influent, surface water)?			
Legislative Requirement	Not Applicable		
Observation			
Yes: There are additional monitoring locations onsite related to the sewage works. The additional monitoring wells are for groundwater monitoring.			

Question ID	WW_ENVIRONMENTAL_MONITORING_210000	Question Type	BMP
Question:			

Has monitoring been conducted at all additional locations (other than effluent, flow or biosolids/sludge) as required?	
Legislative Requirement	OWRA | 53 | (1);
Observation	
Yes: Monitoring at additional locations has been conducted as required.	

Question ID	WW_SPILLS_100000	**Question Type**	BMP
Question: Does the facility have appropriate contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: The facility does have contingency plans and procedures for dealing with abnormal situations. These contingency plans were reviewed during inspection.			

Question ID	WW_SPILLS_200000	**Question Type**	Information
Question: Has the facility had any spills during the inspection period?			
Legislative Requirement	Not Applicable		
Observation			
No: The facility has not had spills during the inspection period.			

Question ID	WW_SAMPLING_100000	**Question Type**	Information
Question: Does this sewage works have sampling requirements?			
Legislative Requirement	Not Applicable		
Observation			
Yes: This sewage works has sampling requirements. Sampling is a requirement for both surface water and groundwater. The facility has complied with all sampling requirements. Condition 4. SURFACE WATER MONITORING AND RECORDING (1) The Owner shall, upon commencement of operation of the Works, carry out the			

following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the SWM Pond at a monthly frequency and analyzed for the following parameters listed in Table 1.

The monthly samples were collected by the Facility and sent for analysis for the parameters listed in Table 1 - Effluent Monitoring SWM Pond.

Condition 9 of the ECA outlines the requirement for the Facility to implement the groundwater monitoring program for the unconfined shallow aquifer and deep bedrock aquifer. As part of the ECA requirements, the Facility must complete an annual report outlining the completion of the groundwater monitoring program and the findings of the program of the operating year.

MECP is still awaiting the 2021 Groundwater and Surface Water Monitoring Report. Once it is received it will be reviewed. During the inspection, it was identified that there is an increase in ammonia concentrations within the groundwater. Once the annual report is received and reviewed, the Ministry will determine what actions are required to address the increased ammonia levels.

Question ID	WW_SAMPLING_110000	**Question Type**	Legislative
Question: Did the facility comply with all sampling requirements since during the inspection period?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: The facility has complied with all sampling requirements during the inspection period.			

Question ID	WW_AUDIT_SAMPLE_100000	**Question Type**	Information
Question: Were Ministry audit samples collected during this inspection?			
Legislative Requirement	Not Applicable		
Observation			
No: Audit samples were not collected during this inspection.			

Question ID	WW_LIMITS_100000	Question Type	Information
Question: Does this sewage works have effluent limits set by an Environmental Compliance Approval (ECA)?			
Legislative Requirement	Not Applicable		
Observation			
Yes: This sewage works has effluent limits set by an ECA. The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the SWM Pond at a monthly frequency and analyzed for the parameters listed in Table 1 of the ECA.			

Question ID	WW_LIMITS_110000	Question Type	Legislative
Question: Have all effluent limits set by the Environmental Compliance Approval (ECA) been met?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All effluent limits set by an ECA have been met.			

Question ID	WW_OBJECTIVES_100000	Question Type	Information
Question: Does this sewage works have effluent objectives set by an Environmental Compliance Approval (ECA)?			
Legislative Requirement	Not Applicable		
Observation			
No: This sewage works does not have effluent objectives set by an ECA.			

Question ID	WW_LIMITS_400000	Question Type	Information
Question: Does this sewage works have limits somewhere other than the effluent discharge (e.g., raw sewage, groundwater)?			
Legislative Requirement	Not Applicable		

Observation
Yes: The sewage works has limits in locations other than the effluent discharge. The facility has groundwater monitoring requirements or trigger levels that must be adhered to. The facility has adhered to these trigger level monitoring requirements.

Question ID	WW_LIMITS_410000	Question Type	Legislative
Question: Have limits at locations other than the effluent discharge been met?			
Legislative Requirement	OWRA | 53 | (1);		
Observation			
Yes: All applicable limits have been met.			

Question ID	WW_IMPAIRMENT_100000	Question Type	Legislative
Question: Were there no indications of a known or anticipated human health impact during the inspection and/or review of relevant material ?			
Legislative Requirement	OWRA | 30 | (1);		
Observation			
Yes: There were no indications of a known or anticipated human health impact associated with the operation of the sewage works.			

Question ID	WW_IMPAIRMENT_200000	Question Type	Legislative
Question: Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?			
Legislative Requirement	OWRA | 30 | (1);		
Observation			
No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works. It was discussed that the ammonia concentration in the shallow groundwater aquifer has increased. This indicates the potential for an onsite ammonia source. Upon receipt of the 2021 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.			

Question ID	949100	Question Type	Legislative
Question: Were the inspection questions sufficient to address other identified non-compliance items?			
Legislative Requirement	Not Applicable		
Observation			

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity: CONVERTUS CANADA LTD.
Inspection Start Date: March 28, 2022
Inspection End Date: March 28, 2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: AIR | **Regulated Activity:** ECA Air Emissions

Question ID	1.1	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there information in regards to site conditions that should be documented for this inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Question ID	2.1	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Was there non-compliance identified during a previous air inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):

A review of the previous Air Facility inspection conducted in 2018 indicated that there were no previous non-compliance issues.

Question ID	3.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility have an Environmental Compliance Approval(s) as required by section 9 of the Environmental Protection Act?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has the required air Environmental Compliance Approval(s).

The facility has Environmental Compliance Approval #1631 A2ELCQ in effect.

Question ID	3.2	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Was the facility in compliance with the requirement to obtain either an amendment to their air Environmental Compliance Approval or registration to the Air Emissions Environmental Activity and Sector Registry, in regard to a modification made at the facility?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has the required air Environmental Compliance Approval(s) and does not require an amendment.

Question ID	5.1.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with limits in their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility is complying or has complied with a limit(s) in their air Environmental Compliance Approval.

At this time the facility is satisfying the limits set out in the ECA. The 2021 Annual Source Test Report confirms this compliance.

Question ID	6.2.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility made the required notification to the ministry or other parties as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to notify the Ministry in accordance with their air Environmental Compliance Approval, the Act and/or Regulations, as appropriate.

Condition 8.2(d) of the Environmental Compliance Approval requires notification. Convertus provided appropriate notification and investigation for a July 24, 2021 odour complaint. The facility is diligent with reporting and investigating complaints pertinent to the Air ECA.

Question ID	7.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility implemented the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to implement the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval.

Question ID	8.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Did the facility prepare and implement operating procedures and maintenance programs as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to prepare and/or implement operating procedures and maintenance plans as required by their air Environmental Compliance Approval.

During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. The operating procedures and maintenance programs were reviewed at the time of the inspection and deemed to be adequate.

Question ID	10.1.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility installed, operated and maintained a continuous emissions monitoring system in accordance with air Environmental Compliance Approval conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with monitoring requirements as set out in their air Environmental Compliance Approval.

The Facility utilizes SCADA to program, adjust, measure and monitor the organic waste processing. The SCADA system also records the data collected during the processing process. In reviewing the process data, the records were collected as required and indicate the biofilters and bioscrubber are being properly operated and monitored.

Question ID	10.1.4	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all the requirements related to air quality monitoring set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with requirements related to ambient air monitoring as set out in their air Environmental Compliance Approval.

Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). This condition is satisfied.

Question ID	10.1.5	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all the requirements pertaining to odour assessments as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the monitoring or testing requirements related to odour as set out in their air Environmental Compliance Approval.

Question ID	10.1.6	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all assessment requirements pertaining to noise/sound as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the monitoring requirements related to noise as set out in their air Environmental Compliance Approval.

Question ID	10.1.3	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all source testing requirements as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with source testing requirements as set out in their air Environmental Compliance Approval.

Condition 10 of the ECA requires the Facility to monitoring the parameters of the Air Pollution Control Equipment. Based on the review of the records indicate the parameters of the Air Pollution Control Equipment are being monitored and recorded as required.

Question ID	11.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Have all documents and reports been prepared and updated as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has prepared and updated the required report(s) as set out in their air Environmental Compliance Approval.

The ministry received the 2021 Source Test Report for Amended ECA No. 1631-A2ELCQ on February 4, 2022.

Question ID	13.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with all record keeping requirements in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with all record keeping requirements in their air Environmental Compliance Approval.

Question ID	14.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with other requirements set out in the air Environmental Compliance Approval that are not otherwise specified in this inspection form?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has complied with all other requirements in the air ECA, not addressed in other questions.

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the MECP's website that shall include the following:
- a declaration of whether the Facility was in compliance with section 9 of the Environmental Protection Act, Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
- a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31 of the 2021 operating year.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

Question ID	16.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with other applicable air regulatory requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has complied with an air regulatory requirement.

Question ID	16.2	Question Type	BMP

Legislative Requirement(s):
Not Applicable

Question:
Does the facility conform with other applicable practices and procedures?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has adhered to applicable air practices and procedures.

Question ID	949100	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Question ID	11.2	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Have all reports been submitted to the ministry as required and by the date set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has submitted the required report(s) as set out in their air Environmental Compliance Approval.

Question ID	11.3	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Are all reports available to the ministry and the public as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has made reports available to the ministry or the public as required in their air

Environmental Compliance Approval.

Ontario

Convertus Ottawa Processing Facility
5123 HAWTHORNE RD, OTTAWA, ON, K0A 1V0

Inspection Report

System Number:
Entity: CONVERTUS CANADA LTD.
Inspection Start Date: 03/28/2022
Inspection End Date: 03/28/2022
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE/NON-CONFORMANCE ITEMS

This should not be construed as a confirmation of full compliance with all potential applicable legal requirement and BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: AIR | **Regulated Activity:** ECA Air Emissions

Question ID	1.1	**Question Type**	Information
Question: Is there information in regards to site conditions that should be documented for this inspection?			
Legislative Requirement	Not Applicable		
Observation			

Question ID	2.1	**Question Type**	Information
Question: Was there non-compliance identified during a previous air inspection?			
Legislative Requirement	Not Applicable		
Observation			
A review of the previous Air Facility inspection conducted in 2018 indicated that there were no previous non-compliance issues.			

Question ID	3.1	**Question Type**	Legislative
Question: Does the facility have an Environmental Compliance Approval(s) as required by section 9 of the Environmental Protection Act?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has the required air Environmental Compliance Approval(s). The facility has Environmental Compliance Approval #1631 A2ELCQ in effect.			

Question ID	3.2	**Question Type**	Legislative

Question: Was the facility in compliance with the requirement to obtain either an amendment to their air Environmental Compliance Approval or registration to the Air Emissions Environmental Activity and Sector Registry, in regard to a modification made at the facility?	
Legislative Requirement	EPA | 9 | (1)(a);
Observation	
Yes, the facility has the required air Environmental Compliance Approval(s) and does not require an amendment.	

Question ID	5.1.1	**Question Type**	Legislative
Question: Does the facility comply with limits in their air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility is complying or has complied with a limit(s) in their air Environmental Compliance Approval. At this time the facility is satisfying the limits set out in the ECA. The 2021 Annual Source Test Report confirms this compliance.			

Question ID	6.2.1	**Question Type**	Legislative
Question: Has the facility made the required notification to the ministry or other parties as required by their air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with the requirement to notify the Ministry in accordance with their air Environmental Compliance Approval, the Act and/or Regulations, as appropriate. Condition 8.2(d) of the Environmental Compliance Approval requires notification. Convertus provided appropriate notification and investigation for a July 24, 2021 odour complaint. The facility is diligent with reporting and investigating complaints pertinent to the Air ECA.			

Question ID	7.1	**Question Type**	Legislative
Question: Has the facility implemented the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance			

Approval?	
Legislative Requirement	EPA | 9 | (1)(a);
Observation	
Yes, the facility has complied with the requirement to implement the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval.	

Question ID	8.1	**Question Type**	Legislative
Question: Did the facility prepare and implement operating procedures and maintenance programs as required by their air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with the requirement to prepare and/or implement operating procedures and maintenance plans as required by their air Environmental Compliance Approval. During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. The operating procedures and maintenance programs were reviewed at the time of the inspection and deemed to be adequate.			

Question ID	10.1.1	**Question Type**	Legislative
Question: Has the facility installed, operated and maintained a continuous emissions monitoring system in accordance with air Environmental Compliance Approval conditions?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with monitoring requirements as set out in their air Environmental Compliance Approval. The Facility utilizes SCADA to program, adjust, measure and monitor the organic waste processing. The SCADA system also records the data collected during the processing process. In reviewing the process data, the records were collected as required and indicate the biofilters and bioscrubber are being properly operated and monitored.			

Question ID	10.1.4	**Question Type**	Legislative

Question: Has the facility met all the requirements related to air quality monitoring set out in the air Environmental Compliance Approval?	
Legislative Requirement	EPA | 9 | (1)(a);
Observation	
Yes, the facility has complied with requirements related to ambient air monitoring as set out in their air Environmental Compliance Approval. Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). This condition is satisfied.	

Question ID	10.1.5	**Question Type**	Legislative
Question: Has the facility met all the requirements pertaining to odour assessments as set out in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with the monitoring or testing requirements related to odour as set out in their air Environmental Compliance Approval.			

Question ID	10.1.6	**Question Type**	Legislative
Question: Has the facility met all assessment requirements pertaining to noise/sound as set out in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with the monitoring requirements related to noise as set out in their air Environmental Compliance Approval.			

Question ID	10.1.3	**Question Type**	Legislative
Question: Has the facility met all source testing requirements as set out in the air Environmental Compliance Approval?			

Legislative Requirement	EPA | 9 | (1)(a);
Observation	
Yes, the facility has complied with source testing requirements as set out in their air Environmental Compliance Approval. Condition 10 of the ECA requires the Facility to monitoring the parameters of the Air Pollution Control Equipment. Based on the review of the records indicate the parameters of the Air Pollution Control Equipment are being monitored and recorded as required.	

Question ID	11.1	Question Type	Legislative
Question: Have all documents and reports been prepared and updated as required in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has prepared and updated the required report(s) as set out in their air Environmental Compliance Approval. The ministry received the 2021 Source Test Report for Amended ECA No. 1631-A2ELCQ on February 4, 2022.			

Question ID	13.1	Question Type	Legislative
Question: Does the facility comply with all record keeping requirements in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with all record keeping requirements in their air Environmental Compliance Approval.			

Question ID	14.1	Question Type	Legislative
Question: Does the facility comply with other requirements set out in the air Environmental Compliance Approval that are not otherwise specified in this inspection form?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			

Yes, the facility has complied with all other requirements in the air ECA, not addressed in other questions. Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the MECP's website that shall include the following:
- a declaration of whether the Facility was in compliance with section 9 of the Environmental Protection Act, Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
- a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31 of the 2021 operating year.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

Question ID	16.1	**Question Type**	Legislative
Question: Does the facility comply with other applicable air regulatory requirements?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has complied with an air regulatory requirement.			

Question ID	16.2	**Question Type**	BMP

Question: Does the facility conform with other applicable practices and procedures?	
Legislative Requirement	Not Applicable
Observation	
Yes, the facility has adhered to applicable air practices and procedures.	

Question ID	949100	**Question Type**	Legislative
Question: Were the inspection questions sufficient to address other identified non-compliance items?			
Legislative Requirement	Not Applicable		
Observation			

Question ID	11.2	**Question Type**	Legislative
Question: Have all reports been submitted to the ministry as required and by the date set out in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has submitted the required report(s) as set out in their air Environmental Compliance Approval.			

Question ID	11.3	**Question Type**	Legislative
Question: Are all reports available to the ministry and the public as required in the air Environmental Compliance Approval?			
Legislative Requirement	EPA | 9 | (1)(a);		
Observation			
Yes, the facility has made reports available to the ministry or the public as required in their air Environmental Compliance Approval.			

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity: CONVERTUS CANADA LTD.
Inspection Start Date: December 12, 2023
Inspection End Date: December 12, 2023
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: AIR | **Regulated Activity:** ECA Air Emissions

Question ID	1.1	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there information in regards to site conditions that should be documented for this inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No.

Question ID	2.1	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Was there non-compliance identified during a previous air inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No.

Question ID	3.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility have an Environmental Compliance Approval(s) as required by section 9 of the Environmental Protection Act?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has the required air Environmental Compliance Approval(s).

The facility has Environmental Compliance Approval #1631 A2ELCQ in effect.

Question ID	3.2	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Was the facility in compliance with the requirement to obtain either an amendment to their air Environmental Compliance Approval or registration to the Air Emissions Environmental Activity and Sector Registry, in regard to a modification made at the facility?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has the required air Environmental Compliance Approval(s) and does not require an amendment.

Question ID	5.1.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with limits in their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility is complying or has complied with a limit(s) in their air Environmental Compliance Approval.

Question ID	6.2.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility made the required notification to the ministry or other parties as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to notify the Ministry in accordance with their air Environmental Compliance Approval, the Act and/or Regulations, as appropriate.

Question ID	7.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility implemented the required procedures for receiving, recording and responding

to public complaints as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to implement the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval.

Question ID	8.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Did the facility prepare and implement operating procedures and maintenance programs as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to prepare and/or implement operating procedures and maintenance plans as required by their air Environmental Compliance Approval.

During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. The operating procedures and maintenance programs were reviewed at the time of the inspection and deemed to be adequate.

Question ID	10.1.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility installed, operated and maintained a continuous emissions monitoring system in accordance with air Environmental Compliance Approval conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with monitoring requirements as set out in their air Environmental Compliance Approval.

Question ID	10.1.4	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all the requirements related to air quality monitoring set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with requirements related to ambient air monitoring as set out in their air Environmental Compliance Approval.

Question ID	10.1.5	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all the requirements pertaining to odour assessments as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the monitoring or testing requirements related to odour as set out in their air Environmental Compliance Approval.

Question ID	10.1.6	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all assessment requirements pertaining to noise/sound as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the monitoring requirements related to noise as set out in their air Environmental Compliance Approval.

Question ID	10.1.3	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all source testing requirements as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with source testing requirements as set out in their air Environmental Compliance Approval.

Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). This condition is satisfied.

Question ID	11.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Have all documents and reports been prepared and updated as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has prepared and updated the required report(s) as set out in their air Environmental Compliance Approval.

Question ID	13.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with all record keeping requirements in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with all record keeping requirements in their air Environmental Compliance Approval.

Question ID	14.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1);

Question:
Does the facility comply with other requirements set out in the air Environmental Compliance Approval that are not otherwise specified in this inspection form?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with all other requirements in the air ECA, not addressed in other questions.

Condition 6 of Environmental Compliance Approval Number 1631- A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the MECP's website that shall include the following:

- a declaration of whether the Facility was in compliance with section 9 of the Environmental Protection Act, Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
- a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31 of the 2023 operating year.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

Question ID	16.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1);

Question:
Does the facility comply with other applicable air regulatory requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with an air regulatory requirement.

Question ID	16.2	**Question Type**	BMP

Legislative Requirement(s):
Not Applicable

Question:
Does the facility conform with other applicable practices and procedures?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has adhered to applicable air practices and procedures.

Question ID	949100	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Question ID	11.2	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Have all reports been submitted to the ministry as required and by the date set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has submitted the required report(s) as set out in their air Environmental Compliance Approval.

Question ID	11.3	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Are all reports available to the ministry and the public as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has made reports available to the ministry or the public as required in their air Environmental Compliance Approval.

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
5123 HAWTHORNE RD, OTTAWA, ON, K1G 3Y3

INSPECTION REPORT

Entity:	CONVERTUS CANADA LTD.
Inspection Start Date:	December 12, 2023
Inspection End Date:	December 12, 2023
Inspected By:	Alexander Baker
Badge #:	1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: AIR | **Regulated Activity:** ECA Air Emissions

Question ID	1.1	**Question Type**	Information
Legislative Requirement(s): Not Applicable			
Question: Is there information in regards to site conditions that should be documented for this inspection?			
Compliance Response(s)/Corrective Action(s)/Observation(s): No.			

Question ID	2.1	**Question Type**	Information
Legislative Requirement(s): Not Applicable			
Question: Was there non-compliance identified during a previous air inspection?			
Compliance Response(s)/Corrective Action(s)/Observation(s): No.			

Question ID	3.1	**Question Type**	Legislative
Legislative Requirement(s): EPA | 9 | (1)(a);			
Question: Does the facility have an Environmental Compliance Approval(s) as required by section 9 of the Environmental Protection Act?			
Compliance Response(s)/Corrective Action(s)/Observation(s): Yes, the facility has the required air Environmental Compliance Approval(s). The facility has Environmental Compliance Approval #1631 A2ELCQ in effect.			

Question ID	3.2	**Question Type**	Legislative
Legislative Requirement(s): EPA | 9 | (1)(a);			
Question: Was the facility in compliance with the requirement to obtain either an amendment to their air			

Environmental Compliance Approval or registration to the Air Emissions Environmental Activity and Sector Registry, in regard to a modification made at the facility?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has the required air Environmental Compliance Approval(s) and does not require an amendment.

Question ID	5.1.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with limits in their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility is complying or has complied with a limit(s) in their air Environmental Compliance Approval.

Question ID	6.2.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility made the required notification to the ministry or other parties as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to notify the Ministry in accordance with their air Environmental Compliance Approval, the Act and/or Regulations, as appropriate.

Question ID	7.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility implemented the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to implement the required procedures for receiving, recording and responding to public complaints as required by their air Environmental Compliance Approval.

Question ID	8.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Did the facility prepare and implement operating procedures and maintenance programs as required by their air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with the requirement to prepare and/or implement operating procedures and maintenance plans as required by their air Environmental Compliance Approval.

During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. The operating procedures and maintenance programs were reviewed at the time of the inspection and deemed to be adequate.

Question ID	10.1.1	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility installed, operated and maintained a continuous emissions monitoring system in accordance with air Environmental Compliance Approval conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with monitoring requirements as set out in their air Environmental Compliance Approval.

Question ID	10.1.4	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Has the facility met all the requirements related to air quality monitoring set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with requirements related to ambient air monitoring as set out in their air Environmental Compliance Approval.

Question ID	10.1.5	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:

Has the facility met all the requirements pertaining to odour assessments as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has complied with the monitoring or testing requirements related to odour as set out in their air Environmental Compliance Approval.

Question ID	10.1.6	**Question Type**	Legislative

Legislative Requirement(s):

EPA | 9 | (1)(a);

Question:

Has the facility met all assessment requirements pertaining to noise/sound as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has complied with the monitoring requirements related to noise as set out in their air Environmental Compliance Approval.

Question ID	10.1.3	**Question Type**	Legislative

Legislative Requirement(s):

EPA | 9 | (1)(a);

Question:

Has the facility met all source testing requirements as set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has complied with source testing requirements as set out in their air Environmental Compliance Approval.

Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). This condition is satisfied.

Question ID	11.1	**Question Type**	Legislative

Legislative Requirement(s):

EPA | 9 | (1)(a);

Question:

Have all documents and reports been prepared and updated as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes, the facility has prepared and updated the required report(s) as set out in their air

Environmental Compliance Approval.

Question ID	13.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Does the facility comply with all record keeping requirements in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with all record keeping requirements in their air Environmental Compliance Approval.

Question ID	14.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1);

Question:
Does the facility comply with other requirements set out in the air Environmental Compliance Approval that are not otherwise specified in this inspection form?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with all other requirements in the air ECA, not addressed in other questions.

Condition 6 of Environmental Compliance Approval Number 1631- A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the MECP's website that shall include the following:
- a declaration of whether the Facility was in compliance with section 9 of the Environmental Protection Act, Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
- a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31 of the 2023 operating year.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action

Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

Question ID	16.1	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1);

Question:
Does the facility comply with other applicable air regulatory requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has complied with an air regulatory requirement.

Question ID	16.2	Question Type	BMP

Legislative Requirement(s):
Not Applicable

Question:
Does the facility conform with other applicable practices and procedures?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has adhered to applicable air practices and procedures.

Question ID	949100	Question Type	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Question ID	11.2	Question Type	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Have all reports been submitted to the ministry as required and by the date set out in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has submitted the required report(s) as set out in their air Environmental Compliance Approval.

Question ID	11.3	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 9 | (1)(a);

Question:
Are all reports available to the ministry and the public as required in the air Environmental Compliance Approval?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes, the facility has made reports available to the ministry or the public as required in their air Environmental Compliance Approval.

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity:	CONVERTUS CANADA LTD.
Inspection Start Date:	December 12, 2023
Inspection End Date:	January 22, 2024
Inspected By:	Alexander Baker
Badge #:	1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Receiver Transfer Processing

Question ID	1-E2RB6B	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | 40;

Question:
Is the site only accepting wastes limited to the types specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The site may only receive solid non-hazardous waste specified in condition 3.1 of the ECA #2766-7HEPSZ.

The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:
(a) Source-separated Organic Waste limited to the following:
(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.
(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The annual reports confirm that the Facility is in compliance with Condition 2(1) by only accepting waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector
which is within the approved service area outlined in ECA. No hazardous waste is being received at the site.

Question ID	1-E2TK4H	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | 40;

Question:
Is waste received at the Site within the approved limits as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	1-E2TK4P	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are wastes stored and handled in accordance with the ECA conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	1-E2TOAX	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are wastes processed in accordance with the ECA conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

A full review of the ECA was conducted and it is confirmed that the facility is in full compliance with all conditions. Additionally, trained personnel inspect the loads and supervise the unloading of waste at the facility. Where waste is deemed to not be acceptable, there is a procedure in place to reject that waste load. Trained personnel conduct routine inspections and ensure that any identified deficiencies are promptly corrected.

Question ID	1-E2TOCQ	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the site maintaining records on incoming, outgoing, and waste storage amounts, as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The mass balance for the 2022 operating year was reviewed. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in the ECA.

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
5123 HAWTHORNE RD, OTTAWA, ON, K1G 3Y3

INSPECTION REPORT

Entity:	CONVERTUS CANADA LTD.
Inspection Start Date:	December 12, 2023
Inspection End Date:	December 12, 2023
Inspected By:	Alexander Baker
Badge #:	1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Landfills

Question ID	NOL 1	**Question Type**	Legislative
Legislative Requirement(s): EPA | 27 | (1);			
Question: Does the Open landfill site have an Environmental Compliance Approval (ECA)?			
Compliance Response(s)/Corrective Action(s)/Observation(s): Yes The facility has an ECA #2766-7HEPSZ			

Question ID	NOL 2	**Question Type**	Information
Legislative Requirement(s): Not Applicable			
Question: Is this landfill on Crown land?			
Compliance Response(s)/Corrective Action(s)/Observation(s): No			

Question ID	NOL 4	**Question Type**	Information
Legislative Requirement(s): Not Applicable			
Question: Does the landfill have a Contaminant Attenuation Zone (CAZ)?			
Compliance Response(s)/Corrective Action(s)/Observation(s): No			

Question ID	NOL 13	**Question Type**	Information
Legislative Requirement(s): EPA | 27 | (1);			
Question: Are access roads and on-site roads provided so that vehicles hauling waste to and on the site may travel readily on any day under all normal weather conditions?			

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

During the inspection, access roads were clear, well organized, and had sufficient space.

Question ID	NOL 14	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is site access limited to times when an attendant is on duty?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The facility complies with the hours set in their ECA, and an attendant is always available.

Question ID	NOL 15	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the site only receive waste from within its approved service area?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The service area is limited to the Province of Quebec and Ontario.

Question ID	NOL 16	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to have a ground water monitoring program by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 18	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 25;

Question:

Are monitoring well samples taken and tested to determine the quality of the ground water?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The samples are collected not as a condition of this waste ECA, but rather as a condition of the facility's sewage works ECA.

Question ID	NOL 19	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the ministry concerned with the results of the samples that have been tested?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The Ministry is closely watching the concentrations of ammonia, and abatement is ongoing under the sewage works ECA #2844-9YNGZC, not this waste ECA.

Question ID	NOL 20	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there ongoing abatement to address any concerns the ministry has with the ground water monitoring?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 21	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to manage leachate by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 26	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to manage landfill gas by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 31	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the site required to have a surface water monitoring program by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No

Question ID	NOL 36	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is proper equipment available for the compaction of waste and applying cover material?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 37	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill able to accurately determine the amount of waste received?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 38	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are all disposal operations at the site adequately and continually supervised?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes

Trained personnel inspect the loads and supervise the unloading of waste at the facility. Where waste is deemed to not be acceptable, there is a procedure in place to reject that waste load.

Question ID	NOL 39	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the landfill operator have a site inspection program as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 40	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill operator have a procedure in place to address issues identified by staff during the site inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 41	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the waste being compacted adequately?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 43	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are procedures implemented to control rodents or other animals and insects at the site?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes

Question ID	NOL 44	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is site access restricted by use of a gate, fence, or physical barrier when the site is not operating?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 45	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the waste disposal area adequately screened from public view?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 46	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 21;

Question:
Are daily records of site operations available at the site for at least the past 2 years or as otherwise required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 47	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the annual operations report been submitted to MECP or available on site as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes

Question ID	NOL 48	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | O. Reg. 232/98 | 23;

Question:
Is scavenging being prevented?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 51	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill only accepting the types of waste that they are approved to receive?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:
(a) Source-separated Organic Waste limited to the following:
(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.
(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.
The annual reports confirm that the Facility is in compliance with Condition 2(1) by only accepting
waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA.

Question ID	NOL 52	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the landfill have a waste refusal procedure in place to manage waste that arrives at the site that the site is not approved the accept?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 53	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
is the waste refusal procedure being followed?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 54	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have a procedure in place to address and document spills and fires?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 55	Question Type	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have emergency contingency plan as required by the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 56	Question Type	Information

Legislative Requirement(s):

Not Applicable

Question:
Is there an ECA condition requiring financial assurance?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 57	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the financial assurance been submitted, as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 58	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the company provided financial assurance re-evaluation estimates in compliance with the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 59	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill have a procedure in place to address complaints?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 60	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:

Has the landfill operator addressed the complaints to the satisfaction of the ministry?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 61	**Question Type**	Information

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Has the landfill operator developed a Design and Operations Manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 62	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the Design and Operations Manual up to date?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 63	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Does the landfill operator have training procedures for site personnel?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	NOL 64	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the landfill operator following the established training procedures?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
5123 HAWTHORNE RD, OTTAWA, ON, K1G 3Y3

INSPECTION REPORT

Entity:	CONVERTUS CANADA LTD.
Inspection Start Date:	December 12, 2023
Inspection End Date:	January 22, 2024
Inspected By:	Alexander Baker
Badge #:	1863

Alex Baker

(signature)

NON-COMPLIANCE

This should not be construed as a confirmation of full compliance with all potential applicable legal requirements. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: WASTE | **Regulated Activity:** Receiver Transfer Processing

Question ID	1-E2RB6B	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1); EPA | 40;

Question:
Is the site only accepting wastes limited to the types specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The site may only receive solid non-hazardous waste specified in condition 3.1 of the ECA #2766-7HEPSZ.

The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:
(a) Source-separated Organic Waste limited to the following:
(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.
(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The annual reports confirm that the Facility is in compliance with Condition 2(1) by only accepting waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector
which is within the approved service area outlined in ECA. No hazardous waste is being received at the site.

Question ID	1-E2TK4H	**Question Type**	Legislative

Legislative Requirement(s):

EPA | 27 | (1); EPA | 40;

Question:
Is waste received at the Site within the approved limits as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	1-E2TK4P	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are wastes stored and handled in accordance with the ECA conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

Question ID	1-E2TOAX	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Are wastes processed in accordance with the ECA conditions?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

A full review of the ECA was conducted and it is confirmed that the facility is in full compliance with all conditions. Additionally, trained personnel inspect the loads and supervise the unloading of waste at the facility. Where waste is deemed to not be acceptable, there is a procedure in place to reject that waste load. Trained personnel conduct routine inspections and ensure that any identified deficiencies are promptly corrected.

Question ID	1-E2TOCQ	**Question Type**	Legislative

Legislative Requirement(s):
EPA | 27 | (1);

Question:
Is the site maintaining records on incoming, outgoing, and waste storage amounts, as specified in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes

The mass balance for the 2022 operating year was reviewed. The data provided in the

mass balance confirms the Facility is in compliance with tonnage limits outlined in the ECA.

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
Physical Address: 5123 HAWTHORNE RD, ,
OTTAWA, ON K1G 3Y3

INSPECTION REPORT

Entity: CONVERTUS CANADA LTD.
Inspection Start Date: December 12, 2023
Inspection End Date: December 12, 2023
Inspected By: Alexander Baker
Badge #: 1863

Alex Baker

(signature)

NON-COMPLIANCE

The following item(s) have been identified as non-compliance, based on a "No" response captured for a legislative question(s). For additional information on each question see the Inspection Details section of the report.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Item	Question	Compliance Response/Corrective Action(s)
NC-1	**Question ID:** .WW_IMPAIRMENT_200000 Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?	No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Question ID	. CQ_PREV_NON_COMPLIANCE_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Have there been any required or recommended actions as a result of non-compliance identified during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There were no required or recommended actions as a result of a previous inspection.

There were indications of a known or anticipated environmental impact associated with the operation of the sewage works. It was discussed that the ammonia concentration in the shallow groundwater aquifer continues to be observed in elevated concentrations. This indicates a strong likelihood for an onsite ammonia source. Upon receipt of the 2023 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.

Question ID	.CQ_COMPLAINTS_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have documented procedures for receiving, recording and responding to public complaints?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has adequate documented procedures for receiving, recording, and responding to public complaints.

The facility has adequate documented procedures for receiving, recording, and responding to public complaints.

Question ID	.CQ_COMPLAINTS_200000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any complaints received by the site or ministry regarding the operations of the sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Complaints applicable to the sewage works were not received since the last inspection.

Question ID	.WW_APPROVAL_100000	Question Type	Information

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is an Environmental Compliance Approval (ECA) required for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is subject to the ECA requirement.

Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC.

Question ID	.WW_APPROVAL_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Do all sewage works currently being inspected have a valid Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There is currently a valid ECA for the sewage works.

Question ID	.WW_APPROVAL_111000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is the sewage works constructed in accordance with the Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works is currently constructed in accordance with the ECA.

The sewage works is currently constructed in accordance with the ECA. On site observations confirm that the sewage works is constructed in accordance with the ECA. Stormwater is

collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Question ID	. WW_SOURCE_PROTECTION_ 100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the review of the Environmental Compliance Approval (ECA) confirmed this works is a significant drinking water threat (SDWT), and that source protection prescribed instrument polices (SPPs) apply?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: A review of the ECA has confirmed that this works is not a SDWT at this time.

Question ID	.WW_LAND_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Are all components of the sewage works located on one parcel of land?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All components of the sewage works are located on one parcel of land.

Question ID	.WW_LAND_110000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:

Does the sewage works owner own or lease the land for the various sewage works components?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All parcels of land for which the sewage works is located is owned by the facility and/or the facility has a land use agreement in place.

Question ID	. WW_FINANCIAL_ASSURANCE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there Financial Assurance (FA) requirements for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There are no Financial Assurance (FA) requirements for this sewage works.

Question ID	.WW_RECORDS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to keep records associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has record keeping requirements.

Question ID	.WW_RECORDS_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Were all records kept as required during this inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All record keeping requirements were met during the inspection period.

This sewage works has record keeping requirements. Condition 5(5) of the ECA

requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2. Condition 10 requires these records to be available to Ministry staff. Records were available.

Question ID	.WW_REPORTS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to create any reports associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is required to create reports.

The owner shall prepare a performance report on an annual basis, following the end of the reporting period.

Question ID	.WW_REPORTS_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been prepared as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been prepared as required.

Question ID	.WW_REPORTS_120000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted to the ministry if required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted to the ministry as required.

Question ID	.WW_REPORTS_121000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted on time?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted on time.

Question ID	.WW_REPORTS_122000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have adequate record keeping and/or reporting towards effective sewage works operations or oversight?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility would benefit from record keeping or reporting to help improve the sewage works operations and/or oversight.

Question ID	.WW_SPCP_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have a Spill Prevention and Contingency Plan (SPCP)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This facility is not currently subject to O. Reg 224/07.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations.

Question ID	.WW_SPCP_110000	Question Type	Legislative

Legislative Requirement(s):
EPA | O. Reg. 224/07 | 3 | (1); OWRA | 53 | (1);

Question:
Has the Spill Prevention and Contingency Plan (SPCP) been developed as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP has been developed.

Question ID	.WW_SPCP_111000	Question Type	Legislative

Legislative Requirement(s):
EPA | O. Reg. 224/07 | 3 | (1); OWRA | 53 | (1);

Question:
Has the Spill Prevention and Contingency Plan (SPCP) been implemented?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP has been implemented as required.

Question ID	. WW_OPERATIONS_MAINTENANCE_000000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This facility is required to have an operations and maintenance manual.

Question ID	. WW_OPERATIONS_MAINTENANCE_210000	Question Type	BMP

Legislative Requirement(s):
Not Applicable

Question:
Is this statement true? Observations during the inspection seems to indicate the sewage works is operating effectively and as designed.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works appears to be operating effectively and as designed.

Question ID	. WW_OPERATIONS_MAINTENANCE_100000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the facility have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has an operations and maintenance manual.

Question ID	. WW_OPERATIONS_MAINTENANCE_110000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the operations and maintenance manual meet any specified requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The operations and maintenance manual meets specified requirements.

Question ID	. WW_OPERATIONS_MAINTENANCE_020000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have inspection, operations and/or maintenance requirements in the Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has inspection, operations and/or maintenance requirements in the Environmental Compliance Approval (ECA).

Question ID	. WW_OPERATIONS_MAINTENANCE_200000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is the facility being inspected, operated and/or maintained as required in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility is being inspected, operated, and/or maintained as required by the ECA

Question ID	. WW_OPERATIONS_MAINTENANCE_400000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility discharge to groundwater (e.g., septic field, exfiltration lagoon)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: The facility does not discharge to groundwater (e.g., septic field, exfiltration lagoon).

Question ID	.WW_CAPACITY_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the sewage works design capacity evident in the approval or any supporting documentation?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works design capacity is evident in the approval and/or supporting documentation

Question ID	.WW_CAPACITY_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the sewage works operate within the design capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operates within the design capacity.

Question ID	.WW_CAPACITY_200000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the sewage works have a defined peak flow capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has a defined peak flow capacity.

Question ID	.WW_CAPACITY_210000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Has the sewage works operated within its listed peak flow rate during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operated within its peak flow rate during the inspection period.

Question ID	.WW_BYPASSES_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the sewage works had any bypasses/overflows during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There have not been bypasses/ overflows during the inspection period.

Question ID	.WW_SOILS_SLUDGE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any biosolids and/or sludge generated by the sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Biosolids and/or sludge are not generated by the sewage works.

Question ID	.WW_SPILLS_010000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have a requirement for contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility is required to have contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situation.

Question ID	.WW_SPILLS_100000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the facility have the required contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has the required contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situation.

Question ID	.WW_SPILLS_200000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the facility had any spills during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: The facility has not had spills during the inspection period.

Question ID	.WW_SAMPLING_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have sampling requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has sampling requirements.

Sampling is a requirement for both surface water and groundwater. The facility has complied with all sampling requirements. Condition 4. SURFACE WATER MONITORING AND RECORDING

Question ID	.WW_SAMPLING_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with all sampling and monitoring requirements for the discharge(s) during the inspection period? This does not include spills, bypasses and overflows.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with all sampling and monitoring requirements for the discharge(s) during the inspection period.

Question ID	.WW_SAMPLING_120000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with all other sewage works sampling and monitoring requirements during the inspection period, e.g., influent, operational, merging effluents? This does not include discharges, flow, or biosolids/sludge.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with all other sampling requirements during the inspection period.

Question ID	.WW_SAMPLING_130000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with the environmental sampling and monitoring requirements during the inspection period, e.g., surface water or groundwater?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with environmental sampling and monitoring requirements during the inspection period.

Question ID	.WW_SAMPLING_131000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there any monitoring well(s) on site related to the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There are monitoring wells onsite related to the sewage works.

Question ID	.WW_SAMPLING_132000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1); OWRA | R.R.O. 1990, Reg. 903 | 20 | (1);

Question:
Are monitoring well(s) maintained as required and in a manner sufficient to prevent the entry of surface water and other foreign materials?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Monitoring well(s) are maintained as required and in a manner sufficient to prevent the entry of surface water and other foreign materials.

Question ID	.WW_AUDIT_SAMPLE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Were Ministry sewage or water quality audit samples collected during this inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Audit samples were not collected during this inspection.

Question ID	.WW_LIMITS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have effluent limits set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has effluent limits set by an ECA.

Question ID	.WW_LIMITS_400000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have limits somewhere other than the effluent discharge (e.g., raw sewage, groundwater)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has limits in locations other than the effluent discharge.

Question ID	.WW_LIMITS_410000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have limits at locations other than the effluent discharge been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All applicable limits have been met.

The facility has trigger level concentrations built into their ECA for groundwater. The elevated ammonia concentration at the site puts the facility into Tier 3 (Contingency Measures and Compliance Monitoring Program).

Question ID	.WW_LIMITS_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all effluent limits set by the Environmental Compliance Approval (ECA) been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All effluent limits set by an Environmental Compliance Approval (ECA) have been met.

The facility has trigger level concentrations built into their ECA. The elevated ammonia concentration at the site puts the facility into Tier 3 (Contingency Measures and Compliance Monitoring Program).

Question ID	.WW_OBJECTIVES_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have effluent objectives set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This sewage works does not have effluent objectives set by an Environmental Compliance Approval (ECA).

Question ID	.WW_IMPAIRMENT_100000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 30 | (1);

Question:
Were there no indications of a known or anticipated human health impact during the inspection and/or review of relevant material?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There were no indications of a known or anticipated human health impact associated with the operation of the sewage works.

Question ID	.WW_IMPAIRMENT_200000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 30 | (1);

Question:
Were there no indications of a known or anticipated environmental impact during the

inspection and/or review of relevant material?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

It was discussed that the ammonia concentration in the shallow groundwater aquifer has continued to increase and it is of high likelihood that the source is leaks from the facility. Upon receipt of the 2023 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.

Question ID	.WW_OTHER	**Question Type**	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Ontario

CONVERTUS OTTAWA PROCESSING FACILITY
5123 HAWTHORNE RD, OTTAWA, ON, K1G 3Y3

INSPECTION REPORT

Entity:	CONVERTUS CANADA LTD.
Inspection Start Date:	December 12, 2023
Inspection End Date:	December 12, 2023
Inspected By:	Alexander Baker
Badge #:	1863

Alex Baker

(signature)

NON-COMPLIANCE

The following item(s) have been identified as non-compliance, based on a "No" response captured for a legislative question(s). For additional information on each question see the Inspection Details section of the report.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Item	Question	Compliance Response/Corrective Action(s)
NC-1	**Question ID:** .WW_IMPAIRMENT_200000 Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?	No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

RECOMMENDATIONS

This should not be construed as a confirmation of full conformance with all potential applicable BMPs. These inspection findings are limited to the components and/or activities that were assessed, and the legislative framework(s) that were applied. It remains the responsibility of the owner to ensure compliance with all applicable legislative and regulatory requirements.

If you have any questions related to this inspection, please contact the signed Provincial Officer.

INSPECTION DETAILS

This section includes all questions that were assessed during the inspection.

Ministry Program: SEWAGE | **Regulated Activity:** Industrial Sewage

Question ID	. CQ_PREV_NON_COMPLIANCE_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Have there been any required or recommended actions as a result of non-compliance identified during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There were no required or recommended actions as a result of a previous inspection.

There were indications of a known or anticipated environmental impact associated with the operation of the sewage works. It was discussed that the ammonia concentration in the shallow groundwater aquifer continues to be observed in elevated concentrations. This indicates a strong likelihood for an onsite ammonia source. Upon receipt of the 2023 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.

Question ID	.CQ_COMPLAINTS_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have documented procedures for receiving, recording and responding to public complaints?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has adequate documented procedures for receiving, recording, and responding to public complaints.

The facility has adequate documented procedures for receiving, recording, and responding to public complaints.

Question ID	.CQ_COMPLAINTS_200000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any complaints received by the site or ministry regarding the operations of the

sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Complaints applicable to the sewage works were not received since the last inspection.

Question ID	.WW_APPROVAL_100000	**Question Type**	Information

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is an Environmental Compliance Approval (ECA) required for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is subject to the ECA requirement.

Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC.

Question ID	.WW_APPROVAL_110000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Do all sewage works currently being inspected have a valid Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There is currently a valid ECA for the sewage works.

Question ID	.WW_APPROVAL_111000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is the sewage works constructed in accordance with the Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works is currently constructed in accordance with the ECA.

The sewage works is currently constructed in accordance with the ECA. On site observations confirm that the sewage works is constructed in accordance with the ECA. Stormwater is collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system.

Process water generated inside the building is stored in leachate holding tanks buried on the

east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Question ID	. WW_SOURCE_PROTECTION_ 100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the review of the Environmental Compliance Approval (ECA) confirmed this works is a significant drinking water threat (SDWT), and that source protection prescribed instrument polices (SPPs) apply?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: A review of the ECA has confirmed that this works is not a SDWT at this time.

Question ID	.WW_LAND_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Are all components of the sewage works located on one parcel of land?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All components of the sewage works are located on one parcel of land.

Question ID	.WW_LAND_110000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:

Does the sewage works owner own or lease the land for the various sewage works components?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All parcels of land for which the sewage works is located is owned by the facility and/or the

facility has a land use agreement in place.

Question ID	. WW_FINANCIAL_ASSURANCE _100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there Financial Assurance (FA) requirements for this sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There are no Financial Assurance (FA) requirements for this sewage works.

Question ID	.WW_RECORDS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is there a requirement to keep records associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has record keeping requirements.

Question ID	.WW_RECORDS_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Were all records kept as required during this inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All record keeping requirements were met during the inspection period.

This sewage works has record keeping requirements. Condition 5(5) of the ECA requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2. Condition 10 requires these records to be available to Ministry staff. Records were available.

Question ID	.WW_REPORTS_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:

Is there a requirement to create any reports associated with the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works is required to create reports.

The owner shall prepare a performance report on an annual basis, following the end of the reporting period.

Question ID	.WW_REPORTS_110000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been prepared as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been prepared as required.

Question ID	.WW_REPORTS_120000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted to the ministry if required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted to the ministry as required.

Question ID	.WW_REPORTS_121000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have all reports been submitted on time?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All reports have been submitted on time.

Question ID	.WW_REPORTS_122000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have adequate record keeping and/or reporting towards effective sewage works operations or oversight?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility would benefit from record keeping or reporting to help improve the sewage works operations and/or oversight.

Question ID	.WW_SPCP_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have a Spill Prevention and Contingency Plan (SPCP)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: This facility is not currently subject to O. Reg 224/07.

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations.

Question ID	.WW_SPCP_110000	Question Type	Legislative

Legislative Requirement(s):
EPA | O. Reg. 224/07 | 3 | (1); OWRA | 53 | (1);

Question:
Has the Spill Prevention and Contingency Plan (SPCP) been developed as required?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP has been developed.

Question ID	.WW_SPCP_111000	Question Type	Legislative

Legislative Requirement(s):
EPA | O. Reg. 224/07 | 3 | (1); OWRA | 53 | (1);

Question:
Has the Spill Prevention and Contingency Plan (SPCP) been implemented?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The SPCP has been implemented as required.

Question ID	. WW_OPERATIONS_MAINTENANCE_000000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the facility required to have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This facility is required to have an operations and maintenance manual.

Question ID	. WW_OPERATIONS_MAINTENANCE_210000	**Question Type**	BMP

Legislative Requirement(s):
Not Applicable

Question:
Is this statement true? Observations during the inspection seems to indicate the sewage works is operating effectively and as designed.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works appears to be operating effectively and as designed.

Question ID	. WW_OPERATIONS_MAINTENANCE_100000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the facility have an operations and maintenance manual?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has an operations and maintenance manual.

Question ID	. WW_OPERATIONS_MAINTENANCE_110000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the operations and maintenance manual meet any specified requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The operations and maintenance manual meets specified requirements.

Question ID	. WW_OPERATIONS_MAINTENANCE_020000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have inspection, operations and/or maintenance requirements in the Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has inspection, operations and/or maintenance requirements in the Environmental Compliance Approval (ECA).

Question ID	. WW_OPERATIONS_MAINTENANCE_200000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Is the facility being inspected, operated and/or maintained as required in the ECA?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility is being inspected, operated, and/or maintained as required by the ECA

Question ID	. WW_OPERATIONS_MAINTENANCE_400000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility discharge to groundwater (e.g., septic field, exfiltration lagoon)?

Compliance Response(s)/Corrective Action(s)/Observation(s):

No: The facility does not discharge to groundwater (e.g., septic field, exfiltration lagoon).

Question ID	.WW_CAPACITY_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Is the sewage works design capacity evident in the approval or any supporting documentation?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works design capacity is evident in the approval and/or supporting documentation

Question ID	.WW_CAPACITY_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the sewage works operate within the design capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operates within the design capacity.

Question ID	.WW_CAPACITY_200000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the sewage works have a defined peak flow capacity?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has a defined peak flow capacity.

Question ID	.WW_CAPACITY_210000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Has the sewage works operated within its listed peak flow rate during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works operated within its peak flow rate during the inspection period.

Question ID	.WW_BYPASSES_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the sewage works had any bypasses/overflows during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: There have not been bypasses/ overflows during the inspection period.

Question ID	.WW_SOILS_SLUDGE_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Were there any biosolids and/or sludge generated by the sewage works during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Biosolids and/or sludge are not generated by the sewage works.

Question ID	.WW_SPILLS_010000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does the facility have a requirement for contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility is required to have contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situation.

Question ID	.WW_SPILLS_100000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Does the facility have the required contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situations?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility has the required contingency plans and procedures for dealing with equipment breakdowns, potential spills, and any other abnormal situation.

Question ID	.WW_SPILLS_200000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Has the facility had any spills during the inspection period?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: The facility has not had spills during the inspection period.

Question ID	.WW_SAMPLING_100000	Question Type	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have sampling requirements?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has sampling requirements.

Sampling is a requirement for both surface water and groundwater. The facility has complied with all sampling requirements. Condition 4. SURFACE WATER MONITORING AND RECORDING

Question ID	.WW_SAMPLING_110000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with all sampling and monitoring requirements for the discharge(s) during the inspection period? This does not include spills, bypasses and overflows.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with all sampling and monitoring requirements for the discharge(s) during the inspection period.

Question ID	.WW_SAMPLING_120000	Question Type	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with all other sewage works sampling and monitoring requirements during the inspection period, e.g., influent, operational, merging effluents? This does not include discharges, flow, or biosolids/sludge.

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with all other sampling requirements during the inspection period.

Question ID	.WW_SAMPLING_130000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Did the facility comply with the environmental sampling and monitoring requirements during the inspection period, e.g., surface water or groundwater?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The facility complied with environmental sampling and monitoring requirements during the inspection period.

Question ID	.WW_SAMPLING_131000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Are there any monitoring well(s) on site related to the sewage works?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: There are monitoring wells onsite related to the sewage works.

Question ID	.WW_SAMPLING_132000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1); OWRA | R.R.O. 1990, Reg. 903 | 20 | (1);

Question:
Are monitoring well(s) maintained as required and in a manner sufficient to prevent the entry of surface water and other foreign materials?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: Monitoring well(s) are maintained as required and in a manner sufficient to prevent the entry of surface water and other foreign materials.

Question ID	.WW_AUDIT_SAMPLE_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Were Ministry sewage or water quality audit samples collected during this inspection?

Compliance Response(s)/Corrective Action(s)/Observation(s):
No: Audit samples were not collected during this inspection.

Question ID	.WW_LIMITS_100000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have effluent limits set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: This sewage works has effluent limits set by an ECA.

Question ID	.WW_LIMITS_400000	**Question Type**	Information

Legislative Requirement(s):
Not Applicable

Question:
Does this sewage works have limits somewhere other than the effluent discharge (e.g., raw sewage, groundwater)?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: The sewage works has limits in locations other than the effluent discharge.

Question ID	.WW_LIMITS_410000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:
Have limits at locations other than the effluent discharge been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):
Yes: All applicable limits have been met.

The facility has trigger level concentrations built into their ECA for groundwater. The elevated ammonia concentration at the site puts the facility into Tier 3 (Contingency Measures and Compliance Monitoring Program).

Question ID	.WW_LIMITS_110000	**Question Type**	Legislative

Legislative Requirement(s):
OWRA | 53 | (1);

Question:

Have all effluent limits set by the Environmental Compliance Approval (ECA) been met?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes: All effluent limits set by an Environmental Compliance Approval (ECA) have been met.

The facility has trigger level concentrations built into their ECA. The elevated ammonia concentration at the site puts the facility into Tier 3 (Contingency Measures and Compliance Monitoring Program).

Question ID	.WW_OBJECTIVES_100000	**Question Type**	Information

Legislative Requirement(s):

Not Applicable

Question:

Does this sewage works have effluent objectives set by an Environmental Compliance Approval (ECA)?

Compliance Response(s)/Corrective Action(s)/Observation(s):

No: This sewage works does not have effluent objectives set by an Environmental Compliance Approval (ECA).

Question ID	.WW_IMPAIRMENT_100000	**Question Type**	Legislative

Legislative Requirement(s):

OWRA | 30 | (1);

Question:

Were there no indications of a known or anticipated human health impact during the inspection and/or review of relevant material?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Yes: There were no indications of a known or anticipated human health impact associated with the operation of the sewage works.

Question ID	.WW_IMPAIRMENT_200000	**Question Type**	Legislative

Legislative Requirement(s):

OWRA | 30 | (1);

Question:

Were there no indications of a known or anticipated environmental impact during the inspection and/or review of relevant material?

Compliance Response(s)/Corrective Action(s)/Observation(s):

No: There were indications of a known or anticipated environmental impact associated with the operation of the sewage works.

It was discussed that the ammonia concentration in the shallow groundwater aquifer has

continued to increase and it is of high likelihood that the source is leaks from the facility. Upon receipt of the 2023 Groundwater and Surface Water Monitoring Report, the Ministry will review and discuss appropriate abatement action with the facility.

Question ID	.WW_OTHER	**Question Type**	Legislative

Legislative Requirement(s):
Not Applicable

Question:
Were the inspection questions sufficient to address other identified non-compliance items?

Compliance Response(s)/Corrective Action(s)/Observation(s):

Ontario

Ontario Ministry of the Environment and Climate Change

Sector Compliance Branch

INSPECTION REPORT

Orgaworld Canada Ltd.
5123 Hawthorne Road
Ottawa, ON, K1G 3N4
District Office: Ottawa

Inspection Completion Date: Jun 20, 2013

Company Information

Company Identification

Company Name	Business Identification Number	Business Name
Orgaworld Canada Ltd.		

Company Address

Street Address, Unit Identifier		District Office	
5123 Hawthorne Road		Ottawa	
Municipality (Type)	**County/District**	**Province**	**Postal Code**
Ottawa (City)		ON	K1G 3N4

Company Mailing Address

Same As Company No

Street Address, Unit Identifier		City
5123 Hawthorne Road		Ottawa
Province/State	**Postal Code**	**Country**
ON	K1G 3N4	Canada

Inspection Information

Inspection Report 1-IRX0I **Pass/Fail** N/A

Incident Report Reference Number (IRRN):

Inspection Report Summary

On June 20, 2013 PO DeVillers visited the Orgaworld Ottawa to collect information relevant to the composting operation. No inspection was conducted, no inpection report was sent out.

Site Information

Site Identification

Site Name
Orgaworld Canada Ltd.

District Office
Ottawa

Contact Name : Greg Mariotti

Contact Phone # :

Site Address

Street Address, Unit Identifier
5123 Hawthorne Road

Municipality (Type)	County/District	Province	Postal Code
Ottawa (City)		ON	K1G 3N4

Site Mailing Address

Same As Site Address: No

Street Address, Unit Identifier

City

Province/State

Postal Code

Country

Inspection Team

Inspection Role	Officer Name	Officer Badge Number
Primary Officer	Mike Devillers	1327
Supervisor	Jatinbhai Patel	950

This Inspection Report does not in any way suggest that there is or has been compliance with all applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements.

Sign-Off

Primary Officer MIKE DEVILLERS **Badge Number** 1327

Date May 6 / 2014

Signature M. DeVillers

June 20/2013

Orgaworld - Ottawa

Compost inspections 2013- 2014
Post Inspection Questions

General Questions

1. Is the finished compost produced at the sites exempt from Part V of the EPA and Regulation 347?
   - Yes/No both AA and a product that is not "compost"
   - ~~Provide~~ explanation in the comments it requires NASM
   - *Valid Answers:*
     - *Yes – Existing facility – AA compost meeting three Part II Standards (metals, feedstock and pathogens) and reference other parameters in the ECA and are in compliance with the ECA*
     - *Yes – Existing facility – AA compost meeting all Part II Standards*
     - *Yes – Existing or New Facility – A compost meeting all Part II Standard including labelling*
     - *No – Existing and new facility – Category B compost produced*

2. Is Category B compost transported from the site by an approved hauler?
   - *Yes/No/NA*

3. Is Category B compost going to agricultural land to be applied under an approved NASM plan?
   - *Yes/No/NA*
   - *Note – that if the answer is No, that the compost is subject to all ministry approval requirements and can only be land applied in accordance with an ECA*

Info on Approval

4. What type of compost is the company attempting to produce?
   - *Text answer (AA, A, B)*

5. If AA is produced and the facility has an existing ECA, does the compost meet the standards in Part II of the Ontario Compost Quality Standards for metals in compost?
   - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
   - *If no, specify in comments what concentration levels have been exceeded.*

6. If AA is produced and the facility has an existing ECA, does the compost meet the standards in Part II of the Ontario Compost Quality Standards for quality of feedstock?
   - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
   - *If no, specify in comments what concentration levels have been exceeded or what feedstock was used.*

7. If AA is produced and the facility has an existing ECA, does the compost meet the standards in Part II of the Ontario Compost Quality Standards for pathogens?
   - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
   - *If no, specify in comment requirement(s) not met.*

8. If AA is produced and the facility has an existing ECA, does the facility's ECA reference other compost quality standards (ie. ~~foreign~~ matter and maturity?)
   - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")* P. 16(4)
   - *If yes, specify in comments what parameters are included in the ECA.*

Have to follow OMA until 2015

Currently not doing dual flask test P.16(4)(iii), have done some respirate rate test as per reg but doesn't believe it kicks in until 2015

9. If AA is produced and the facility has an existing ECA, is the facility incompliance with the compost quality standards in their ECA?
   - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*

- *If no, specify in comments issue(s) of non-compliance.*

10. If A is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for metals in compost?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what concentration levels have been exceeded.*

11. If A is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for quality of feedstock?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what concentration levels have been exceeded or what feedstock was used.*

12. If A is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for pathogens?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comment requirement(s) not met.*

13. If A is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for foreign matter?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what parameter(s) was exceeded.*

14. If A is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for maturity?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments the requirement(s) not met*

15. If A is produced (for new and existing sites), does the compost meet the labelling requirements in Part II of the Ontario Compost Quality Standards?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments the requirement(s) not met.*

16. If B is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for metals in compost?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what concentration levels have been exceeded.*

17. If B is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for quality of feedstock?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what concentration levels have been exceeded.*

18. If B is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for pathogens?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comment requirement(s) not met.*

19. If B is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for foreign matter?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what parameter(s) was exceeded.*

20. If B is produced (for new and existing sites), does the compost meet the standards in Part II of the Ontario Compost Quality Standards for maturity?
    - *Yes/No/NA (Refer to "Answering the Compost Inspection Questions")*
    - *If no, specify in comments what requirement(s) was not met.*

21. Will the compost be applied to an agricultural land?
    - *Yes/No*

22. Does the finished compost require a Part V approval for transportation?
    - *Yes/No*
    - *Refer to flowchart - "Determining Part V Approval and Reg 347 Requirement for Finished Compost at a Composting Facility"*

23. Does the finished compost require a Part V approval for use?
    - *Yes/No*
    - *Refer to flowchart - "Determining Part V Approval and Reg 347 Requirement for Finished Compost at a Composting Facility"*

Info on Feedstock

24. What type of feedstock(s) is used at the site?
    - *Text answer* All municipal res from ottawa / Leaf + yard small % ICI from Ottawa
25. Is the site considering using biosolids as a feedstock in the future?
    - *Yes/No*

26. Is the site considering using septage as a feedstock in the future?
    - *Yes/No*

27. Is the feedstock tested before it arrives at the site or at the site?
    - *Text answer (Before, At site)*

Info on curing

28. What % moisture does the site cure at?
    - *Numeric answer* Around 20-25% a little higher in winter test by sending to lab or oven
29. How many days curing is currently used at the site?
    - *Numeric answer* 21 days
    - *If the answer is less than 21 days, ask site to explain why and include in comments*

30. How does the site test for maturity?
    - *Text answer (e.g. Solvita Index™ tes, DEWAR self-heating test)*
      dual flask but not consistently & respiration
31. Has the site used either of the two tests O2 Consumption or CO2 Production for respiration?
    - *Yes/No* occasionally
    - *If yes, list which one has been used in the comments*

32. Has the site experienced difficulty curing at >40% moisture?
    - *Yes/No answer* haven't gone that high, anticipate it would cause an issue at sticking to screens
33. Does the site rehydrate the curing materials?
    - *Yes/No* only during maturation process
    - *If yes, ask them to describe the process they use and include in the comments*

34. Is the site using leachate to rehydrate the curing materials?
    - *Yes/No*
    - *Note: Leachate should only be used to rehydrate the composting material prior to the termophilic temperature period. Operators should also be aware that extensive use of this practice may lead to the accumulation of contaminants.*

35. Is the water the site uses to rehydrate materials treated before it is used?
    - *Yes/No*

Info on how they sample –

36. Does the site have a Standard Operating Procedure or written methodology for Sampling?
    - *Yes/No*
    - *Will need to review SOP/methodology to determine if it follows the recommended method outlines in "Appendix 1: Feedstock and Compost Sampling of the Ontario Compost Quality Standards"*
        - *e.g. determine if 10 grab samples (1-3 liters each) are mixed to prepare an appropriate composite laboratory submission sample. Grabs should be taken from different, evenly spaced points on the pile. The outside and base of the pile should be avoided.*

Asked for

37. Does the site take random grab samples?
    - *Yes/No* ~~Use random~~ part of SOP
    - *If yes, specify in the comments where they take the sample from (From 1m inside the pile, From the surface or From both)*

38. Is a duplicate sample being maintained on site for 6 months? → no
    - *Yes/No* Lab keeps it

39. What method is used by the site to measure the temperature of the compost?
    - *Text answer (e.g. (55oC) of thermophilic phase – at 1 m inside the pile, or at surface*

    Probe 1m, fully inserted

40. At what stage in the process does the site send the compost for testing?
    - *Text answer (At maturity, At bagging, Before or After screening)*

41. What equipment does the site use for screening?
    - *Text answer (Explain the equipment used)*

    Trommel screens

42. What size screen is used during the screening process?
    - *Numeric answer (Units in mm)*

    Compost 12mm / NASM 12.mm – 20 mm

43. Does the site count or consider the bulking agent (e.g., woodchips) as "feedstock"?
    - *Yes/No*

    NA. No need for bulking agent

44. Does the site test the Bulking agent?
    - *Yes/No* NA

45. Does the site anticipate any issues achieving new Category AA foreign matter standards by July 15, 2015?
    - *Yes/No* Feedstock is clean

Water losses and process considerations

46. Does the site experience water loss at any stage of the process?
    - *Yes/No*
    - *If yes, specify in comments generally if the water loss is consistent or highly variable*

warmer weather feedstock is dry, winter is wetter → leachate

47. If water loss is experienced, does the site know what the water loss is at each stage of the process
    - *Yes/No*
    - *If yes, specify in comments generally the water loss at each stage of the process*

48. Does the site use forced aeration during curing?
    - *Yes/No*
    - *If yes, specify the type (e.g. fans, ventilation) in the comments*

49. Has the site received odour complaints (related to the anaerobic conditions and/or odor during the curing process)?
    - *Yes/No*
    - *If yes, specify in comments what steps the facility has taken to address the concerns.*

50. How much water is used on the site per day (worst case scenario)?
    - *Numeric Answer*

Not sure, not measured.

Received ✓ 20/2013

Orgaworld Part of Shanks Group	Quality System	Code: . ST02
		Version 2012.2 Document: Sampling/Testing of outgoing Compost
	Sampling / Testing Procedures for Outgoing Compost	Date : 03/10/2012
		Page: 1 of 4

1. GENERAL DESCRIPTION

It is a requirement as stated in our Certificate of Approval (Waste) for both facilities, that certain procedures and methodology be followed when sampling compost for analysis. In September 2012 this changed with the introduction of the "Ontario Compost Quality Standards". These standards outline what must be sampled, when it must be sampled and what parameters must be tested for and met, before Orgaworld compost can be sent to the customer. **This important document SUPERCEDES each facilities Environmental Compliance Approval (ECA – formerly our Certificate of Approval).** Therefore all testing of Orgaworld compost for the London and Ottawa facilities will conform to this new standard.

This new standard becomes effective January 1, 2013 for everything except the limits for maturity and foreign matter, which come into effect on July 15, 2015.

2. SCOPE

The old ECA's for London and Ottawa detailed a sampling frequency: "a composite sample, consisting of a minimum of ten representative grab samples, shall be collected **every two (2) months** representing all compost generated within the preceding sixty (60) days or **every 5,000 tonnes** of finished compost, whichever comes first;" This has now changed. For both facilities the sampling frequency is determined by **Table A1: Baseline Sampling Frequency of Compost in the Ontario Compost Quality Standards.** It uses compost production volume, and whether the compost contains "Human Body Waste Feedstock" which is defined as "feedstock materials derived from or containing wastes from the human body, including sewage biosolids, domestic septage and **diapers.**"

At the time of writing, both facilities were producing compost in the range of 15,000 – 50,000 tonnes annually. By using the chart you see that both facilities have to perform at least **12 samples per year distributed throughout the production year to capture seasonal variability.** Additionally, because they accept diapers in their feedstock, the **London facility has to add a further 4 samples per year.**

Therefore, every year: **Ottawa must sample their compost 12 times throughout the year.**
London must sample their compost 16 times throughout the year.

3. RESPONSIBILITIES

The person giving the responsibility of taking the samples must follow this procedure. The Compost Process Supervisor and Site Manager will be responsible to ensure this procedure is followed and that all samples are taken and submitted as per the requirements of the Ontario Compost Quality Standards.

4. PROCEDURE FOR SAMPLING COMPOST

Required Equipment:

- Clean hand shovel
- Clean plastic bag, bucket or pail large enough to contain 10 grab samples of 1-3 litres each
- Clean tarp at least 2mX 3m
- Implement handle that can be cleaned and disinfected between samples to split the sample on tarp
- Clean sample containers (ie. new plastic freezer bags)
- Marker to identify the sample (ie. date, location, bin number, etc)
- Shovel to remove rejected material from the tarp

A clean area where the tarp can be laid out and the compost mixed and handled is essential. This can be a cleaned part of the concrete floor, a paved area, or a sheet of plywood.

The sample locations should be randomly selected from a lot of compost following these steps:

respiration rate 2015 → ADD

METHOD:

1. Select a starting point (usually at the front of the compost bunker to be sampled)
2. Measure the perimeter of the lot of compost (this can be done by pacing if you are sampling a free standing pile). For both facilities, you can calculate what the perimeter length is knowing the dimensions of the bunker.
   Perimeter = Length + width + length + width
3. Divide the total perimeter distance into 10 parts (since you will be taking 10 grab samples) to give the length of one distance interval
   Ex. If your perimeter was 100m, divided by 10 is 10m. Therefore you would sample every 10m.
4. In order to ensure "randomness", the MOE has introduced the concept of generating a random number. This can be done by:
   Using Excel, use the following formula to generate a random number (=round(rand(),2). Multiply that number by the distance interval, rounding up or down as required. For example, if your sample interval was 10m as calculated in step 3, and you generated a random number of 0.68, then 10 X 0.68 = 6.8 metres. Therefore every 6.8 metres you would take a sample.
5. Pace off this distance from the starting point to find the first sampling location.
6. At the midpoint between the top and bottom of the lot, dig approximately 1 metre into the compost using a small shovel or similar tool.
7. Collect a 1-3 litre grab sample and place the grab sample in a plastic bucket or pail
8. Walk a distance equal to the distance interval and collect a second grab sample (1-3 litres) and combine it with the first sample in the bucket.

Repeat until all 10 grab samples have been collected.

QUARTERING METHOD TO PREPARE A LABORATORY SAMPLE

a) Take the sample from the pail and form it into a conical pile in the middle of the clean tarp.
b) Flatten the top of the cone and divide it into 4 sections
c) Flip a coin to decide which tow diagonal quarters to accept and which to reject. Remove and discard the opposite sections
d) Mix the remaining quarters into a pile and repeat steps a,b and c until the desired volume is achieved (usually about 5 to 10 kg)
e) **Split this sample into two parts. One can be sent to the lab as the "representative sample" and the other must be kept in a refrigerator for a minimum of 6 months. The ministry may require additional testing to be performed on this duplicate sample, therefore this sample must be handled and stored "appropriately"**

2) The representative sample can then be placed in a clean dry sample container (freezer bag) and labelled with the appropriate information such as bunker number, date sample was taken, and name of person taking it.
3) **Ensure that the necessary information is written down in the facility sample log. This log will require information such as:**
   a) **sample locations and volumes collected**
   b) **day and time of sample collection**
   c) **sample handling procedures**
   d) **parameters tested for and the resulting concentrations**
   e) **name of laboratory facility conducting the testing**
   f) **conclusions drawn with respect to results of the monitoring and testing**
4) The representative sample shall be stored at a temperature from 0 C to 5 C during shipping and storage until the time of analysis
5) In order to determine the fecal coliform content, the delay between the collection of increments and the analysis shall not exceed 48 hrs.

METAL ANALYSIS:

For both facilities, the compost must be analyzed for the maximum concentration of metals in the compost:

Item	Column 1	Column 2	Column 3	Column 4
	Metal	Category AA Compost	Category A Compost	Category B Compost
		mg/kg dry weight		
1.	Arsenic	13	13	75
2.	Cadmium	3	3	20
3.	Chromium	210	210	1060
4.	Cobalt	34	34	150
5.	Copper	100	400	760
6.	Lead	150	150	500
7.	Mercury	0.8	0.8	5
8.	Molybdenum	5	5	20
9.	Nickel	62	62	180
10.	Selenium	2	2	14
11.	Zinc	500	700	1850

Note: PCB analysis no longer required

PATHOGEN LIMITS:

For both Orgaworld facilities, the pathogen limits are:
E. Coli – must not exceed 1000 colony forming units (CFU) / gram total solids
Salmonella – must not exceed 3 MPN(most probable number)/4 grams total solids

FOREIGN MATTER: JUNE 2015

Parameter	Category AA	Category A	Category B
Foreign matter	Total foreign matter greater than 3 mm shall not exceed 1.0%, calculated on a dry weight basis, and plastic cannot exceed 0.5%: **and** Compost shall not contain any foreign matter greater than 25 mm per 500 ml.	Total foreign matter greater than 3 mm shall not exceed 1.0%, calculated on a dry weight basis, and plastic cannot exceed 0.5%: **and** Compost shall not contain any foreign matter greater than 25 mm per 500 ml.	Total foreign matter greater than 3 mm shall not exceed 2.0%, calculated on a dry weight basis, and plastic cannot exceed 0.5%: **and** Compost shall not contain any foreign matter greater than 25 mm per 500 ml.
Sharp Foreign matter	Compost shall contain no material of a size or shape that can reasonably cause human or animal injury.	Compost shall contain no material of a size or shape that can reasonably cause human or animal injury.	Compost shall have a maximum of 3 pieces of sharp foreign matter per 500ml: **and** The maximum dimension of any sharp foreign matter shall be 12.5 mm.

MATURITY:

For regulatory purposes the Dewar Flask can no longer be used to demonstrate Maturity.
Compost will be deemed mature if cured for a minimum of 21 days from the day the last portion of material went into the batch, and the respiration rate is :

- Less than or equal to, 400 milligrams of oxygen per kilogram of volatile solids (on a dry weight basis) per hour: or,

- Less than or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter (on a dry weight basis) per day

5. SAMPLE FAILURE PROCEDURE (RE-TESTING)

If the analytical result of a compost sample shows parameters for metals content or pathogens above regulatory limits, then the following procedure must be completed.

i. Additional samples must be taken (**at least 4 samples**)
ii. These four samples must all pass the criteria
iii. The average of all the samples taken (even the failed one) must then pass the criteria
iv. If the above criteria are not met after a total of 12 samples are taken, the batch fails.
v. All documentation and test results must be maintained and made available to the MOE upon request.

6. TIME FOR COMPLETION

This procedure will take approximately one hour to complete.

7. HEALTH AND SAFETY CONCERNS

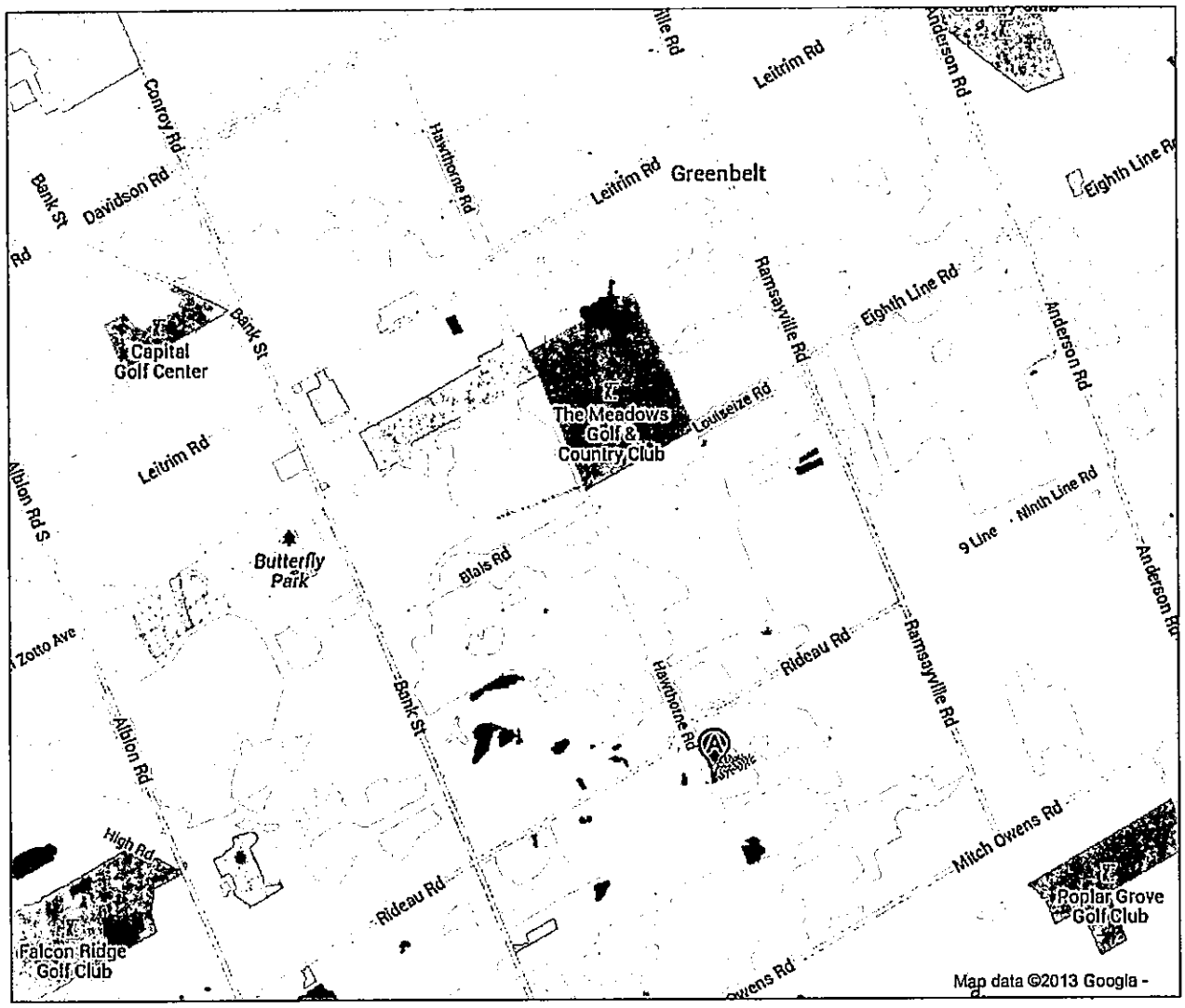
Clean, unused gloves are required for this test. The gloves will have to be heavy duty as the compost can be quite warm depending on how deep the sample is obtained from. A dust mask should be worn as well.

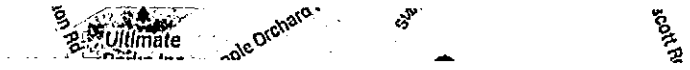
7. RELATED DOCUMENTATION

Ontario Compost Quality Standards July 25, 2012
National Standard of Canada CAN/BNQ 0413-200/2005 Organic Soil Conditioners - Compost

To see all the details that are visible on the screen, use the "Print" link next to the map.

Google




Ultimate

Ontario

Ministry of the Environment
Ministère de l'Environnement

CERTIFICATE OF APPROVAL
AIR
NUMBER 7021-7HQNDE
Issue Date: September 16, 2009

Orgaworld Canada Ltd.
Post Office Box, No. 364
Waterloo, Ontario
N2J 4A4

Site Location: 5123 Hawthorne Road, Gloucesster (Ottawa)
Lot 27, Concession 6 (Rideau Front), Gloucester
Ottawa City, Ontario

You have applied in accordance with Section 9 of the Environmental Protection Act for approval of:

Description Section

An aerobic composting facility, consisting of the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

including the *Equipment* and any other ancillary and support processes and activities, **operating at a *Facility Production Limit* of up to 150,000 tonnes per year of *Organic Waste*** exhausting to the atmosphere as described in the *ESDM Report.*

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. *"Acoustic Assessment Report"* means the report, prepared in accordance with *Publication NPC-233* and Appendix A of the *Basic Comprehensive User Guide,* by Conestoga-Rovers & Associates Ltd., and dated June 20, 2008, submitted in support of the application, that documents all sources of noise emissions and *Noise Control Measures* present at the *Facility* and includes all up-dated *Acoustic Assessment Reports* as required by the Documentation Requirements conditions of this *Certificate* to demonstrate continued compliance with the *Performance Limits* following the implementation of any *Modification.*

2. *"Acoustic Assessment Summary Table"* means a table prepared in accordance with the *Basic Comprehensive User Guide* summarising the results of the *Acoustic Assessment Report,* up-dated as required by the Documentation Requirements conditions of this *Certificate.*

3. *"AERMOD"* means the dispersion model developed by the American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) including the PRIME (Plume Rise Model Enhancement) algorithm, used to calculate, as a minimum, one-hour and 24-hour average concentrations of a contaminant at the *Point of Impingement* and at the *Sensitive Receptors.*

4. *"Air Pollution Control Equipment"* means the air pollution control equipment, including but not limit to the ammonia scrubber, biofilters and bioscrubber used to treat the air in the *Facility* as described in the *ESDM Report* before the air is discharged into the atmosphere.

5. *"Air Standards Manager"* means the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, or any other person who represents and carries out the duties of the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, as those duties relate to the conditions of this *Certificate.*

6. *"Basic Comprehensive User Guide"* means the *Ministry* document titled "Basic Comprehensive Certificates of Approval (Air) User Guide" dated April 2004 as amended.

7. *"Certificate"* means this entire certificate of approval document, issued in accordance with section 9 of the *EPA* and includes all the *Schedules,* and the *Supporting Documentation.*

8. *"Certificate (Waste)"* means the Provisional Certificate of Approval (Waste Disposal Site) number 2766-7HEPSZ issued to the *Company* in accordance with section 27 of the *EPA* and includes all the schedules contained in the certificate, as amended.

9. *"Company"* means Orgaworld Canada Ltd. that is responsible for the construction or operation of the *Facility* and includes any successors and assigns.

10. *"Compound of Concern"* means a contaminant that, based on generally available information, may be emitted to the atmosphere in a quantity from any source at the *Facility* that is significant either in comparison to the relevant *Ministry Point of Impingement Limit* or if a *Ministry Point of Impingement Limit* is not available for the compound then, based on generally available toxicological information, the compound has the potential to cause an adverse effect as defined by the *EPA* at a *Point of Impingement.*

11. *"Description Section"* means the section on page one of the *Certificate* describing the *Company's* operations and the *Equipment* located at the *Facility* and specifying the *Facility Production Limit* for the *Facility.*

12. *"Director"* means any person appointed in writing by the Minister of the Environment pursuant to section 5 of the *EPA* as a Director for the purposes of section 9 of the *EPA.*

13. *"District Manager"* means the District Manager of the appropriate local district office of the *Ministry,* where the *Facility* is geographically located.

14. *"Emission Summary Table"* means the table prepared in accordance with *O. Reg. 419/05* and the *Procedure Document* listing the appropriate *Point of Impingement* concentrations of each *Compound of Concern* from the *Facility* and providing comparison to the corresponding *Ministry Point of Impingement Limit* or *Maximum Concentration Level Assessment.*

15. *"Environmental Assessment Act"* means the Environmental Assessment Act, R.S.O. 1990, c.E.18.

16. *"EPA"* means the Environmental Protection Act, R.S.O. 1990, c.E.19.

17. *"Equipment"* means equipment or processes described in the *ESDM Report,* this *Certificate* and in the *Supporting Documentation* referred to herein and any other equipment or processes.

18. *"Equipment with Specific Operational Limits"* means any *Equipment* related to the thermal oxidation of waste or waste derived fuels, fume incinerators or any other *Equipment* that is specifically referenced in any published *Ministry* document that outlines specific operational guidance that must be considered by the *Director* in issuing of a Certificate of Approval.

19. *"ESDM Report"* means the Emission Summary and Dispersion Modelling Report prepared in accordance with the *Procedure Document* by Conestoga-Rovers & Associates and dated June 2008 submitted in support of the application, and includes any amendments to the ESDM Report listed in *Schedule A* and all up-dated ESDM Reports prepared as required by the Documentation Requirements conditions of this *Certificate.*

20. *"Facility"* means the entire operation located on the property where the *Equipment* is located.

21. *"Facility Production Limit"* means the production limit placed on the main product(s) or raw materials used by the *Facility* that represents the design capacity of the *Facility* and assists in the definition of the operations approved by the *Director.*

22. *"Fugitive Odour Control Plan"* means a document or a set of documents, forming part of the *Manual,* that provides written instructions to staff of the *Company* to meet the requirements in Condition 6.1(d) in this *Certificate.*

23. *"Log"* means the up-to-date log that is used to track all *Modifications* to the *Facility* since the date of this *Certificate* as required by the Documentation Requirements conditions of this *Certificate.*

24. *"Manager"* means the Manager, Technology Standards Section, Standards Development Branch of the *Ministry,* or any other person who represents and carries out the duties of the Manager, as those duties relate to the conditions of this *Certificate.*

25. *"Manual"* means a document or a set of documents that provides written instructions to staff of the *Company,* to meet the requirements in Condition 6.1 in this *Certificate.*

26. *"Maximum Concentration Level Assessment"* means the Maximum Concentration Level Assessment for the purposes of a Basic Comprehensive Certificate of Approval, described in the *Basic Comprehensive User Guide,* prepared by a *Toxicologist* using currently available toxicological information, that demonstrates that the concentration at any *Point of Impingement* for a *Compound of Concern* that does not have a *Ministry Point of Impingement Limit* is not likely to cause an adverse effect as defined by the *EPA.* The concentration at *Point of Impingement* for a *Compound of Concern* must be calculated in accordance with *O. Reg. 419/05.*

27. *"Ministry"* means the ministry of the government of Ontario responsible for the *EPA* and includes all officials, employees or other persons acting on its behalf.

28. *"Ministry Point of Impingement Limit"* means the appropriate Standard from Schedule 1, 2 or 3 from *O.Reg. 419/05* and if a standard is not provided for a *Contaminant of Concern* the appropriate criteria listed in the *Ministry* publication titled "Summary of Standards and Guidelines to support Ontario Regulation 419: Air Pollution - Local Air Quality (including Schedule 6 of O. Reg. 419 on Upper Risk Thresholds)", dated February 2008, as amended.

29. *"Modification"* means any construction, alteration, extension or replacement of any plant, structure, equipment, apparatus, mechanism or thing, or alteration of a process or rate of production at the *Facility* that may discharge or alter the rate or manner of discharge of a *Compound of Concern* to the atmosphere or discharge or alter noise or vibration emissions from the *Facility.*

30. *"Noise Control Measures"* means measures to reduce the noise emissions from the *Facility* and/or *Equipment* including, but not limited to, silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers.

31. *"O. Reg. 419/05"* means the Ontario Regulation 419/05, Air Pollution – Local Air Quality.

32. *"Operating Envelope"* means the limits on the *Company's* approved operations set out in Conditions 2.3 to 2.7 of this *Certificate.*

33. *"Organic Waste"* means the organic waste listed in Condition 2(1) in the *Company's Certificate (Waste),* that the *Company* is approved to receive and process in the *Facility.*

34. *"Performance Limits"* means the performance limits specified in the section of this *Certificate* titled Performance Limits.

35. *"Point of Impingement"* means any point outside the facility in the natural environment and as defined by s.2 of *O. Reg. 419/05.*

36. *"Point of Reception"* means Point of Reception as defined by *Publication NPC-205* and/or *Publication NPC-232,* as applicable.

37. *"Pre-Test Information"* means the information outlined in Section 1 of the *Source Testing Code.*

38. *"Procedure Document"* means *Ministry* Procedure titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated July 2005, as amended.

39. *"Processes with Significant Environmental Aspects"* means the *Equipment* which, during regular operation or if not properly operated or maintained, may cause or are likely to cause an adverse effect.

40. *"Publication NPC-205"* means the *Ministry* Publication NPC-205, "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)", October, 1995 as amended.

41. *"Publication NPC-207"* means the *Ministry* draft technical publication "Impulse Vibration in Residential Buildings", November 1983, supplementing the Model Municipal Noise Control By-Law, Final Report, August 1978, published by the *Ministry.*

42. *"Publication NPC-232"* means the *Ministry* Publication NPC-232, "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)", October, 1995 as amended.

43. *"Publication NPC-233"* means the *Ministry* Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995 as amended.

44. *"Schedules"* means the following schedules attached to the *Certificate* and forming part of the *Certificate* namely:

    Schedule "A" - *Supporting Documentation*
    Schedule "B" - Procedure to calculate 10-minute average concentrations of odour

45. *"Sensitive Receptor"* means any location where routine or normal activities occurring at reasonably expected times would experience adverse effect(s) from odour discharges from the *Facility,* including one or a combination of:

    (a) private residences or public facilities where people sleep (e.g.: single and multi-unit dwellings, nursing homes, hospitals, trailer parks, camping grounds, etc.),
    (b) institutional facilities (e.g.: schools, churches, community centres, day care centres, recreational centres, etc.),
    (c) outdoor public recreational areas (e.g.: trailer parks, play grounds, picnic areas, etc.), and

(d) other outdoor public areas where there are continuous human activities (e.g.: commercial plazas and office buildings).

46. *"Source Testing Code"* means the Source Testing Code, Version 2, Report No. ARB-66-80, dated November 1980, prepared by the *Ministry,* as amended.

47. *"Source Testing"* means sampling and testing to measure the rates of emissions of odour, hydrogen sulphide and total mercaptans as required under this *Certificate* from the exhaust stack of the *Air Pollution Control Equipment* in the *Facility* under process conditions which represent a maximum operating range achievable at the time of the measurement, within the approved operating capacity of the *Facility.*

48. *"Start-up Date"* means the date when *Organic Waste* is first received at the *Facility.*

49. *"Supporting Documentation"* means the documents listed in Schedule "A" of this *Certificate* which forms part of this *Certificate.*

50. *"Toxicologist"* means a qualified professional currently active in the field of risk assessment, risk management and toxicology that has a combination of formal university education, training and experience necessary to assess the *Compound of Concern* in question.

51. *"Written Summary"* means the written summary that must be submitted annually to the *Ministry* as required by the Section titled Reporting Requirements of this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

1.1 Except as otherwise provided by this *Certificate,* the *Facility* shall be designed, developed, built, operated and maintained in accordance with the terms and conditions of this *Certificate* and in accordance with the application, the *ESDM Report,* the *Acoustic Assessment Report,* plans, specifications and *Supporting Documentation* submitted and the following *Schedules* attached hereto:

Schedule "A" - *Supporting Documentation*
Schedule "B" - Procedure to calculate 10-minute average concentrations of odour

2. OPERATIONAL FLEXIBILITY

2.1 The *Company* may make *Modifications* to the *Facility* in accordance with this *Certificate.*

2.2 Despite Condition 2.1, all *Modifications* made by the *Company* shall be within the *Operating Envelope* of the *Facility* as defined by conditions 2.3 to 2.7.

2.3 Despite Condition 2.1, the *Company* shall not make *Modifications* to the *Facility* that are outside the scope of the intended operations of the *Facility* as described in the *Description Section.*

2.4 Despite Condition 2.1, the *Company* shall not make *Modifications* to the *Facility* that result in an increase of the *Facility Production Limit* above the level specified in this *Certificate.*

2.5 Despite Condition 2.1, the *Company* shall not make *Modifications* to the *Facility* that would add any *Equipment with Specific Operational Limits.*

2.6 Despite Condition 2.1, the *Company* shall only make *Modifications* to the *Facility* which comply with the *Performance Limits.*

2.7 Despite Condition 2.1, the *Company* shall not make *Modifications* to the *Facility* if the *Modifications* would be subject to the *Environmental Assessment Act.*

2.8 Condition 2.1 of this *Certificate* shall expire five (5) years from the date of this *Certificate,* unless this *Certificate* is revoked prior to this date. Upon expiry of Condition 2.1 of this *Certificate,* the *Company* shall apply for amendment to include the current *ESDM Report* and the current *Acoustic Assessment Report* in Schedule "A" as *Supporting Documentation* to this *Certificate.*

3. PERFORMANCE LIMITS

3.1 The *Company* shall, at all times, ensure that all *Equipment* that are a source of a *Compound of Concern* from the *Facility* are operated to comply with the following *Performance Limits:*

(a) the maximum concentration of any *Compound of Concern* at a *Point of Impingement* shall not exceed the corresponding *Ministry Point of Impingement Limit;*

(b) for any *Compound of Concern* that does not have a *Ministry Point of Impingement Limit,* the maximum concentration of any *Compound of Concern* at a *Point of Impingement* shall not be greater than a level assessed as part of the original *ESDM Report;*

(c) for any *Compound of Concern* that does not have a *Ministry Point of Impingement Limit,* the maximum concentration of any *Compound of Concern* at a *Point of Impingement* shall not be greater than the *Maximum Concentration Level Assessment* submitted to the *Ministry* and accepted by the *Air Standards Manager;*

(d) the maximum 10-minute average concentration of odour at the most impacted *Sensitive Receptor,* computed in accordance with Schedule "B", resulting from the operation of the *Facility,* shall not be greater than 1.0 odour unit.

3.2 The *Company* shall, no later than thirty (30) days prior to:

(a) the introduction of a new *Compound of Concern* that does not have a *Ministry Point of Impingement Limit;*

(b) an increase to the concentration at a *Point of Impingement* of a *Compound of Concern* that does not have a *Ministry Point of Impingement Limit* such that the resulting concentration at a *Point of Impingement* will be greater than the level that was reviewed as part of the original *ESDM Report;* or

(c) an increase to the concentration at a *Point of Impingement* of a *Compound of Concern* that does not have a *Ministry Point of Impingement Limit* such that the resulting concentration at a *Point of Impingement* will be greater than the corresponding *Maximum Concentration Level Assessment* previously accepted by the *Air Standards Manager;*

submit a proposed or revised *Maximum Concentration Level Assessment* for the *Compound of Concern* to the *Director* for review by the *Air Standards Manager.*

3.3 The *Company* may not use the *Maximum Concentration Level Assessment* prior to thirty (30) days from the date of an acknowledgment letter from the *Ministry* unless the *Company* receives written acceptance by the *Director.*

3.4 If the *Air Standards Manager* does not accept the proposed *Maximum Concentration Level Assessment,* the *Company* shall not introduce or increase the emission rate of the *Compound of Concern* without approval from the *Director.*

3.5 The *Company* shall, at all times, ensure that the noise emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-205.*

3.6 The *Company* shall, at all times, ensure that the vibration emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-207.*

4. DOCUMENTATION REQUIREMENTS

4.1 The *Company* shall, within three (3) months after the *Start-up Date* of the *Facility,* update the *ESDM Report* to incorporate all the as-built details of the *Facility.*

4.2 The *Company* shall, at all times, maintain documentation that describes the current operations of the *Facility,* including but not limited to:

(a) a current *ESDM Report* that demonstrates compliance with the *Performance Limits* for the *Facility* regarding all *Compounds of Concern;*

(b) a current *Acoustic Assessment Report* that demonstrates compliance with the *Performance Limits* for the *Facility* regarding noise emissions;

(c) an up-to-date *Log* that describes each *Modification* to the *Facility;* and

(d) a record of the changes to the *ESDM Report* and *Acoustic Assessment Report* that documents how each *Modification* is in compliance with the *Performance Limits.*

4.3 The *Company* shall, during regular business hours, make the current *Emission Summary Table* and *Acoustic Assessment Summary Table* available for inspection at the *Facility* by any interested member of the public.

5. REPORTING REQUIREMENTS

5.1 The *Company* shall provide the *District Manager* and the *Director* no later than May 31 of each year, a *Written Summary* of activities undertaken in the previous calendar year that shall include the following:

(a) a signed statement that the *Facility* was in compliance with the *Performance Limits;*

(b) a summary of each *Modification* that took place in the previous calendar year and resulted in a change in the previously calculated concentration at the *Point of Impingement* for any *Compound of Concern* or resulted in a change in the sound levels reported in the *Acoustic Assessment Summary Table* at any *Point of Reception;*

(c) a list of each *Compound of Concern* submitted to the *Air Standards Manager* for review in the previous calendar year;

(d) a review of any changes to a *Ministry Point of Impingement Limit* undertaken in the previous calendar year that affect a *Compound of Concern* emitted from the *Facility;*

(e) a tabulated summary of the changes in the emission rate of any *Compound of Concern* and the resultant increase or decrease in the *Point of Impingement* concentration reported in the *ESDM Report* over the previous calendar year; and

(f) the *Emission Summary Table* and *Acoustic Assessment Summary Table* for the *Facility* as of December 31 from the previous calendar year.

6. OPERATION AND MAINTENANCE

6.1 The *Company* shall prepare and submit to the *District Manager,* not later than three (3) months prior to the *Start-up Date* of the *Facility,* a *Manual* outlining the operating procedures and maintenance programs for all *Processes with Significant Environmental Aspects.* The *Company* shall finalize the *Manual* in consultation with the *District Manager* and update the *Manual* if required. The *Company* shall ensure that all *Processes with Significant Environmental Aspects* are operated and maintained at all times in accordance with this *Certificate,* and the most updated operating procedures and maintenance programs in the *Manual.* The operating procedures and maintenance programs in the *Manual* shall specify, as a minimum,:

(a) frequency of inspections and scheduled preventative maintenance;

(b) the parameters and the frequency of monitoring of those parameters to ensure the proper operation and maintenance of the equipment in the *Air Pollution Control Equipment;*

(c) procedures to prevent upset conditions;

(d) the *Fugitive Odour Control Plan,* identifying fugitive odour emission sources from the operation of the *Facility* and outlining the physical and procedural controls such as policies and standard operating procedures required in order to prevent or mitigate fugitive odour emissions from the operation of the *Facility;*

(e) procedures for record keeping activities relating to the operation and maintenance programs.

6.2 The *Company* shall keep all doors in the enclosed building of the *Facility* fully closed at all times, except when used for necessary personnel or vehicle entrance and exit.

6.3 The *Company* shall keep the enclosed building of the *Facility* under adequate negative pressure whenever there are raw *Organic Waste* or *Organic Waste* in process or partially cured compost materials inside the building of the *Facility.*

6.4 The *Company* shall, whenever incoming leaf and yard waste is unloaded on the storage pad, immediately screen the materials for odorous materials such as grass clippings and move those materials inside the enclosed building for storage or processing.

7. COMPLAINTS RECORDING PROCEDURE

7.1 A designated representative of the *Company* shall be available to receive complaints twenty-four (24) hours per day, seven (7) days per week.

7.2 If at any time, the *Company* receives any environmental complaints from the public regarding the operation of the *Equipment* approved by this *Certificate,* the *Company* shall respond to these complaints according to the following procedures:

Step 1: Record of Compliant

(a) The *Company* shall record each complaint in a computerized tracking system. The information to be recorded shall include the following:

(i) name, address and the telephone number of the complainant, if known;
(ii) time and date of the complaint; and
(iii) details of the complaint.

Step 2: Investigation and Handling of Complaint

(b) After the complaint has been recorded in the tracking system, the *Company* shall immediately report, either to the *District Manager* by phone during office hours or to the *Ministry's* Spills Action Centre at 1-800-268-6060 off office hours, on the receipt of the complaint. The *Company* shall immediately initiate investigation of the complaint. The investigation shall include, as a minimum, the following:

(i) determination of the activities undertaken in the *Facility* at the time of the complaint;
(ii) meteorological conditions including, but not limited to the ambient temperature, approximate wind speed and its direction;
(iii) determination if the complaint is attributed to activities in the *Facility* and if so, the possible cause(s) of the complaint;
(iv) determination of the remedial action(s) to address the cause(s) of the complaint, and implementation of the remedial action(s) as soon as practicably possible.

(c) The *Company* shall document the response provided to the complainant, if known, and shall make the document(s) available for inspection by staff of the *Ministry* upon request. The response shall include the results of the investigation of the complaint, the action(s) taken or planned to be taken to address the cause(s) of the complaint, and if follow-up response(s) would be provided.

(d) Upon successful resolution of the complaint, the *Company* shall, within three (3) business days, submit a report to the *District Manager* on that complaint, and all proposed action(s) to prevent recurrence of the complaint in the future.

All the information collected and action(s) taken in this step have to be recorded in the computerized tracking system.

Step 3: Suspension of Operation

(e) If the complaint could not be resolved to the satisfaction of the *District Manager,* or complaints have continually been received during the course of resolution of the complaint(s), the *Company* shall, upon written instructions from the *District Manager,* suspend the receipt of *Organic Waste* and/or suspend operations of the *Facility* in accordance with the Emergency Response and Contingency Plan contained in the *Company's Certificate (Waste).*

8. RECORD KEEPING REQUIREMENTS

8.1 Any information requested by the *Ministry* concerning the *Facility* and its operation under this *Certificate,* including, but not limited to, any records required to be kept by this *Certificate,* shall be provided to the *Ministry,* upon request, in a timely manner.

8.2 The *Company* shall retain, for a minimum of seven (7) years from the date of their creation, except as noted below, all reports, records and information described in this *Certificate* and shall include but not be limited to:

(a) the current *ESDM Report;*

(b) the *Acoustic Assessment Report;*

(c) supporting information used in the emission rate calculations performed in the *ESDM Report* and *Acoustic Assessment Report* to document compliance with the *Performance Limits* (superseded information must be retained for a period of three (3) years after *Modification);*

(d) the *Log* that describes each *Modification* to the *Facility;*

(e) the *Written Summaries* provided to the *Ministry;*

(f) the *Manual* on the operating procedures and maintenance programs, including records on the maintenance, repair and inspection of the *Equipment* related to all *Processes with Significant Environmental Aspects;*

(g) all reports of the *Source Testing;*

(h) all records generated from the monitoring of the *Air Pollution Control Equipment;* and

(i) the complaints recording procedure, including records related to all environmental complaints made by the public as required by the section titled Complaints Recording Procedure of this *Certificate.*

9. MONITORING

9.1 The *Company* shall monitor the parameters of the *Air Pollution Control Equipment,* either as specified in the *Manual* which shall contain the manuals of the equipment manufacturers, or as deemed necessary in accordance with site operational conditions. The results of monitoring of these parameters shall be recorded in a log.

10. SOURCE TESTING

10.1 The *Company* shall perform *Source Testing* to determine the rates of emissions of odour, hydrogen sulphide and total mercaptans from the exhaust stack of the *Air Pollution Control Equipment,* once within six (6) months after the *Start-up Date* of the *Facility,* and every six (6) months thereafter within a period as directed or agreed to by the *District Manager.*

10.2 The *Company* shall also determine, at times of *Source Testing,* the rate of emission of odour from the fugitive odour source(s) in the *Facility.* The fugitive odour sources include the leaf and yard waste on the storage pad outside the enclosed building of the *Facility,* and the finished compost stored outside the *Facility* if they are required to be stored outdoor.

10.3 The *Company* shall submit, not later than three (3) months prior to the *Start-up Date* of the *Facility,* to the *Manager* a test protocol, including the *Pre-Test Information* for fugitive odour emission measurement and the *Source Testing* required by the *Source Testing Code.* The *Company* shall finalize the test protocol in consultation with the *Manager.*

10.4 The *Company* shall not perform *Source Testing* and the fugitive odour emission measurement required under this *Certificate* until the *Manager* has accepted the test protocol.

10.5 The *Company* shall, after the *Manager* has accepted the test protocol, conduct the *Source Testing* and the fugitive odour emission measurement required in this *Certificate* in accordance with the testing schedule unless the schedule has been changed otherwise by the *District Manager.*

10.6 The *Company* shall notify the *Director,* the *District Manager* and the *Manager* in writing of the location, date and time of any impending *Source Testing* and fugitive odour emission measurement required by this *Certificate,* at least fifteen (15) days prior to the *Source Testing* and fugitive odour emission measurement.

10.7 The *Company* shall submit a report, whenever *Source Testing* and fugitive odour emission measurement are completed, on the *Source Testing* and the fugitive odour emission measurement to the *Director,* the *District Manager* and the *Manager* not later than two (2) months after completing the *Source Testing* and the fugitive odour emission measurement. The report shall be in the format described in the *Source Testing Code,* and shall include, but not be limited to,:

(1) an executive summary;

(2) records of weather conditions such as ambient temperature and relative humidity, wind speed and direction, and any environmental compliants if received, at the time of the *Source Testing* and fugitive odour emission measurement;

(3) all operating conditions of the *Facility,* including the quantity of leaf and yard waste on the storage pad, the quantity of organic materials received, the quantity of organic materials on the tipping floor, the quantity of materials in the composting tunnels, the quantity of materials in the curing section, and the results of monitoring of the *Air Pollution Control Equipment,* at the time of the *Source Testing* and fugitive odour emission measurement;

(4) results of the *Source Testing* and fugitive odour emission measurement;

(5) the results of dispersion calculations employing the *AERMOD* dispersion model that employs at least five (5) years of hourly local meteorological data, and using the average of the results of the *Source Testing,* to indicate the maximum one-hour concentrations of hydrogen sulphide and total mercaptans at the *Point of Impingement* and the most impacted *Sensitive Receptor,* and, using a conversion factor of 1.2 and 1.65 respectively, to calculate the maximum 1/2-hour and 10-minute average concentrations for hydrogen sulphide and total mercaptans at the *Point of Impingement* and the most impacted *Sensitive Receptor;* and

(6) the results of dispersion calculations, using the average of the results of the *Source Testing* and fugitive odour emission measurement, indicating the maximum 10-minute average concentrations for odour at the *Point of Impingement* and at the most impacted *Sensitive Receptor* computed in accordance with Schedule "B", and their comparison with the performance limit for odour contained in this *Certificate.*

10.8 The *Director* may not accept the results of the *Source Testing* and the fugitive odour emission measurement if:

(1) the *Source Testing Code* or the requirements of the *Manager* were not followed, or

(2) the *Company* did not notify the *Director,* the *District Manager* and the *Manager* of the *Source Testing* and the fugitive odour emission measurement, or

(3) the *Company* failed to provide a complete report on the *Source Testing* and the fugitive odour emission measurement.

10.9 If the *Director* does not accept the results of the *Source Testing* and the fugitive odour emission measurement, the *Director* may require re-testing.

10.10 If the results of dispersion calculations conducted in any report on the *Source Testing* or fugitive odour emission measurement indicate non-compliance with Condition 3.1(d) of this *Certificate,* the *Company* shall include in the report of the *Source Testing* an action plan to investigate the cause(s) of the non-compliance and an implementation schedule of the remedial action(s) identified to bring the *Facility* back into compliance. The *Company* shall repeat the *Source Testing* within one (1) month after completion of remedial action(s).

10.11 The *District Manager* may not require subsequent testing of hydrogen sulphide or total mercaptans or relax the frequency of subsequent *Source Testing* and/or fugitive odour emission measurement if the results of the *Source Testing* and/or fugitive odour emission measurement indicate that the environmental impact from the contaminants and/or the fugitive sources are insignificant and/or that the odour emissions from the fugitive sources have already been sufficiently characterized as determined by the *Director.*

The reasons for the imposition of these terms and conditions are as follows:

1. GENERAL

Condition No. 1 is included to require the *Certificate* holder to build, operate and maintain the *Facility* in accordance with the *Supporting Documentation* considered by the *Director* in issuing this *Certificate.*

2. OPERATIONAL FLEXIBILITY AND PERFORMANCE LIMITS

Conditions No. 2 and 3 are included to limit *Modifications* and define the operating envelope permitted by this *Certificate.* The holder of the *Certificate* is approved for operational flexibility for the *Facility* that is consistent with the description of the operations included with the application up to the *Facility* · *Production Limit.* In return for the operational flexibility the *Certificate* places performance based limits that cannot be exceeded under the terms of this *Certificate. Certificate* holders will still have to obtain other relevant approvals required to operate the *Facility,* including requirements under other environmental legislation such as the *Environmental Assessment Act.*

3. DOCUMENTATION REQUIREMENTS

Condition No. 4 is included to require the *Company* to maintain ongoing documentation that demonstrates compliance with the *Performance Limits* of this *Certificate* and allows the *Ministry* to monitor on-going compliance with these *Performance Limits.* The *Company* is required to have an up to date *ESDM Report* and *Acoustic Assessment Report* that describe the *Facility* at all times and make the *Emission Summary Table* and *Acoustic Assessment Summary Table* from these reports available to the public on an ongoing basis in order to maintain public communication with regard to the emissions from the *Facility.*

4. REPORTING REQUIREMENTS

Condition No. 5 is included to require the *Company* to provide a yearly *Written Summary* to the *Ministry.*

5. OPERATION AND MAINTENANCE

Condition No. 6 is included to require the *Company* to properly operate and maintain the *Processes with Significant Environmental Aspects* to minimize the impact to the environment from these processes.

6. COMPLAINTS RECORDING PROCEDURE

Condition No. 7 is included to require the *Company* to respond to any environmental complaints regarding the operation of the *Equipment,* according to the procedures contained in the *Certificate (Waste)* issued to the *Company.*

7. RECORD KEEPING REQUIREMENTS

Condition No. 8 is included to require the *Company* to retain all documentation related to this *Certificate* and provide access to *Ministry* staff, upon request, so that the *Ministry* can determine if a more detailed review of compliance with the *Performance Limits* is necessary.

8. MONITORING

Condition No. 9 is included to provide the minimum performance requirements considered necessary to prevent an adverse effect resulting from the operation of the *Facility.*

9. *SOURCE TESTING*

Condition No. 10 is included to require the *Company* to gather accurate information so that compliance with the *EPA,* the regulations and this *Certificate* can be verified.

SCHEDULE "A"

Supporting Documentation

(a) Application dated June 10, 2008, signed by Frederick Mosher and submitted by the *Company* for a Certificate of Approval (Air & Noise);

(b) Emission Summary and Dispersion Modelling Report, dated June 2008, prepared by Conestoga-Rovers & Associates;

(c) Acoustic Assessment Report, dated June 2008, prepared by Conestoga-Rovers & Associates;

(d) A copy of the Application for a Provisional Certificate of Approval for a Waste Disposal Site submitted to the *Ministry,* sent by Conestoga-Rovers & Associates in a transmittal dated September 2, 2008;

(e) Additional information contained in a letter dated September 22, 2008 and signed by Tej Gidda, P.Eng., Conestoga-Rovers & Associates;

(f) Additional information contained in a letter dated March 16, 2009 and signed by Tej Gidda, P.Eng., Conestoga-Rovers & Associates;

(g) Revised Emission Summary and Dispersion Modelling Report, dated March 2009, prepared by Conestoga-Rovers & Associates, received by the *Ministry* on March 31, 2009.

SCHEDULE "B"

Procedure to calculate and record the 10-minute average concentrations of odour at the *Point of Impingement* and at the most impacted *Sensitive Receptor*

(a) Calculate and record one-hour average concentration of odour at the *Point of Impingement* and at the most impacted *Sensitive Receptor*, employing the *AERMOD* atmospheric dispersion model that employs at least five (5) years of hourly local meteorological data and that can provide results reported as individual one-hour average odour concentrations;

(b) Convert and record each of the one-hour average concentrations predicted over the five (5) years of hourly local meteorological data at the *Point of Impingement* and at the most impacted *Sensitive Receptor* to 10-minute average concentrations using the One-hour Average to 10-Minute Average Conversion described below; and

(c) Record and present the 10-Minute Average concentrations predicted to occur over a five (5) year period at the *Point of Impingement* and at the most impacted *Sensitive Receptor* in a histogram. The histogram shall identify all predicted 10-minute average odour concentration occurrences in terms of frequency, identifying the number of occurrences over the entire range of predicted odour concentration in increments of not more than 1/10 of one odour unit. The maximum 10-minute average concentration of odour at the *Sensitive Receptor* will be considered to be the maximum odour concentration at the most impacted *Sensitive Receptor* that occurs and is represented in the histogram, disregarding outlying data points on the histogram as agreed to by the *Director*.

One-hour Average To 10-minute Average Conversion

Use the following formula to convert and record one-hour average concentrations predicted by the *AERMOD* atmospheric dispersion model to 10-minute average concentrations:

$$X10min = X60min * 1.65$$

where X10min = 10-minute average concentration
X60min = one-hour average concentration

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, S.O. 1993, Chapter 28, the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Environmental Commissioner
1075 Bay Street, 6th Floor
Suite 605
Toronto, Ontario
M5S 2B1

AND

The Director
Section 9, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ene.gov.on.ca , you can determine when the leave to appeal period ends.

The above noted works are approved under Section 9 of the Environmental Protection Act.

DATED AT TORONTO this 16th day of September, 2009

Victor Low, P.Eng.
Director
Section 9, *Environmental Protection Act*

RW/

c: District Manager, MOE Ottawa District Office
Tej Gidda, P.Eng., Conestoga-Rovers & Associates Ltd.

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER 2766-7HEPSZ
Notice No. 1
Issue Date: October 21, 2010

Orgaworld Canada Ltd.
5123 Hawthorne Rd
Ottawa, Ontario
K1G 3Y3

Site Location: Orgaworld Canada Ltd. Ottawa Composting Facility
5123 Hawthorne Rd Lot 27, Conc.6, Reference Plan 2003 Official Plan
Ottawa City,

You are hereby notified that I have amended Provisional Certificate of Approval No. 2766-7HEPSZ issued on September 16, 2009 for 10.12-hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste, *as follows:*

1. The following definitions are added:

   "Mobile Unit" means the mobile grinding unit proposed for the temporary operation at the Site and described in Items #5 and #6 of the attached Schedule "A";

   "Mobile Unit Start-up Date" means the day on which the mobile grinding unit commenced operating at the Site and as per the required notification to the District Manager;

2. The following conditions are added:

   5. (6) (b) (i) The Owner may process the Organic Waste limited to the 10-100 fraction, generated by screening of the Immature Compost and described in Item #7 of the attached Schedule "A".

   (ii) The Organic Waste processing referred to in Condition 5.(6)(b)(i), above, shall be undertaken by the Mobile Unit as defined in this Certificate.

   (iii) Should the Organic Waste processing referred to in Conditions 5.(6)(b)(i) and (ii), be

undertaken outdoors, the Mobile Unit shall be located as shown on the drawing described in Item #5.(b) of the attached Schedule "A".

(c) Within three (3) days following the commencement of the Mobile Unit operation, the Owner shall notify the District Manager, in writing, of the Mobile Unit Start-up Date.

(d) The duration of the Mobile Unit operation shall not exceed five (5) weeks from the Mobile Unit Start-up Date.

(e) Within seven (7) days from completion of the Mobile Unit operation, the Owner shall notify the District Manager, in writing, that the Mobile Unit operation has been completed.

3. The following documents were added to Schedule "A":

5. Application for this Certificate dated October 12, 2010 and signed by Henk Kaskens, Orgaworld Canada Ltd., including the following supporting documentation:

   (a) letter dated October 12, 2010 from Tej Gidda, Conestoga-Rovers & Associates, to Director, Environmental Assessment and Approvals Branch, Ontario Ministry of the Environment providing additional information on the proposal
   (b) Figure 1 entitled "Temporary 10-100 Material Shredding Location, Amendment Application to Certificate of Approval (Waste) No. 2766-7HEPSZ, Organics Composting Facility, Ottawa, Ontario"
   (c) Figure 2 entitled "Point of Reception Locations, Orgaworld Canada Ltd, Ottawa Ontario" and prepared by Conestoga-Rovers & Associates

6. E-mail dated October 14, 2010 (5:00 p.m.) from Tej Gidda, Conestoga-Rovers & Associates, to Margaret Wojcik, Ontario Ministry of the Environment, providing the maximum amount of waste to be processed by the Mobile Unit, the expected truck traffic and the schedule of the ground waste removal off-site.

7. E-mail dated October 18, 2010 (3:41 p.m.) from Greg Mariotti, Orgaworld Canada Ltd., to Tracy Hart, Ontario Ministry of the Environment, providing confirmation that only 10-100 material associated with the fires and currently stored outdoors will be processed by the Mobile Unit.

The reason for this amendment to the Certificate of Approval is as follows:

to approve a temporary operation of a mobile grinder to allow Orgaworld Canada Inc. to process and remove off-site the 10-100 Organic Waste fraction, which if stored indoors poses a fire hazard and therefore a risk to the health and safety of the environment or any person.

This Notice shall constitute part of the approval issued under Provisional Certificate of Approval No. 2766-7HEPSZ dated September 16, 2009, as amended.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the waste disposal site is located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 21st day of October, 2010

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

MW/
c: District Manager, MOE Ottawa
Tej Gidda, P. Eng., Conestoga-Rovers & Associates

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 2766-7HEPSZ
Notice No. 2
Issue Date: May 2, 2012

Orgaworld Canada Ltd.
5123 Hawthorne Rd
Ottawa, Ontario
K1G 3Y3

Site Location: Orgaworld Canada Ltd. Ottawa Composting Facility
5123 Hawthorne Rd Lot 27, Conc.6, Reference Plan 2003 Official Plan
Ottawa City,

You are hereby notified that I have amended Approval No. 2766-7HEPSZ issued on September 16, 2009 for 0.12-hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste, *as follows:*

1. Condition 5.(1)(a) is amended to read as follows:

Receipt and Removal of Waste from the Site

(a) The Owner shall receive waste at the Site and ship waste from the Site between the hours of 6:00 a.m. and 8:00 p.m. Monday through Friday, and between the hours of 7:00 a.m. and 8:00 p.m. on Saturdays.

2. The following documents are added to Schedule "A":

8. Application for Environmental Compliance Approval dated November 8, 2011 and signed and submitted by Michael Rooke, Orgaworld Canada Ltd., and including the cover letter dated November 21, 2011 from Michael Rooke to Director, Waste Unit, Environmental Assessment and Approvals Branch, Ontario Ministry of the Environment.

9. Letter dated December 21, 2011 from Michael Rooke, Orgaworld Canada Ltd. to Julius Arscott, Ontario Ministry of the Environment, providing additional clarification of the proposal, the drawing entitled "Site Plan" and the drawing entitled "Site and Landscape Plan".

The reason for this amendment to the Approval is as follows:

to approve extended waste receipt hours as requested by the Company.

This Notice shall constitute part of the approval issued under Approval No. 2766-7HEPSZ dated September 16, 2009, as amended.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 2nd day of May, 2012

Tesfaye Gebrezghi, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MW/
c: District Manager, MOE Ottawa
Michael Rooke, Orgaworld Canada Ltd.

Ontario

Ministry of the Environment
Ministère de l'Environnement

PROVISIONAL CERTIFICATE OF APPROVAL
WASTE DISPOSAL SITE
NUMBER 2766-7HEPSZ
Issue Date: September 16, 2009

Orgaworld Canada Ltd.
Post Office Box, No. 364
Waterloo, Ontario
N2J 4A4

Site Location: Organics Composting Facility (ORGAWORLD Ottawa)
Lot 27, Concession 6
Ottawa City, Ontario

You have applied in accordance with Section 27 of the Environmental Protection Act for approval of:

a 10.12-hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste and encompassing the following processes and support units:

- receipt and temporary storage of Organic Waste in accordance with Condition 2. of this Certificate;
- pre-processing of Organic Waste within an enclosed building;
- composting of the pre-processed Organic Waste in aerated composting tunnels;
- removal of the processed Organic Waste from the composting tunnels at end of the composting process; and
- screening and curing of the immature compost within an enclosed building;

to be used for processing of the following types of waste:

- solid non-hazardous organic waste derived from plants or animals, including wastes consisting of other compounds of carbon, all readily biodegradable, and as listed in Condition 2. of this Certificate.

Note: Use of the site for any other type of waste is not approved under this Certificate, and requires obtaining a separate approval amending this Certificate.

For the purpose of this Provisional Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*EPA* " means the *Environmental Protection Act* , R.S.O. 1990, c.E-19, as amended;

"***O. Reg.** 347* " means *Ontario Regulation 347* , R.R.O. 1990, General - Waste Management, made under the *EPA* , as amended from time to time;

"**Certificate**" means this entire provisional Certificate of Approval, issued in accordance with Section 39 of the *EPA* , and includes any schedules to it, the application and the supporting documentation listed in Schedule "A;

"**Owner**" means any person that is responsible for the establishment or operation of the Site being approved by this Certificate, and includes Orgaworld Canada Ltd., its successors and assigns;

"**Site**" means the waste disposal site located on Lot 27, Concession 6 (Rideau Front) Gloucester in the City of Ottawa, approved in this Certificate;

"**Organic Waste**" means solid non-hazardous waste derived from plants or animals, including wastes consisting of other compounds of carbon, all readily biodegradable, and as listed in Condition 2. of this Certificate;

"**Composting**" means an aerobic biological process, conducted under controlled engineered conditions designed to decompose and stabilize organic matter; simple exposure of organic matter under non-engineered conditions resulting in uncontrolled decay is not considered composting;

"**Immature Compost**" means Organic Waste which has been composted in the aerated composting tunnels and screened within the confines of the Curing Compost Storage Hall of the Processing Building. Composted Organic Waste is considered an Immature Compost until it has been fully cured and is ready for compliance testing for compost quality criteria. Immature Compost is considered a waste;

"**Finished Compost**" means Organic Waste that has been composted and fully cured and is considered ready for sampling and testing for compliance with the compost quality criteria. Finished Compost is considered a waste until testing for the compost quality criteria is completed and compliance with the criteria is demonstrated;

"**Compost**" means the material produced by an aerobic composting of Organic Waste and which has been tested to show compliance with the compost quality criteria listed in this Certificate and can be used as a soil additive or for other similar uses;

"**District Manager**" means the District Manager of the Ottawa District Office of the Ministry;

"**Director**" means any Ministry employee appointed in writing by the Minister pursuant to section 5 of the *EPA* as a Director for the purposes of Part V of the *EPA* ;

"**Ministry**" means the Ontario Ministry of the Environment;

"***OWRA*** " means the *Ontario Water Resources Act* , R.S.O. 1990, c. O.40, as amended;

"***PA*** " means the *Pesticides Act* , R.S.O. 1990, c. P-11, as amended from time to time;

"*NMA* " means *Nutrient Management Act* , 2002, S.O. 2002, c. 4, as amended from time to time;

"***SDWA*** " means *Safe Drinking Water Act* , 2002, S.O. 2002, c. 32, as amended from time to time;

"**Provincial Officer**" means any person designated in writing by the Minister as a provincial officer pursuant to Section 5 of the *OWRA* or Section 5 of the *EPA* or Section 17 of *PA* or Section 4 of *NMA* or Section 8 of *SDWA* .

"**Residual Waste**" means waste resulting from the Organic Waste processing activities at the Site and the waste that cannot be composted and that is destined for final disposal;

"**Rejected Waste**" means the incoming waste received at the Site that does not meet the incoming waste quality criteria set out in this Certificate or cannot be composted;

"**Air Emission Control Equipment**" means the air emission control equipment to abate emissions to the atmosphere originating from the Processing Building;

"**trained personnel**" means knowledgeable in the following through instruction and/or practice:

(i) relevant waste management legislation, regulations and guidelines;
(ii) major environmental concerns pertaining to the waste to be handled;
(iii) occupational health and safety concerns pertaining to the processes and wastes to be handled;
(iv) management procedures including the use and operation of equipment for the processes and wastes to be handled;
(v) records keeping procedures;
(vi) emergency response procedures;
(vii) specific written procedures for the control of adverse effects from the Site;
(viii) specific written procedures for refusal of unacceptable waste loads;
(ix) the requirements of this Certificate;

"**Processing Building**" means the building at the Site where the Organic Waste is received, pre-processed, composted, screened and cured;

"**Certificate of Approval (Air/Noise)**" means the Certificate of Approval issued under section 9 of the *EPA* for this Site;

"Certificate of Approval (Industrial Sewage)" means the Certificate of Approval issued under section 53 of the *OWRA* for this Site;

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL**

Compliance

(1) The Owner shall ensure compliance with all the conditions of this Certificate and shall ensure that any person authorized to carry out work on or operate any aspect of the Site is notified of this Certificate and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Any person authorized to carry out work on or operate any aspect of the Site shall comply with the conditions of this Certificate.

Build, etc. in Accordance

(3) Except as otherwise provided by this Certificate, the Site shall be designed, developed, built, operated and maintained in accordance with the application for this Certificate dated June 10, 2008 and signed by Frederick Mosher, Orgaworld Canada Ltd. and the supporting documentation listed in the attached Schedule "A".

As-built Drawings

(4) Within ninety (90) days from the first receipt of waste at the Site, a set of as-built drawings showing the Site, as constructed shall be prepared and kept at the Site.

Interpretation

(5) Where there is a conflict between a provision of any document, including the application referred to in this Certificate and the conditions of this Certificate, the conditions in this Certificate shall take precedence.

(6) Where there is a conflict between the application and a provision in any documents listed in Schedule "A", the application shall take precedence, unless it is clear that the purpose of the document was to amend the application and that the Ministry approved the amendment.

(7) Where there is a conflict between any two documents listed in Schedule "A", other than the application, the document bearing the most recent date shall take precedence.

(8) The requirements of this Certificate are severable. If any requirement of this Certificate, or the application of any requirement of this Certificate to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this Certificate shall not be affected thereby.

Other Legal Obligations

(9) The issuance of, and compliance with the conditions of this Certificate does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement; or

(b) limit in any way the authority of the Ministry to require certain steps be taken or to require the Owner to furnish any further information related to compliance with this Certificate.

Adverse Effects

(10) The Site shall be constructed, operated and maintained in a manner which ensures the health and safety of all persons and prevents adverse effects on the natural environment or on any persons.

(11) The Owner shall take steps to minimize and ameliorate any adverse effect on the natural environment or impairment of water quality resulting from the approved operations at the Site, including such accelerated or additional monitoring as may be necessary to determine the nature and extent of the effect or impairment.

(12) Despite an Owner or any other person fulfilling any obligations imposed by this Certificate, the person remains responsible for any contravention of any other condition of this Certificate or any applicable statute, regulation, or other legal requirement resulting from any act or emission that caused the adverse effect to the natural environment or impairment of water quality.

(13) If at any time odours, pests, litter, dust, noise or other such negative effects are generated at this Site and cause an adverse effect, the Owner shall take immediate appropriate remedial action that may be necessary to alleviate the adverse effect, including suspension of all waste management activities if necessary.

Change of Owner

(14) The Owner shall notify the Director in writing, and forward a copy of the notification to the District Manager, within thirty (30) days of the occurrence of any changes:

(a) the ownership of the Site;
(b) the operator of the Site;

(c) the address of the Owner;
(d) the partners, where the Owner is or at any time becomes a partnership and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B.17, as amended, shall be included in the notification;
(e) the name of the corporation where the Owner is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C.39, as amended, shall be included in the notification.

(15) No portion of this Site shall be transferred or encumbered prior to or after closing of the Site unless the Director is notified in advance and sufficient financial assurance is deposited with the Ministry to ensure that these conditions will be carried out. In the event of any change in ownership of the Site, other than change to a successor municipality, the Owner shall notify the successor of and provide the successor with a copy of this Certificate, and the Owner shall provide a copy of the notification to the District Manager and the Director.

Inspections by the Ministry

(16) No person shall hinder or obstruct a Provincial Officer from carrying out any and all inspections authorized by the *OWRA* , the *EPA* , the *PA* , the *SDWA* or the *NMA* of any place to which this Certificate relates, and without limiting the foregoing:

(a) to enter upon the premises where the approved processing is undertaken, or the location where the records required by the conditions of this Certificate are kept;
(b) to have access to, inspect, and copy any records required to be kept by the conditions of this Certificate;
(c) to inspect the Site, related equipment and appurtenances;
(d) to inspect the practices, procedures, or operations required by the conditions of this Certificate;
(f) to conduct interviews with staff, contractors, agents and assignees of the company; and
(e) to sample and monitor for the purposes of assessing compliance with the terms and conditions of this Certificate or the *EPA* , the *OWRA* , the *PA* , the *SDWA* or the *NMA* .

Information and Record Retention

(17) Any information requested by the Ministry, concerning the operation of the Site and its operation under this Certificate, including but not limited to any records required to be kept by this Certificate shall be provided to the Ministry,immediately upon request. Records shall be retained for two (2) years except as otherwise authorized in writing by the Director.

(18) The receipt of any information by the Ministry or the failure of the Ministry to prosecute any person or to require any person to take any action, under this Certificate or under any statute, regulation or other legal requirement, in relation to the information, shall not be construed as:

(a) an approval, waiver, or justification by the Ministry of any act or omission of any person

that contravenes any term or condition of this Certificate or any statute, regulation or other legal requirement; or

(b) acceptance by the Ministry of the information's completeness or accuracy.

(19) The Owner shall ensure that a copy of this Certificate, in its entirety and including all its Notices of Amendment, and the documentation listed in Schedule "A", are retained at the Site at all times.

Financial Assurance

(20) (a) A minimum of sixty (60) days prior to the first receipt of the waste at the Site, the Owner shall submit to the Director, Financial Assurance, as defined in Section 131 of the *EPA*. This Financial Assurance shall be in a form acceptable to the Director and shall provide sufficient funds for the transportation, Site clean-up and disposal of all quantities of waste on the Site at any one time. No waste shall be received at the Site unless the acceptable Financial Assurance has been submitted to the Ministry and approved by the Director.

(b) The Financial Assurance shall be provided to the Ministry in accordance with the schedule stipulated in the attached Schedule "C". The Owner shall not receive and store more waste than the amount for which the financial assurance has been provided for and approved by the Director, in accordance the most up-to-date version of Schedule "C".

(c) Commencing on March 31, 2012 and at intervals of three (3) years thereafter, the Owner shall submit to the Director, a re-evaluation of the amount of Financial Assurance to implement the actions required under Condition 1.(20)(a). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of contingency plans required by the Director upon review of the closure plan and annual reports. The Financial Assurance re-evaluation submission must include the quotes of the Financial Assurance must be submitted to the Director within ten (10) days of written acceptance of the re-evaluation by the Director.

(d) Commencing on March 31, 2010, the Owner shall prepare and maintain at the Site an updated re-evaluation of the amount of the Financial Assurance required to implement the actions required under Condition 1.(20)(a) for each of the intervening years in which a re-evaluation is not required to be submitted to the Director under Condition 1.(20)(c). The re-evaluation shall be made available to the Ministry, upon request.

(e) The amount of the Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating the Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial assurance at least sixty (60) days before the Financial Assurance terminates, the Financial Assurance shall

forthwith be replaced by cash.

2. SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:
  (i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
  (ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
  (iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;

(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;

(d) Leaf & yard waste;

(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

(2) (i) The Owner shall not accept at the Site sanitary products and human body waste.

(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.

(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:

(a) a maximum of 1,200 tonnes on a daily basis; and

(b) a maximum of 150,000 tonnes per year.

(4) The Owner is approved to store the following amounts of waste at the Site:

(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;

(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;

(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;

(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;

(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;

(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;

(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;

(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;

(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

(6) Organic Waste storage duration is limited to the following:

(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.

(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days

from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

(10) All waste removed from the Site for final disposal shall only be disposed of at a site for which a Provisional Certificate of Approval has been issued by the Ministry and the site is approved to receive this type and quantity of waste.

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

(3) The Owner shall ensure that the Site is operated in a safe and secure manner, and that waste is properly handled, packaged or contained and stored so as not to pose any threat to the general public and the Site personnel.

(4) The Owner shall ensure that all entrances and storage areas are to be adequately lit.

5. **SITE OPERATIONS**

(1) The Site is approved to operate within the following operating hours, subject to limitations of the local municipal by-laws:

Receipt and Removal of Waste from the Site

(a) The Owner shall receive waste at the Site and ship waste from the Site between the hours of 6:00 a.m. and 7:00 p.m. Monday through Friday, and between the hours of 7:00 a.m. and 7:00 p.m. on Saturdays.

Shipment of Compost from the Site

(b) Compost may be shipped from the Site Monday through Friday between the hours of 7:00 a.m. and 7:00 p.m. and between 7:00 a.m. and 5:00 p.m. on Saturdays.

Processing Within the Processing Building

(c) The Owner may process waste within the confines of the Processing Building twenty four (24) hours per day, seven (7) days per week.

Approved Outdoor Activities

(d) All approved outdoor activities shall be undertaken Monday through Friday between the hours of 7:00 a.m. and 7:00 p.m. and between 7:00 a.m. and 5:00 p.m. on Saturdays.

Emergency Receipt of Waste

(e) The Owner may receive waste at the Site outside of the operating hours specified in subcondition (i), above, on an emergency basis only.

(f) Within seventy two (72) hours from the emergency receipt of waste, the Owner shall notify, in writing, the District Manager that waste was received outside of the approved hours.

(g) If in the opinion of the District Manager, the emergency receipt of waste results in complaint(s), the Owner shall not receive waste outside of the approved hours.

(2) Incoming Organic Waste receipt:

(a) The Owner shall ensure that all unloading of Organic Waste shall take place entirely

within the confines of the Processing Building except for the receipt of the leaf & yard waste approved to be unloaded and stored in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

(b) All loads of incoming Organic Waste shall be accompanied by documentation containing the results of the required waste characterization or the identification of a pre-approved generator of waste.

(c) Trained Personnel shall inspect the required documentation prior to acceptance of the incoming Organic Waste at Site.

(d) Organic Waste that have not been characterized in accordance with this Certificate or that is not accompanied by the required documentation shall not be accepted at the Site and shall immediately be directed off-Site.

(e) Trained Personnel shall also visually inspect the incoming Organic Waste to ensure that only approved waste type is accepted at the Site.

(f) The Owner shall only accept the incoming Organic Waste that is delivered in vehicles that have been approved by the Ministry, as required.

(3) Rejected Waste handling:

(a) In the event that waste that is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that all Rejected Waste:

(i) is stored in a way that ensures that no adverse effects result from such storage;
(ii) is segregated from all other waste;
(iii) is handled and removed from the Site in accordance with *O.Reg. 347* and the *EPA* ;
(iv) is removed from the Site within three (3) days of its receipt or as acceptable to the District Manager.

(b) (i) In the event that Rejected Waste is inadvertently accepted at the Site, a record shall be made in the daily log book or in an electronic file of the reason why the waste was rejected and of the origin of the waste, if known.

(ii) The District Manager shall be notified in writing of the receipt of unacceptable waste within four (4) business days of its receipt. The following information shall be included in the notification to the District Manager:

- quantity and type of the Rejected Waste;
- source of the Rejected Waste, if known;
- final destination of the Rejected Waste; and
- date of receipt and time and date of removal from the Site.

(4) Should outdoor storage of leaf & yard waste be undertaken, the following handling procedures must be followed:

(a) The Owner shall ensure that, if needed, the leaf & yard waste storage stockpiles are turned at a rate frequent enough to reduce the likelihood of anaerobic conditions arising within the stockpiles.

(b) Upon the receipt of the leaf & yard waste at the Site, the Owner shall inspect the received waste, separate potentially odourous components and immediately transfer these potentially odourous components into the Processing Building.

(c) Should anaerobic conditions arise in a leaf & yard waste pile, or, in a specific portion of a leaf & yard waste pile, the Owner shall ensure that this portion of leaf & yard waste is prioritized for use within the composting process within twenty four (24) hours of anaerobic conditions occurring, or, if this is not practical, the Owner shall remove of the waste from the Site within twenty four (24) hours.

(5) Residual Waste handling:

(a) The Owner shall ensure that storage of solid Residual Waste resulting from processing of Organic Waste at the Site is undertaken within the confines of the Processing Building.

(6) Waste Processing:

(a) The Owner shall ensure that all Organic Waste pre-processing, composting, screening and curing of Immature Compost are undertaken within the confines of the Processing Building.

(7) Odour Control:

(a) The Owner shall maintain and monitor a negative air pressure atmosphere within the Processing Building at all times in accordance with the documents in Schedule "A". In the event that adequate negative air pressure cannot be maintained within the Processing Building, the Owner shall cease accepting additional Organic Waste waste and shall keep the loading bay doors and the air intake louvers closed until such time that negative pressure is re-established.

(b) The Owner shall ensure that the outside loading bay doors into the Small Truck and Large Truck Halls of the Processing Building are kept closed at all times except to permit the entry or exit of waste transportation vehicles.

(c) The Owner shall ensure that the loading bay doors into the Compost Curing Storage Hall of the Processing Building are kept closed at all times except to permit the entry or exit of Compost transportation equipment.

(d) The Owner shall maintain an air lock when Organic Waste is received in the Small Truck Receiving Hall of the Processing Building.

(e) The Owner shall ensure that, at all times, the air from the Processing Building is exhausted through an appropriate air pollution control equipment approved by the Ministry in the Certificate of Approval (Air/Noise).

(f) If in the opinion of the District Manager, the air emissions originating from the leaf & yard waste stockpile in the future outdoor storage area result in odour complaint(s), the Owner shall within two (2) days of the receipt of the written notification from the District Manager move the leaf & yard waste from the future outdoor storage area into the Processing Building.

(g) The Owner shall ensure that no equipment handling Organic Waste or their storage containers are kept outside, unless they have been washed to prevent odours.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin.

(2) The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) **Cross-Contamination Prevention**

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

(b) On an emergency basis, the Owner may use equipment utilized in processing of incoming Organic Waste to process the Immature Compost / the Finished Compost and the Compost provided that the equipment has been cleaned to prevent the Immature Compost / the Finished Compost and the Compost from being contaminated by the incoming Organic Waste.

(2) **Quality Control Monitoring of Organic Waste at the generator site:**

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

(b) The incoming Organic Waste shall be re-characterized following any process changes, operational issues or other factors that may affect the quality of the incoming Organic Waste from the pre-approved source/stream.

(3) **Quality Control Monitoring of the Incoming Organic Waste**

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

(b) The Owner shall conduct quality control monitoring of the incoming Organic Waste, except leaf & yard waste, as follows:

(i) incoming Organic Waste from each source shall be sampled and analyzed weekly;

(ii) for incoming Organic Waste from a particular source with consistent quality as demonstrated through a minimum of four (4) analytical events spaced over a minimum of four (4) weeks, the sampling frequency may be reduced to once every two (2) months; and

(iii) all new sources of incoming Organic Waste shall be sampled and analyzed in accordance to (a) above, prior to incorporation into the composting process.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and

(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or

(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or

(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

using this one

Non-compliance with Compost Quality Criteria

(5) (a) Finished Compost is considered a waste until sampling/testing required by this Certificate demonstrates that all compost quality criteria specified in this Certificate are met. The Owner shall segregate the Immature Compost at various stages of curing until all compost quality criteria specified in this Certificate are tested for and met.

(b) Finished Compost that continues to be classified as waste shall be handled in accordance with *O. Reg. 347* and the *EPA* .

(c) (i) Finished Compost that does not meet the pathogen criteria from Schedule "B" and/or non-biodegradable matter criteria from Condition 7.(4) shall be moved back to the Processing Building for re-processing.

(ii) Should Finished Compost consistently exceed the pathogen criteria set out in Schedule "B" of this Certificate, as demonstrated by five (5) sampling/testing events, the Owner, in consultation with the District Manager, shall implement appropriate modifications to the Composting process to ensure consistent destruction of pathogens in the compost.

(d) Finished Compost that does not meet the maturation criteria from Condition 7.(4) shall be re-tested and shall not be removed from the Curing Building until the maturation criteria are met.

(e) Finished Compost that does not meet the trace elements and/or organic chemicals criteria from Schedule "B" shall be kept segregated from all other compost and waste and shall be disposed of in accordance with *O. Reg. 347* and the *EPA* .

Quality Control Monitoring of Finished Compost

(6) The Owner shall conduct quality control monitoring of the Finished Compost as follows:

(a) a composite sample, consisting of a minimum of ten (10) representative grab samples, shall be collected for every 500 tonnes of Finished Compost produced during the first four (4) months of operation; and

(b) following the first four (4) months of operation, a composite sample, consisting of a minimum of ten (10) representative grab samples, shall be collected every two (2) months representing all compost generated within the preceding sixty (60) days or every 5,000 tonnes of Finished Compost, whichever comes first; and

(c) if non-compliance with the compost quality criteria has taken place during five (5) consecutive sampling events, the Owner shall sample and test compost in accordance with (a) until compliance with the compost criteria is demonstrated again.

(d) all composite samples shall be analyzed for the parameters listed in Schedule "B".

Sampling And Testing Methods

(7) All sampling and testing required in this Certificate for the purpose of verifying compliance with the finished compost criteria from Condition 7.(4) shall be undertaken in compliance with the document entitled "National Standard of Canada CAN/BNQ 0413-200/2005 Organic Soil Conditioners – Composts", dated 2005, as amended from time to time.

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and

(h) temperature of the Immature Compost in the curing piles.

Compliance With Composting Process Operating Parameters

(9) (a) The Owner shall ensure that the composting Organic Waste is maintained in the composting tunnels at a minimum temperature of 55°C for a minimum of seventy two (72) hours, as measured at any point one (1) metre inside the composting mass, to ensure complete inactivation of pathogens in the composting Organic Waste.

(b) The temperature must be monitored daily and at points sufficient to provide a temperature profile of the composting Organic Waste.

(c) Should temperature monitoring show that the above has not been achieved, the composting process must be continued until the above requirement has been achieved.

Temperature Monitoring Within the Curing Stockpiles

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

(11) Should the temperature of the Immature Compost within the curing stockpile reheat to the thermophillic temperature of 55°C, as demonstrated by the temperature monitoring required by this Certificate, the Company shall remove the Immature Compost from the curing stockpile area and shall re-introduce it into the composting tunnels to complete the composting process.

(12) Should the Immature Compost within the curing stockpiles consistently reheat to the thermophillic temperature of 55°C, as demonstrated by five (5) events of removal of the Immature Compost from the curing area to the composting tunnels, the Owner, in consultation with the District Manager, shall implement appropriate modifications to the composting process to ensure complete biodegradation of organic matter within the waste in the composting tunnels.

Odour Monitoring Program

(13) A minimum of ninety (90) days prior to any waste being received at the Site, the Company shall prepare and submit to the District Manager an Odour Monitoring Program. The Odour Monitoring Program shall be designed to detect and identify any odours originating from the operation of the Site which may cause nuisance impacts. The Odour Monitoring Program shall include a description of the equipment and inspection protocol to ensure that negative pressure is maintained at all times throughout the processing building. The Odour Monitoring Program shall be implemented after written concurrence from the District Manager has been received. In the future should it be necessary to modify the approved Odour Monitoring Program the written authorization of the District Manager.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

(5) The Owner shall:

(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

(6) Prior to the receipt of any waste at the Site, the Owner shall:

(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

(9) The Owner shall regularly clean and disinfect, if necessary, all equipment and storage areas that

are used to handle and process waste at the Site.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

(4) The Owner shall ensure that all personnel are trained in the requirements of this Certificate relevant to the employee's position:

(a) upon commencing employment at the Site in a particular position;
(b) whenever items listed in Condition 9.(1) are changed or updated.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;

(b) a list of equipment and clean up materials available for dealing with the emergency situations;

(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;

(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;

(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;

(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;

(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

(2) No waste shall be received at the Site for storage or processing until the District Manager provides a written concurrence to the Emergency Response and Contingency Plan required by Condition 10.(1).

(3) An up-to-date version of the Emergency Response and Contingency Plan shall be kept at the Site at all times, in a central location available to all staff, and a copy shall be submitted to the District Manager, the local Municipality and the Fire Department.

(4) The Emergency Response and Contingency Plan shall be reviewed on an annual basis and updated, if necessary. The revised version of the Emergency Response and Contingency Plan shall be submitted to the District Manager, the local Municipality and the Fire Department for comments and concurrence.

11. EMERGENCY SITUATIONS RESPONSE AND REPORTING

(1) The Company shall immediately take all necessary measures, as outlined in the Emergency Response and Contingency Plan, to handle the emergency situations occurring at the Site.

(2) The Company shall ensure that the equipment and materials outlined in the Emergency Response and Contingency Plan are immediately available at the Site at all times and are in a good state of repair and fully operational.

(3) The Company shall ensure that all Site personnel are fully trained in the use of the equipment and materials outlined in the Emergency Response and Contingency Plan, and in the procedures to be employed in the event of an emergency.

(4) All Spills, as defined in the *EPA* , shall be immediately reported to the **Ministry's Spills Action Centre at 1-800-268-6060** and shall be recorded in the log book as to the nature and cause of the spill, and the action taken for clean-up, correction and prevention of similar future occurrences.

(5) Should a Spill, as defined in the *EPA* , occur at the Site, in addition to fulfilling the requirements from the *EPA* , the Company shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.

12. RECORDS KEEPING

Daily Activities

(1) The Owner shall maintain an on-Site written or digital record of activities undertaken at the Site. All measurements shall be recorded in consistent metric units of measurement. The record shall include, as a minimum, the following information:

(a) date, quantity, source and type of Organic Waste, (including any analytical data), received at the Site;
(b) date, quantity, type and the destination of Compost, transferred off-Site;
(c) date, quantity, type and the destination of Residual Waste, transferred off-Site for final disposal;

(d) date, quantity, type and the destination of Rejected Waste, transferred off-Site;
(e) pre-composting and post-composting processing activities undertaken at the Site;
(f) tunnel loading / unloading activities and number of tunnels actively undergoing composting;
(g) amount of Immature Compost transferred from the tunnels to the curing area;
(h) amount of Compost transferred from the curing area to the outdoor Compost storage area;
(i) housecleaning activities, including litter collection, floor washing, leaf & yard waste pad cleaning activities;

Emergency Situations

(3) The Owner shall maintain an on-Site written or digital record of the emergency situations. The record shall include, as a minimum, the following:

(a) the type of an emergency situation;
(b) description of how the emergency situation was handled;
(b) the type and amount of material spilled, if applicable;
(b) a description of how the spilled material was cleaned up and stored, if generated; and
(c) the location and time of final disposal, if applicable.

Inspections

(4) The Owner shall maintain an on-Site written or digital record of inspections as required by this Certificate. The record shall include, as a minimum, the following:

(a) the name and signature of person that conducted the inspection;
(b) the date and time of the inspection;
(c) the list of any deficiencies discovered;
(d) the recommendations for remedial action; and
(e) the date, time and description of actions taken.

Training

(5) The Owner shall maintain an on-Site written or digital record of training as required by this Certificate. The record shall include, as a minimum, the following:

(a) date of training;
(b) name and signature of person who has been trained; and
(c) description of the training provided.

Sampling & Testing Records

(6) The Owner shall establish and maintain a written or digital record of all sampling and testing activities at the Site. This record shall include, as a minimum, the following information:

(a) waste sampled, sample collection locations and volume collected;
(b) day and time of collection;
(c) sample handling procedures;
(d) parameters tested for and the resulting concentrations;
(e) name of the laboratory facility conducting the testing;
(f) conclusions drawn with respect to the results of the monitoring and testing.

Monitoring Records

(7) The Owner shall establish and maintain a written or digital record of all monitoring activities at the Site as required by this Certificate.

Complaints Response Records

(8) The Owner shall establish and maintain a written or digital record of complaints received and the responses made as required by the Certificate of Approval (Air/Noise) for this Site.

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;

(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

13. WASTEWATER MANAGEMENT

(1) The Owner shall ensure that all wastewater generated within the Processing Building is:

(a) contained within the Processing Building;
(b) collected in the sufficiently designed wastewater storage facilities; and
(c) either utilized in the process or discharged to the sanitary sewer or disposed of at a Ministry-approved site.

(2) The Owner shall ensure that no sumps or wastewater storage/holding areas are located in the vicinity of the loading bay doors into the Processing Building.

(3) The Owner shall regularly empty, clean and disinfect if necessary, all sumps or wastewater storage/holding areas that are used to contain and collect the wastewater generated within the Processing Building.

14. CLOSURE PLAN

(1) (a) The Owner shall submit, for approval by the Director, a written Closure Plan for the Site at least nine (9) months prior to closure of the Site. This plan shall include, as a minimum, a description of the work that will be done to facilitate closure of the Site and a schedule for completion of that work.

(b) Within ten (10) days after closure of the Site, the Owner shall notify the Director, in writing, that the Site is closed and that the Site Closure Plan has been implemented.

15. PUBLIC LIAISON COMMITTEE

(1) A minimum of ninety (90) days prior to the receipt of waste at the Site, the Owner shall prepare Terms of Reference for the Public Liaison Committee (ToR PLC) and submit it to the District Manager for approval. The ToR PLC shall be prepared in consultation with the interested members of the affected public and the Owner shall invite representation from the following groups to participate on the preparation of the ToR PLC:

(a) The City of Ottawa;
(b) home owners within 2,000 metres of the Site;
(c) any interested NGOs.

(2) The ToR PLC shall be amended from time to time according to appropriate amending

procedures identified within the content of the ToR PLC. Any amendment to the ToR PLC must be approved by the District Manager prior to its implementation.

(3) Within thirty (30) days from the District Manager's approval, the Owner shall take all reasonable steps to establish, maintain and participate in a Public Liaison Committee (PLC), which shall serve as a forum for dissemination, consultation, review and exchange of information regarding the operation of the Site, including environmental monitoring, maintenance, complaint resolution, and new approvals or amendments to existing approvals related to the operation of this Site.

(4) The Owner shall invite representation from the following groups to participate on the PLC:

(a) The City of Ottawa;
(b) home owners within 2,000 metres of the Site;
(c) any interested NGOs;.

(5) The number of representatives from each group shall be as specified in the ToR PLC approved by the District Manager.

(6) No later than ninety (90) days from the District Manager's approval, from 15.(3) above, the Owner shall submit to the District Manager a written report that details steps to be taken by the Owner to establish, maintain and participate in a PLC. This report shall include the identification of each of the representatives that have been invited to participate in the PLC.

Schedule "A"

1. Application for this Certificate dated June 10, 2008 and signed by Frederick Mosher, Orgaworld Canada Ltd., including a report entitled "Design and Operations Report", dated June 2008 and prepared by Conestoga-Rovers & Associates.

2. Letter dated June 27, 2008, from Tej Gidda, by Conestoga-Rovers & Associates to Sanja Jankovic, Ontario Ministry of the Environment providing the estimate for the financial assurance.

3. Letter dated October 3, 2008, from Tej Gidda, by Conestoga-Rovers & Associates to Margaret Wojcik Ontario Ministry of the Environment, providing additional information on the proposal.

4. Letter dated January 29, 2009, from Tej Gidda, by Conestoga-Rovers & Associates to Margaret Wojcik Ontario Ministry of the Environment, providing additional information on the proposal, the financial assurance estimate and including Figure 1.0.

Schedule "B"

Compost Quality Criteria

Parameter		Concentration
Trace Elements (mg/kg dry weight)[1]	arsenic	13
	cadmium	3
	chromium	210
	cobalt	34
	copper	100
	lead	150
	mercury	0.8
	molybdenum	5
	nickel	62
	selenium	2
	zinc	500
Organic chemicals (mg/kg dry weight)[1]	PCBs[2]	0.5
Pathogens	fecal coliforms ✓ now E. Coli	<1000 MPN/g of total solids calculated on a dry weight basis[3]
	salmonellae	<3 MPN/4g total solids calculated on a dry weight basis[3]
Non-biodegradable matter[4] % dry weight	plastic	1
	other	2

Note 1 – means milligrams per kilogram
Note 2 - means polychlorinated biphenols
Note 3 - means "Most Probable Number"
Note 4 - will not fit through a size 8 mesh

Schedule "C"

This Schedule "C" forms part of this Provisional Certificate of Approval for a Waste Disposal Site

FINANCIAL ASSURANCE VS STORAGE CAPACITY SCHEDULE:

INCREMENTAL FINANCIAL ASSURANCE LEVELS			
	Maximum Approved Waste Processing Capacity	Units	Total Financial Assurance Requirement per Level **(year 2009)**
Level 1	100,000	tonnes	$727,700.00
Level 2	150,000	tonnes	$1,018,000

The reasons for the imposition of these terms and conditions are as follows:

1. **GENERAL**

(1) Conditions 1.(1), (2), (5), (6), (7), (8), (9), (10), (11), (12), (13), (17), (18) and (19) are included to clarify the legal rights and responsibilities of the applicant.

(2) Conditions 1.(3) and (4) are included to ensure that the Site is operated in accordance with the application and supporting documentation submitted by the Owner, and not in a manner which the Director has not been asked to consider.

(3) Condition 1.(14) is included to ensure that the Site is operated under the corporate name which appears on the application form submitted for this approval and to ensure that the Director is informed of any changes.

(4) Condition 1.(15) is included to restrict potential transfer or encumbrance of the Site without the approval of the Director and to ensure that any transfer of encumbrance can be made only on the basis that it will not endanger compliance with this Certificate.

(5) Condition 1.(16) is included to ensure that the appropriate Ministry staff has ready access to the operations of the Site which are approved under this Certificate. The Condition is supplementary to the powers of entry afforded a Provincial Officer pursuant to the *EPA* ,

the *OWRA* , the *PA* , the *NMA* and the *SDWA* .

(6) Condition 1.(20) is included to ensure that sufficient funds are available to the Ministry to clean up the Site in the event that the Owner is unable or unwilling to do so.

2. **SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE**

(1) Condition 2. is included to specify the approved waste receipt rate, the approved waste types and the service area from which waste may be accepted at the Site based on the Owner's application and supporting documentation. Condition 2.(4) is also included to specify the maximum amount of waste that is approved to be stored at the Site that is covered by the required Financial Assurance.

3. **SIGNS**

(1) Condition 3. is included to ensure that the Site's users, operators and the public are fully aware of important information and restrictions related to the operation of the Site.

4. **SITE SECURITY**

(1) Condition 4. is included to ensure that the Site is sufficiently secured, supervised and operated by properly trained personnel and to ensure controlled access and integrity of the Site by preventing unauthorized access when the Site is closed and no site personnel is on duty.

5. **SITE OPERATIONS**

(1) Condition 5.(1) is included to specify the hours of operation for the Site to ensure that the hours of Site's operation do not result in an adverse effect or a hazard to the natural environment or any person.

(2) Condition 5.(2) is included to ensure that only the approved waste types are accepted and processed at the Site.

(3) Condition 5.(3) is included to specify the requirements for handling of the Rejected Waste that was inadvertently received at the Site.

(4) Conditions 5.(4), (5) and (6) are included to ensure that waste handling and storage are undertaken in done in a way which does not result in an adverse effect or a hazard to the environment or any person.

(5) Condition 5.(7) is included to specify odour control measures to minimize a potential for odour emissions from the Site.

6. **SITE INSPECTION AND MAINTENANCE**

(1) Condition 6. is included to require the Site to be maintained and inspected thoroughly and on a regular basis to ensure that the operations at the Site are undertaken in a manner which does not result in an adverse effect or a hazard to the health and safety of the environment or any person.

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Condition 7. is included to require the Owner to characterize all waste received at the Site and shipped off the Site to ensure that only waste approved by this Certificate is handled at the Site and that all waste transferred off Site is handled in accordance with the Ministry's requirements. Condition 7. is also included to require the Owner to monitor the composting process parameters.

8. **NUISANCE IMPACT CONTROL & HOUSEKEEPING**

(1) Condition 8. is included to ensure that the Site is operated and maintained in an environmentally acceptable manner which does not result in a negative impact on the natural environment or any person.

9. **OPERATIONS MANUAL & TRAINING**

(1) Condition 9. is included to ensure that personnel employed at the Site are fully aware and properly trained on the requirements and restrictions related to Site operations under this Certificate.

10. **EMERGENCY RESPONSE AND CONTINGENCY PLAN & EMERGENCY SITUATIONS RESPONSE AND REPORTING**

(1) Condition 10. is included to ensure that the Owner is prepared and properly equipped to take action in the event of an emergency situation.

(2) Conditions 11. also is included to require further spill notification to the Ministry, in addition to the requirements already listed in Part X of the *EPA* .

11. **RECORDS KEEPING**

(1) Condition 12. is included to ensure that detailed records of Site activities, inspections, monitoring and upsets are recorded and maintained for inspection and information purposes.

12. **WASTEWATER MANAGEMENT**

(1) Condition 13. is included to ensure that the wastewater generated at the Site is handled in

accordance with the Ministry's requirements and in a manner which does not result in a negative impact on the natural environment or any person.

13. **CLOSURE**

(1) Condition 14. is included to ensure that final closure of the Site is completed in accordance with Ministry's standards.

14. **PUBLIC LIAISON COMMITTEE**

(1). Condition 15. is included to require the Owner to establish a forum for the exchange of information and public dialogue on activities carried out at the Site. Open communication with the public and local authorities is important in helping to maintain high standards for the operation of the Site and protection of the natural environment.

In accordance with Section 139 of the Environmental Protection Act, R.S.O. 1990, Chapter E-19, as amended, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, S.O. 1993, Chapter 28, the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Environmental Commissioner
1075 Bay Street, 6th Floor
Suite 605
Toronto, Ontario
M5S 2B1

AND

The Director
Section 39, *Environmental Protection Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from**

the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca

This instrument is subject to Section 38 of the Environmental Bill of Rights, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ene.gov.on.ca , you can determine when the leave to appeal period ends.

The above noted waste disposal site is approved under Section 39 of the Environmental Protection Act.

DATED AT TORONTO this 16th day of September, 2009

Tesfaye Gebrezghi, P.Eng.
Director
Section 39, *Environmental Protection Act*

MW/
c: District Manager, MOE Ottawa
Frederick Mosher, Conestoga-Rovers & Associates

Pages 245 to / à 333

are duplicates

sont des duplicatas

CONESTOGA-ROVERS & ASSOCIATES

www.CRAworld.com



Final Report

2014 Groundwater and Surface Water Monitoring Report

Orgaworld Organics Facility
5123 Hawthorne Road
Ottawa, Ontario

Prepared for: Orgaworld Canada Limited

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

March 23, 2015 • 045804 • Report No. 56

Partners in Sustainability

Table of Contents

		Page
Section 1.0	**Introduction**	**1**
1.1	Site Background	1
1.2	Site Setting	2
1.3	Site Processes	3
1.4	MOECC Correspondence to Date	4
1.5	Groundwater/Surface Water Monitoring Activities	5
Section 2.0	**Physical Setting**	**6**
2.1	Site Geology	6
2.2	Site Hydrogeology	7
2.3	Surface Water and Drainage Features	9
2.4	Groundwater Use	9
Section 3.0	**Monitoring Program**	**9**
3.1	Monitoring Network	10
3.2	Monitoring Protocol	10
3.2.1	Groundwater Monitoring	10
3.2.2	Surface Water Monitoring	11
3.3	Quality Assurance/Quality Control Program	11
Section 4.0	**Monitoring Results**	**12**
4.1	Groundwater Hydraulic Monitoring	12
4.2	Water Quality Monitoring	14
4.2.1	Shallow Unconfined Aquifer Unit Groundwater Quality	14
4.2.3	Deep Bedrock Aquifer Groundwater Quality	20
4.2.4.	Surface Water Quality	23
Section 5.0	**Compliance and Trigger Level Program**	**24**
5.1	Trigger Parameters	25
5.2	Trigger Concentrations	25
5.3	Trigger Level Assessment	26
Section 6.0	**Conclusions**	**28**
Section 7.0	**Recommendations**	**29**
Section 8.0	**References**	**30**

List of Figures
(Following Text)

Figure 1.1 Site Location Map

Figure 1.2 Site Plan

Figure 3.1 Groundwater and Surface Water Monitoring Locations

Figure 4.1 Unconfined Shallow Groundwater Elevations – May 28, 2014

Figure 4.2 Unconfined Shallow Groundwater Elevations – November 25, 2014

Figure 4.3 Bedrock Groundwater Elevations – May 28, 2014

Figure 4.4 Bedrock Groundwater Elevations – November 25, 2014

Figure 4.5 Median 2014 Ammonia Concentration Isopleths

Figure 4.6 Median 2014 Dissolved Iron Concentration Isopleths

Figure 4.7 Median 2014 Dissolved Manganese Concentration Isopleths

Figure 4.8 Median 2014 Dissolved Organic Carbon Concentration Isopleths

List of Tables
(Following Text)

Table 2.1 Monitoring Location Details

Table 3.1 Monitoring Program Schedule

Table 4.1 Groundwater Elevations

Table 4.2 Unconfined Shallow Groundwater Analytical Results

Table 4.2A MW103-09 Analytical Results – PWQO Comparison

Table 4.3 Deep Bedrock Groundwater Analytical Results

Table 4.4 Surface Water Analytical Results

Table 4.5 SW4-09 Monthly Sampling Analytical Results

List of Appendices
(on CD)

Appendix A Environmental Compliance Approval (No. 7251-8GKRPD)

Appendix B Compliance and Trigger Level Program Memorandum

Appendix C Monitoring Program Rationalization Memorandum

Appendix D Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

Appendix E Deep Bedrock Water Well and Stratigraphic Logs

Appendix F QA/QC Assessment Memorandum & Laboratory Analytical Reports

Appendix G Groundwater Assessment and Work Plan Memorandum

Appendix H Analytical Plots

- Appendix H1 Select Analytical Plots – Shallow Aquifer
- Appendix H2 Select Analytical Plots – Deep Aquifer

Section 1.0 Introduction

Conestoga-Rovers & Associates (CRA) was retained by Orgaworld Canada Ltd. (Orgaworld) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Orgaworld Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site). A Site location map is provided on Figure 1.1.

The Monitoring Program is being completed in accordance with the scope of work outlined in the June 25, 2009 correspondence to the Ministry of the Environment and Climate Change (MOECC) under MOECC reference number 4852-7KEQ29, and as required under the Facilities Industrial Sewage Works Environmental Compliance Approval (No. 7251-8GKRPD), as amended on May 30, 2011 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A on the CD included with this report. Please note that all Appendices and a complete PDF of this report are also included on the CD.

The purpose of the Monitoring Program is to assess the potential for activities conducted at the Site to adversely affect the surrounding surface water and groundwater quality, in accordance with the ECA.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Orgaworld is a tenant of Tomlinson.

Between June and August 2008, CRA conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO facility in the southwest portion of the HIP (CRA, 2008a). CRA submitted the ESAs to the City of Ottawa on behalf of Orgaworld.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates (Golder) conducted pump testing and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, CRA was tasked by Orgaworld to generate the Monitoring Program, based on a request from the MOECC through the process of reviewing the ECA application. In March 2010, the

Monitoring Program was modified through an ECA amendment to reflect current Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, CRA prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/ 2015. The TLP was submitted to the MOECC along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 5.0. For reference, a copy of the memorandum sent to the MOECC that outlines the updated TLP is included in Appendix B.

CRA prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure adequate monitoring of the groundwater and surface water was being accomplished through the monitoring program and to remove any redundant or unnecessary monitoring from the program. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of the CRA's memorandum outlining the MPR is included in Appendix C.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2014.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in

January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa. The Site limits included in the Orgaworld lease and the boundary of the HIP subdivision are provided on Figure 1.2.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of the large processing plant with delivery receiving area, administrative office, septic bed area, and emission stack. There is an asphalt skirt around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system which drains to the storm water management (SWM) pond located at the east side of the Site. A weigh scale is located northeast of the administrative office. The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, and a few shrubs and grass scrub. Surface run-off from the Site generally drains to the on-Site perimeter ditch system to the on-site SWM pond where it is impounded for re-use in the Facility process or until manual release off-Site through local roadside ditches within the HIP subdivision, to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects as backfill, and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to evacuate groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), brush material, food wastes (solid or sludge), commercial waste (restaurant wastes, etc.) and other sludges, into an unrestricted use product (UUP) suitable for application on agricultural lands, use as potting soil, or for other similar applications. The Facility is intended to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond and is retained for use in Orgaworld's process, in accordance with the Site's ECA. If excess water is available in the SWM

pond, then Orgaworld undertakes analysis and testing of the pond water and then discharges upon receipt of suitable test results.

1.4 MOECC Correspondence to Date

The below correspondences document the communications between Orgaworld and the MOECC with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 7251-8GKRPD:

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b)
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009)
- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009)
- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a)
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b)
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010)
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c)
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011)Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013)
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014)

- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 3, 2015)
- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015)

1.5 Groundwater/Surface Water Monitoring Activities

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), CRA has completed ongoing monitoring from 2009 to present. The following monitoring activities were completed at the Site during the current monitoring period:

- April 2014 – Quarterly sampling
  - Sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, and MW105-13)
  - Hydraulic monitoring at the remaining shallow unconfined aquifer and deep bedrock aquifer wells (with the exception of MW1-08)
- May 2014 – Semi-annual sampling
  - Sampling at four surface water locations (SW1-09 to SW4-09)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells with the exception of TW-4
- August 2014 – Quarterly sampling
  - Sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, and MW105-13)
  - Hydraulic monitoring at the remaining shallow unconfined aquifer and deep bedrock aquifer wells
- November 2014 – Semi-annual sampling
  - Sampling at four surface water locations (SW1-09 to SW4-09)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells

Typically, the initial quarterly sampling event takes place in February; however, the event was delayed in 2014 due to the majority of the well network being frozen and inaccessible.

Section 2.0 Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and examination of the stratigraphic logs. Examination of the stratigraphic logs prepared by CRA, as provided in Appendix D, indicates that the geology is generally consistent across the HIP subdivision. Six main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer
- Alluvial sand and silts
- Silty clay
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, by marine deposits removed by fluvial erosion. The filling activities carried out since the early 1990's have also significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the topography; however the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by CRA indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick) and occasionally some clay and boulders. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was in a loose state, was dark brown to black in colour, and was generally in a moist state. The topsoil was found in most locations that were not currently being used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were locally observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlaying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface exposure to a depth in excess of 7.62 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to permit bedrock identification and characterization. The bedrock consists of a weathered and fractured, grey limestone. Limestone bedrock was generally found to be fractured in the upper meter, where bedrock recovery ranging from 93 to 94 percent was reported, and Rock Quality Designation (RQD) numbers varying from 63 to 75 percent were measured. At depths in excess of 1 m into the bedrock, at the location of MW2-08, the limestone was found to be competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- An shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock

- A deep confined bedrock unit (referred to as the deep bedrock aquifer)

A total of eighteen monitoring wells were completed into the unconfined shallow aquifer unit throughout the HIP subdivision, ten of which were completed within the limits of the Orgaworld Site. The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix D. Well details are also provided in Table 2.1.

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

Test wells (TW-1 to TW-3) installed at the HIP subdivision in 1993 by Golder intercepted the deep bedrock unit, at depths varying from 25 to 36 m bgs (Golder, 2008). The deep bedrock aquifer unit was estimated by Golder to be within the Nepean bedrock formation. Based on the results of the laboratory chemical, physical and bacteriological analyses conducted and the field groundwater quality monitoring performed in 1993, Golder concluded that the groundwater quality of the deep bedrock aquifer unit met the Ontario Drinking Water Standards (ODWS) (MOECC, 2003) with respect to the parameters analyzed, with the exceptions of iron, manganese, turbidity and TDS.

Three additional test wells (TW-4 to TW-6) were advanced by Golder at the HIP subdivision in 2008. CRA oversaw the installation of two additional on-Site test wells (TW-7 and TW-8) in May 2010, since access to deep wells TW-1, TW-2, TW-3, TW-5, and TW-6, which had been historically used to assess the groundwater quality of the deep aquifer unit, was removed by Tomlinson as of January 2010. Deep aquifer well TW-4 (on-Site) is now also used to provide potable water for the Facility.

The test wells (TW-1 to TW-8) consist of a 6-inch diameter steel casing extending between 6.25 and 17.67 m bgs and anchored in bedrock. These deep bedrock aquifer wells extended to depths varying from 30 to 83 m bgs, as shown on the water wells records and well construction details provided in Appendix D and E, respectively. Well details are also provided in Table 2.1. Additional groundwater information regarding groundwater flow direction within the deep bedrock aquifer groundwater unit is discussed in Section 4.1.

As part of CRA's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. The water levels gathered from the shallow unconfined aquifer unit registered no corresponding drawdown decline in elevations, while the deep bedrock aquifer unit was

lowered from 1.18 to 3.7 m during 6-hour pumping tests. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to an on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch that runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually outletting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Orgaworld Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by CRA shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs. The deep bedrock aquifer well logs are provided in Appendix E.

Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. As necessary, TW-4 is also used as an alternative refilling source for replenishing the fire water tank.

Section 3.0 Monitoring Program

The Monitoring Program developed and implemented at the Site includes:

- Monitoring prior to the January 2010 Facility start-up
- Monitoring post Facility start-up, in accordance with the ECA, respectively quarterly and semi-annual monitoring, between May 2010 and November 2014

The Monitoring Program consists of the following:

- Hydraulic (water level) monitoring
- Groundwater and surface water sample collection and analysis
- Quality Assurance/Quality Control (QA/QC) sample collection and analysis

3.1 Monitoring Network

Currently, the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer: eleven groundwater monitoring wells, respectively MW01-08, MW2-08, MW3-08, MW4-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, and MW105-13.
- Deep bedrock aquifer: three monitoring wells, respectively TW-4, TW-7, and TW-8.

Surface water is monitored through four surface water monitoring locations (SW1-09 to SW4-09).

Table 3.1 provides a summary of the current monitoring program. The groundwater and surface water monitoring locations are provided on Figure 3.1.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following CRA's field method guideline protocols, which are consistent with MOECC requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling methodology with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled once field readings were stabilized, indicating that a representative sample could be collected.

Due to the greater depth to groundwater, deep bedrock aquifer monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted to ALS Environmental (ALS) of Waterloo, Ontario for analysis under standard chain-of-custody protocol. Analytical results are discussed in Section 4.0.

The analytical parameter list for groundwater is summarized in Table 3.1.

The original laboratory analytical reports are provided in Appendix F.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW1-09 to SW4-09) by following CRA's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch/creek water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. Potential dissolution of particulates by the acid preservative in the metals sample bottles may affect parameter results for the surface water samples. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2014 analytical data were made through the QA/QC assessment. All analytical data tables have been updated to provide those qualifications.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix F. The qualifications indicated in Appendix F do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

Section 4.0 Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 Groundwater Hydraulic Monitoring
- Section 4.2 Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow aquifer, deep aquifer, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

Shallow Unconfined Aquifer

Upgradient: MW3-08, MW4-08, and MW4-09
Downgradient: MW1-08, MW2-08, MW5-09, MW102-09, MW103-09, MW101-13, MW104-13, and MW105-13

Deep Bedrock Aquifer

Upgradient: TW-7
Downgradient: TW-4 and TW-8

Surface Water

Upstream: SW1-09 and SW2-09
Downstream: SW3-09 and SW4-09

MW101-09 was abandoned and replaced in 2013; however, the analytical results from the monitor are included in the groundwater quality discussion to provide historical water quality in the vicinity of its replacement monitoring well MW101-13.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected in during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the May and November 2014 monitoring

events are consistent with those observed historically at the Site, and were used in the development of groundwater contours, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the May 2014 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2014 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.48 to 98.52 metres above mean sea level (m AMSL) during the May monitoring event and 90.20 to 98.44 m AMSL during the November event. Based on the groundwater elevations gathered in May and November 2014, shallow unconfined aquifer flow occurs in a northeasterly direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the May and November 2014 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.019 to 0.022 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 25 percent for the shallow unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)
K = hydraulic conductivity (L/T)
i = horizontal hydraulic gradient (unitless)
n = effective porosity

Based on this equation, the local groundwater velocity in 2014 is estimated to be a few millimeters per year in the slightly fractured bedrock to a high of approximately 12.0 m per year in the fill deposits. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

In 2014 the deep bedrock aquifer unit groundwater levels were encountered at elevations varying from 84.25 to 89.11 m AMSL in May and from 83.12 to 88.54 m AMSL in November. Based on the groundwater elevations gathered in 2014, groundwater in the deep bedrock aquifer unit flows in a southwesterly direction, in the opposite direction of the shallow

unconfined aquifer unit. It is likely that the presence of a quarry to the west and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.012 and 0.013 m/m for the May and November 2014 events.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in a northeasterly direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08, MW4-08, and MW4-09,
- Upgradient/crossgradient wells: MW2-08
- Downgradient wells: MW5-09, MW101-09, MW101-13, MW102-09, MW103-09, MW104-13, and MW105-13

Tabulated analytical results for the shallow unconfined aquifer from the 2014 sampling program are provided in Table 4.2.

On behalf of Orgaworld, CRA completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment). The Groundwater Assessment evaluated current and historical groundwater quality in order to determine appropriate parameters of concern for the Site. Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of a plume of ammonia within the shallow unconfined aquifer, originating from the Facility.

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MOECC criteria listed in the Ontario Drinking Water Standards (ODWS) (MOECC, 2003, amended 2006). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

A copy of the Groundwater Assessment memo is included in Appendix G.

Ammonia and DOC are direct indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations. Concentrations of total dissolved solids (TDS) increase as additional iron and manganese dissolve into the groundwater.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2014 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleths figures are useful for evaluating and presenting spatial patterns in groundwater chemistry. In each figure (Figures 4.5 through 4.8), the presence of elevated concentrations of each indicator parameter is identified in close proximity to the Facility. Concentrations are observed to decrease with distance from the facility. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese is consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.

Figures H1-A to H1-I in Appendix H-1 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges of ammonia, DOC, iron, and manganese in the shallow unconfined aquifer:

Location	*Trend*	*Ammonia Concentration Range (mg/L)*	
		Historic	*2014*
MW4-08	--	ND(0.05) – 0.069	ND(0.050) – ND(0.067)
MW4-09	--	ND(0.05) – 0.117	ND(0.5)
MW3-08	--	ND(0.05) – 0.123	ND(0.05) – 0.051
MW2-08	--	ND(0.05) – 0.105	ND(0.05)
MW105-13	↑	22.3 – 34.3	18.2 – 76.0
MW101-09[1]	↑	7.89 -108.0	--
MW101-13	↑	6.98 – 34.9	19.6 – 34.9
MW104-13	↑	4.69 – 14.3	4.8 – 13.2
MW5-09	↑	0.32 – 30.4	6.91 – 30.4
MW102-09	↑	0.823 – 10.4	5.47 – 10.4
MW1-08	↑	0.335 – 2.08	1.22 – 2.08
MW103-09	↓	0.508 – 2.26	0.667 – 1.49

Notes:
1. MW101-09 was decommissioned in 2013.
ND non-detect at the associated value

As presented above, each of the upgradient locations have shown relatively stable and low ammonia levels. With the exception of MW103-09 and MW2-08, each of the downgradient monitoring locations have shown increasing temporal trends in ammonia concentrations. Ammonia concentrations have shown an overall decreasing trend at MW103-09; however, this is mostly related to a sharp drop in concentrations between May 2010 and May 2011. Ammonia has increased at MW103-09 since 2011. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have remained consistently very low to non-detect.

Location	*Trend*	*DOC Concentration Range (mg/L)*	
		Historic	*2014*
MW4-08	--	1.6 – 8.7	ND(1.0) – 1.1
MW4-09	--	1.0 – 3.1	1.7 – 2.0
MW3-08	--	1.7 – 9.0	1.5 – 2.7
MW2-08	--	1.6 – 10.0	2.2 – 5.6
MW105-13	↑	2.6 – 7.5	4.2 – 9.4
MW101-09[1]	↓	4.0 – 266.0	-
MW101-13	--	3.9 – 14.8	3.6 – 6.7
MW104-13	↓	10.3 – 51.2	10.3 – 14.3
MW5-09	--	5.5 – 12.1	7.1 – 9.2
MW102-09	--	7.7 – 18.5	7.7 – 10.9
MW1-08	↑	6.2 – 9.9	6.4 – 7.4
MW103-09	↑	3.0 – 17.9	6.9 – 11.3

Notes:
1. MW101-09 was decommissioned in 2013.
ND non-detect at the associated value

Similar to the trends in ammonia concentrations, levels of DOC have remained consistent and relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility have demonstrated trends of elevated or increasing levels of DOC.

Location	*Trend*	*Iron (dissolved) Concentration Range (mg/L)*	
		Historic	*2014*
MW4-08	--	ND(0.05) – 0.32	ND(0.05) – 0.335
MW4-09	--	ND(0.05) – 1.86	0.221 – 0.382
MW3-08	↓	ND(0.05) – 1.04	ND(0.05)
MW2-08	--	ND(0.05)	ND(0.05)
MW105-13	↓	2.07 – 5.31	0.08 – 2.75
MW101-09[1]	--	ND(0.05) – 3.24	-
MW101-13	↓	ND(0.05) – 34.5	ND(0.05) – 10.7
MW104-13	↓	0.932 – 23.9	2.74 – 18.2
MW5-09	↑	1.99 – 7.47	4.68 – 7.82
MW102-09	↓	4.85 – 24.7	5.12 – 9.19
MW1-08	↓	0.897 – 17.2	2.54 – 2.78
MW103-09	↓	5.03 – 23.8	2.69 – 5.16

Location	*Trend*	*Manganese (dissolved) Concentration Range (mg/L)*	
		Historic	*2014*
MW4-08	↓	0.22 – 1.10	0.0861 – 0.27
MW4-09	↓	0.218 – 1.25	0.182 – 0.234
MW3-08	↓ to --	0.0014 – 0.0987	ND(0.001) – 0.0055
MW2-08	--	0.0035 – 0.177	0.0019 – 0.0047
MW105-13	↓	0.487 – 0.650	0.413 – 0.580
MW101-09[1]	↑	0.462 – 1.660	-
MW101-13	--	0.179 – 2.24	0.0299 – 1.62
MW104-13	↑	1.82 -19.4	5.35 – 14.6
MW5-09	↑	2.65 – 4.79	2.5 – 3.28
MW102-09	↑	1.95 – 4.5	3.17 – 5.02
MW1-08	↓	0.539 – 11.0	0.901 – 1.23
MW103-09	↓	2.73 – 7.77	1.78 – 2.99

Notes:
1. MW101-09 was decommissioned in 2013.
ND non-detect at the associated value

Elevated concentrations of dissolved iron and manganese are apparent downgradient of the facility, with the most elevated concentrations being reported at MW104-13, MW101-13, MW5-09, and MW102-09. This pattern is consistent with the patterns observed for DOC and ammonia.

Concentrations of dissolved iron and manganese show variable temporal trends downgradient of the Facility. However, in many instances concentrations have shown an overall decreasing trend. The overall decreases are partially related to sharp drops in iron concentrations observed between May 2010 and May 2011 at several monitoring locations. Since 2011 many locations have shown relatively stable levels of dissolved iron and manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MOECC on the 2012 annual report, the MOECC requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of the future annual monitoring reports. Table 4.2A provides the 2014 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during 2014. The following provides a summary of those exceedances:

- Arsenic – 3 of 4 samples
- Cobalt – 1 of 4 samples
- Iron – 4 of 4 samples
- Phosphorus – 2 of 4 samples
- Un-ionized Ammonia – 1 of 4 samples
- Field pH – 1 of 4 samples

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included staff gauges be installed at four points within the northern ditch and that a topographic survey of the northern portion of the Site be undertaken. Once the additional staff gauges are installed and geodetically surveyed a direct comparison between the surface and groundwater elevations in the ditch and stormwater pond can be made. This will allow a better understanding of the potential impacts to surface water resulting from shallow groundwater discharge. Work to install and measure the staff gauges is currently underway.

The results of this assessment will be provided to the MOECC in the 2015 monitoring report.

The proposed staff gauge locations are described in the Groundwater Assessment memo in Appendix G.

4.2.3 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2014 sampling program are provided in Table 4.3.

Because the deep bedrock aquifer is a potential source of drinking water in the vicinity of the Site, Table 4.3 also provides a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOECC, June 2003, revised June 2006).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2014:

- TW-7 (upgradient) – iron, manganese, colour, TDS, and turbidity
- TW-4 (downgradient) – iron, manganese, alkalinity, colour, DOC, TDS, and turbidity
- TW-8 (downgradient) – iron, manganese, colour, total coliform bacteria, TDS, and turbidity (field and lab.)

ODWQS Operational Guidelines as well as the criteria for colour and turbidity do not relate directly to water samples collected from groundwater wells. The criteria for colour and turbidity were are included in the ODWQS as they related to the effectiveness of water treatment and are not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and are thus not directly relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer has historically been poor. Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer. The 2014 water quality results from TW-7 show ODWQS exceedances for iron, manganese, and TDS. Concentrations of alkalinity, chloride, and DOC were also elevated but remained below the applicable ODWQS.

Water quality results from the both downgradient wells show that operations at the Facility are potentially degrading the already poor upgradient water quality. ODWQS exceedances for alkalinity and DOC at TW-4 and total coliform bacteria at TW-8 were found at in addition to those noted in the samples collected from TW-7.

Figures H2-A to H2-C in Appendix H-2 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

Location	*Trend*	*Ammonia Concentration Range (mg/L)*	
		Historic	*2014*
TW-7	↓	0.091 – 0.157	ND(0.05) – 0.055
TW-4	↑	0.218 – 1.91	1.13 – 3.72
TW-8	↑	0.311 – 4.60	0.273 – 2.69
Location	**Trend**	**DOC Concentration Range (mg/L)**	
		Historic	**2014**
TW-7	↓	6.9 -15.1	3.0– 3.5
TW-4	↓	4.4 – 8.0	4.4 – 7.6
TW-8	↓	3.1 – 13.5	2.5 – 4.2
Location	*Trend*	*Iron (dissolved) Concentration Range (mg/L)*	
		Historic	*2014*
TW-7	↓	0.082 – 9.16	1.12 – 11.1
TW-4	↓	0.455 – 3.3	ND(0.05) – 1.72
TW-8	--	ND(0.05) – 6.25	ND(0.05) – 3.06
Location	*Trend*	*Manganese (dissolved) Concentration Range (mg/L)*	
		Historic	*2014*
TW-7	↓	0.0838 – 1.71	0.0994 – 1.02
TW-4	↑	0.496 – 1.94	1.30
TW-8	--	0.321 – 2.95	0.648 – 1.34

Based on the temporal trends, there is additional evidence for potential Site-related impacts to the deep bedrock aquifer. In particular, increasing trends in ammonia concentrations in both downgradient monitoring wells indicate that the Facility operations may be degrading water quality in the deep bedrock aquifer. Ammonia concentrations in the upgradient monitoring well have steadily remained below or near the detection limits.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. In addition, recent monitoring results show a sharp decrease in ammonia concentrations at both downgradient deep aquifer monitoring wells. These results could be indicative of natural fluctuations or improving water quality within the deep bedrock aquifer. It is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential Site-related water quality impacts. If trends of continuing deteriorating water quality are

apparent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy.

4.2.4. Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW4-09) and local ditch monitoring locations (SW1-09 through SW3-09) are presented in Table 4.4 and compared to the Provincial Water Quality objectives (PWQO). The following table summarizes the PWQO exceedances noted at the surface water monitoring locations during the 2014 semi-annual sampling events.

Location	*Parameter*	*Units*	*PWQO*	*Spring*	*Fall*
SW1-09	Cobalt	mg/L	0.0009	--	0.00141
SW1-09	Molybdenum	mg/L	0.04	0.585	0.301
SW1-09	Phosphorus	mg/L	0.01	0.0183	--
SW2-09	Iron	mg/L	0.3	0.385	0.459
SW2-09	Phosphorus	mg/L	0.01	0.0259	0.0368
SW3-09	Molybdenum	mg/L	0.04	0.157	--
SW3-09	Phosphorus	mg/L	0.01	0.021	0.0336
SW4-09	Phosphorus	mg/L	0.01	0.0556 (0.133)	0.158 (0.170)
SW4-09	Un-ionized Ammonia	mg/L	0.02	--	0.0468 (0.0537)

Notes:

(0.0537) indicates duplicate analytical results

- No exceedance for sampling event

In general, water quality at the downstream monitoring point (SW3-09) is similar to that reported at the upstream monitoring locations (SW1-09 and SW2-09). Concentrations of phosphorus were consistently above the PWQO at all monitoring locations. Sporadic metals exceedances were noted at SW1-09, SW2-09, and SW3-09 in 2014.

Concentrations of un-ionized ammonia have shown increases at SW4-09 during recent monitoring periods. As discussed in Section 4.2.1, the potential for shallow groundwater to discharge to surface exists within the ditch and SWP. The presence of un-ionized ammonia at elevated concentrations in SW4-09 is likely related to the discharge of impacted groundwater directly to the SWP or via overland flow of impacted runoff. As previously mentioned, the

Groundwater Assessment memo included recommendations to further investigate the potential discharge of shallow groundwater to surface water.

Nine additional samples were collected by Orgaworld staff at surface water monitoring point SW4-09 during 2014. Orgaworld staff collected samples in April, twice in May, twice in June, July, August, September, and October. The analytical results for these samples have been included in Table 4.5 with PWQO exceedances highlighted. As indicated in Table 4.5, PWQO exceedances were noted for:

- Chromium – June and October
- Cobalt – June
- E. Coli – June and October
- pH (Laboratory) – June and August
- Total Phosphorus – exceeded in each sample where phosphorus analysis was completed
- Un-ionized Ammonia – June, August, September, and October

With the exception of April 24th, water was not discharged from the SMP during 2014. Table 4.5 provides the analytical results from the surface water samples collected from SW4-09 in April. As seen in the Table, phosphorus was the only parameter above its respective PWQO. All parameters, including phosphorus, were below the discharge criteria listed in the Sites ECA (see Appendix A). Thus, there was no impact to local surface water occurring as a result of stormwater discharge from the SWP. Any difference between upstream and downstream surface water quality is not attributable to Site-related stormwater discharge. Orgaworld utilized all excess water in the on-Site process, in accordance with the ECA.

Section 5.0 Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA requires the development of trigger level criteria in accordance with MOECC Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MOECC, dated February 27, 2015, CRA provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B. The memo provides a detailed history of developing the TLP as well as the three tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

5.1 Trigger Parameters

A reduced set of parameters have been chosen to focus on the sources of potential impacts from on-Site activities. The TLP is to include the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and E. coli.

Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

5.2 Trigger Concentrations

Shallow Unconfined Aquifer

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail of how the trigger concentrations were calculated is provided in Appendix B.

Parameter	***Trigger Level***
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L

Parameter	*Trigger Level*
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Aquifer

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the deep bedrock aquifer. The trigger levels are based on the 95 percent (UTL) for upgradient (TW-7) groundwater data in the deep bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100 mL

5.3 Trigger Level Assessment

The first Tier of the TLP consists of regular quarterly and semi-annual monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) have been updated to include the trigger concentrations.

The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	*2014 Tier*	*Trigger Level Exceedances*				*2015 Tier*
		Winter	*Spring*	*Summer*	*Fall*	
MW1-08	-	--	None	--	None	I
MW2-08	-	--	None	--	None	I
MW5-09	-	Alkalinity, Ammonia,	Alkalinity, Ammonia	Alkalinity, Ammonia	Ammonia	II
MW101-13	-	Ammonia	Ammonia	Ammonia	Ammonia	I
MW102-13	-	Ammonia	Ammonia	Ammonia	Ammonia	I
MW103-13	-	None	None	None	None	I
MW104-13	-	Ammonia	Ammonia	Ammonia	Ammonia	I
MW105-13	-	Alkalinity, Ammonia, E. Coli	Ammonia	Ammonia	Ammonia	I

Notes: - -- not sampled

As indicated in the above table, there are several locations where ammonia concentrations were reported above the recommended trigger level during 2014. The presence of a plume of elevated ammonia originating near the facility has been documented in previous evaluations of on-Site groundwater quality and in response to the deteriorating water quality Orgaworld implemented a remediation strategy to mitigate the effects of Facility operations on shallow unconfined groundwater quality. Specifically, a shallow groundwater extraction well will be installed in early 2015 in the vicinity of former monitoring well MW101-09. The purpose of the extraction well is to remove the most heavily impacted groundwater from the source area. It is anticipated that the operation of this extraction well will result in observable improvements in shallow unconfined aquifer groundwater quality downgradient of the Facility over time. If the long-term monitoring program demonstrates that improvements in water quality are insufficient, then consideration will be given to expanding the remediation program.

Future trigger level program assessments will be used to gauge the effectiveness of the extraction well at controlling the downgradient migration of Facility-related groundwater quality impacts.

It should be noted that a recommendation was included in the Groundwater Assessment to install a shallow unconfined aquifer monitoring well to the west of MW5-09 in order to better define the lateral extent of Facility-related water quality impacts in this area. This monitoring well was installed in March 2015 and has been incorporated into the regular monitoring program. The results of monitoring at this location will be discussed in the 2015 Annual Monitoring Report.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	***2014 Tier***	***Trigger Level Exceedances***		***2015 Tier***
		Spring	***Fall***	
TW-7	-	None	None	I
TW-4	-	Ammonia	Ammonia, Nitrate	II
TW-8	-	Ammonia	Ammonia	I

Concentrations of ammonia and nitrate exceeded their respective deep bedrock Tier I trigger concentrations at TW-4 in the fall 2014 sample. It is recommended that Tier II sampling be initiated at TW-4 in the spring of 2015, which involves sampling this well in duplicate to confirm the results.

The results of the Tier II duplicate sampling will be assessed against the recommended trigger levels and background groundwater quality in order to determine if a Tier III response is warranted.

Section 6.0 Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2014:

1. Based on the groundwater elevations gathered in May and November 2014, shallow unconfined aquifer flow occurs in a northeasterly direction and groundwater in the

deep bedrock aquifer flows in a southwesterly direction, opposite to the direction of the shallow unconfined aquifer.

2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source emanating from the Facility. The impacts are particularly evident with respect to ammonia concentrations which show steadily increasing trends at downgradient monitoring locations.
3. Analytical results obtained from the deep bedrock aquifer samples indicate that groundwater quality in the deep bedrock aquifer may be altered by Facility operations. Increasing trends of ammonia concentrations during previous monitoring periods have been observed downgradient of the Facility. Recent monitoring results have shown a potential reversal of this trend.
4. Analytical results obtained from surface water samples indicate that surface water quality downstream of the Site is not being altered by current Site activities.
5. General decreasing trends in surface water quality are observed in the Stormwater Management Pond. The source of impacts is likely related to overland flow of impacted water from Facility operations or impacted shallow groundwater discharging to the pond. Surface water was discharged from the on-Site Stormwater Management Pond during April 2014. All parameters were below their respective discharge levels listed in the Sites ECA.

Section 7.0 Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. The Monitoring Program presented in the Monitoring Program Rationalization should be implemented for the next monitoring year (2015), with the following exceptions:
   a. TW-4 should be sampled in duplicate as per Tier II sampling protocol
2. The staff gauges recommended in the Groundwater Assessment memo should be installed and monitored for the next two years. An assessment of potential groundwater discharge to surface water should be made using the monitoring results from the each staff gauge. It is noted that work is underway to install these staff gauges.
3. The results of the additional investigative efforts should be included in the 2015 annual report. An additional section discussing the effectiveness of the groundwater remediation program should also be included.

4. Future monitoring reports should continue to include trigger level assessments consistent with the proposed TLP included in Appendix B.
5. The shallow unconfined aquifer extraction well proposed in the Groundwater Assessment should be installed and operated for the purpose of mitigating groundwater impacts to the shallow unconfined aquifer in the source area. Future monitoring reports should assess the effectiveness of this extraction well and provide recommendations for continued operation or expansion, as appropriate, of the remediation system. It is noted that work is underway to install the extraction well.

Section 8.0 References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

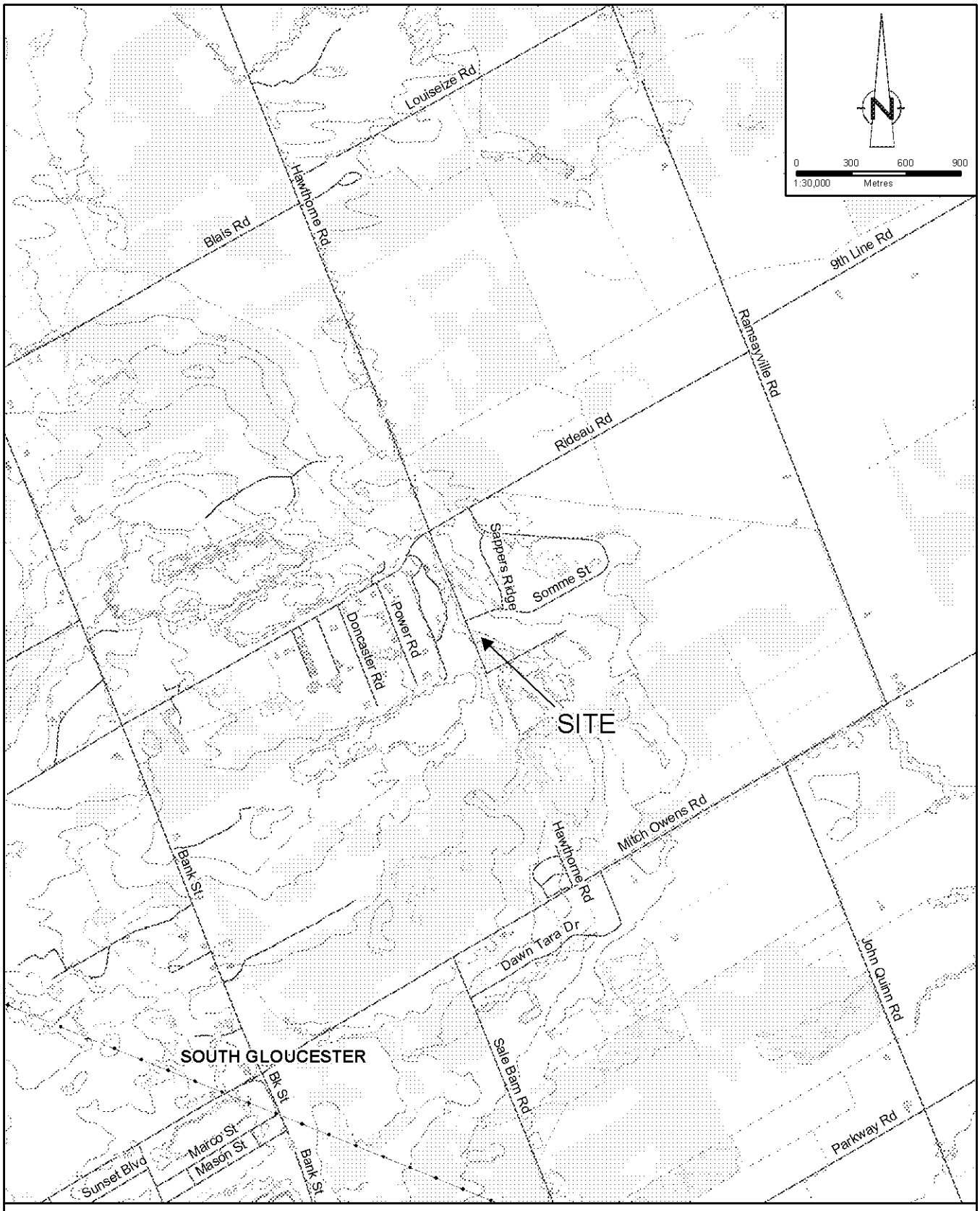
All of Which is Respectfully Submitted,

CONESTOGA-ROVERS & ASSOCIATES

Ben Kempel, BES.

Ben Constable, P.Eng.

Tej Gidda, Ph.D., P.Eng.



Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;
Coordinate System: NAD 1983 UTM Zone 18N

figure 1.1

SITE LOCATION MAP
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

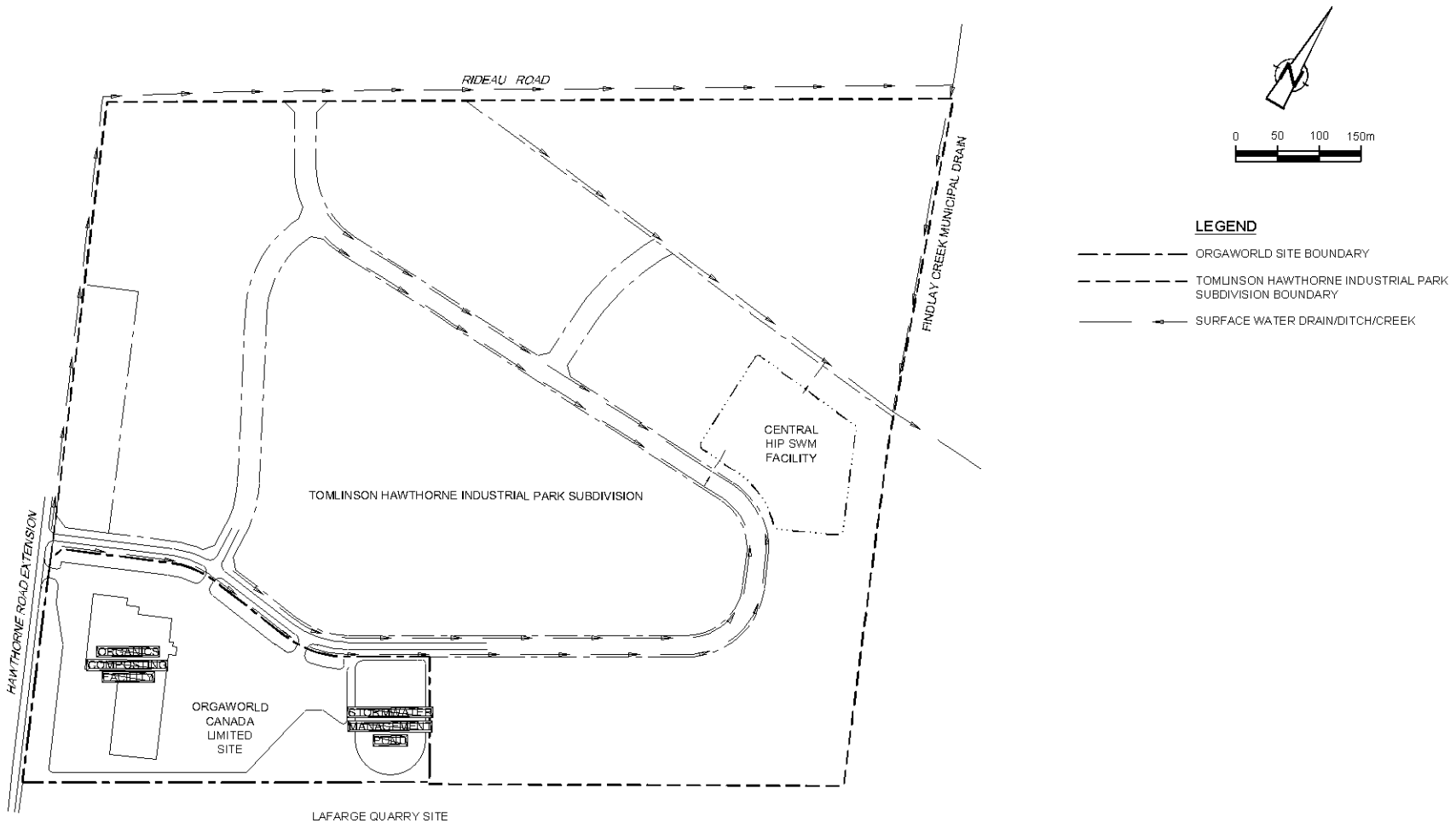


figure 1.2

SITE PLAN
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA008 MAR 9/2015

000371

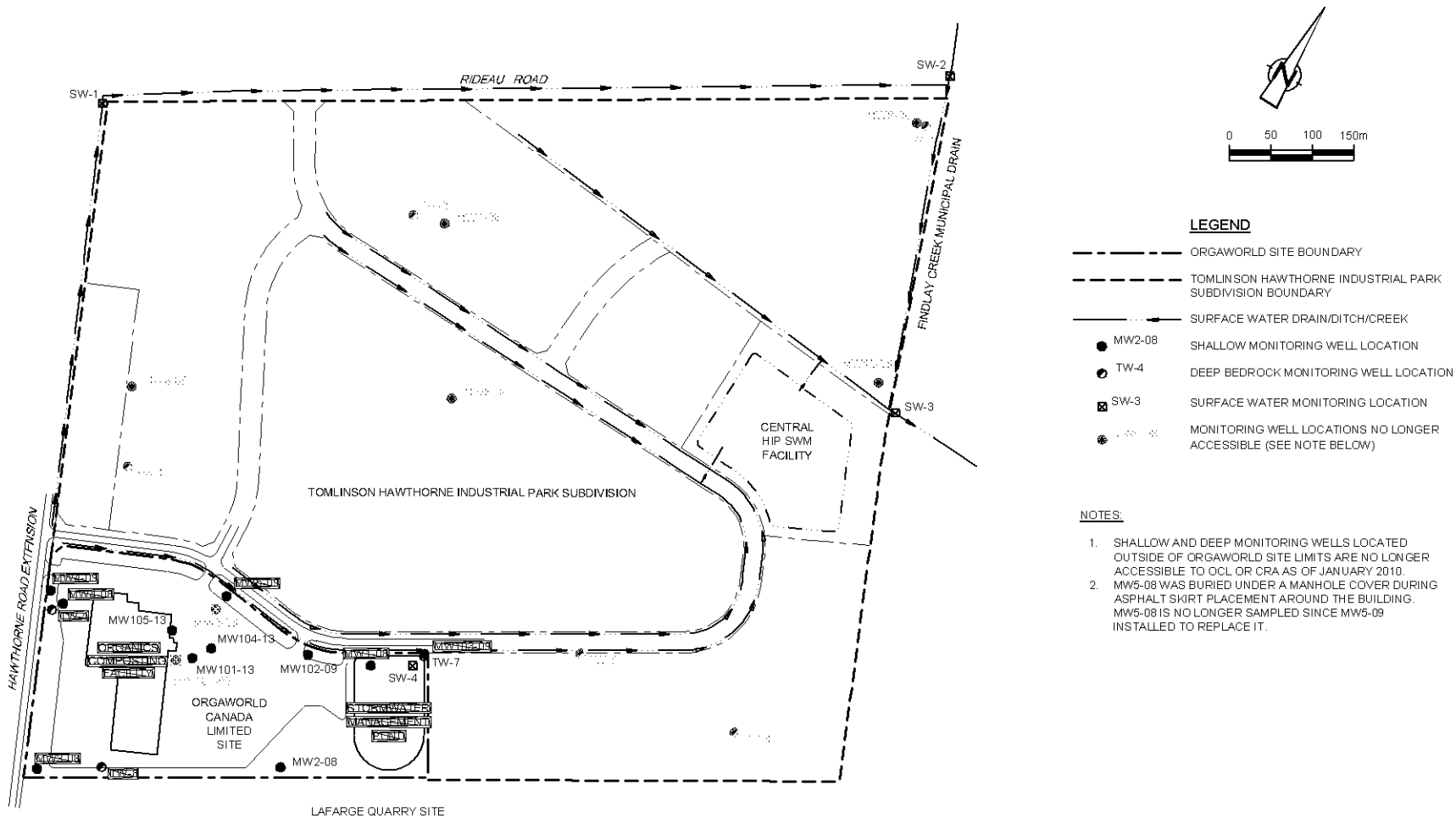
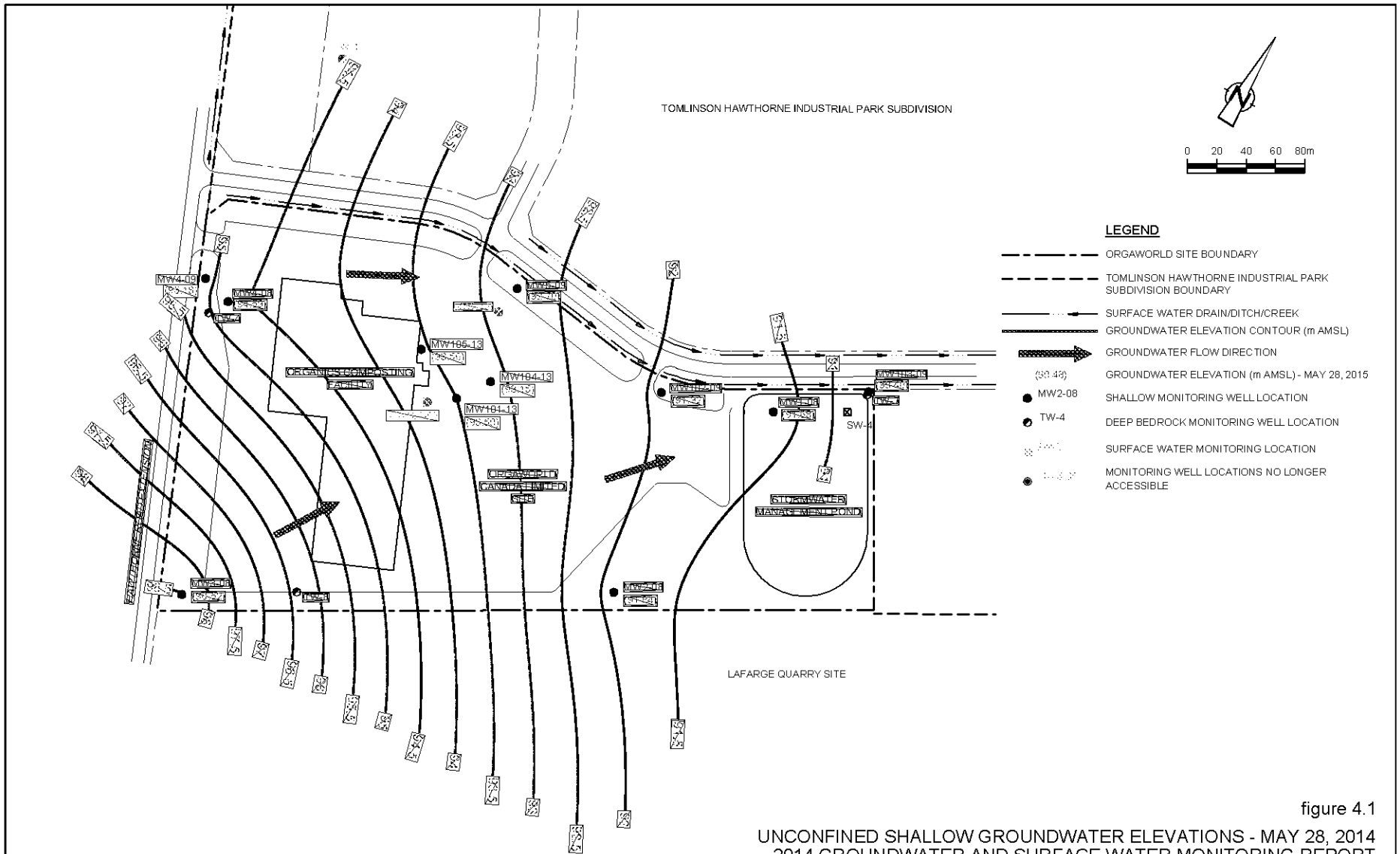


figure 3.1

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA001 MAR 9/2015


TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION
0 20 40 60 80m
LEGEND
ORGAWORLD SITE BOUNDARY
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
SURFACE WATER DRAIN/DITCH/CREEK
GROUNDWATER ELEVATION CONTOUR (m AMSL)
GROUNDWATER FLOW DIRECTION
(93.46) GROUNDWATER ELEVATION (m AMSL) - MAY 28, 2015
MW2-08 SHALLOW MONITORING WELL LOCATION
TW-4 DEEP BEDROCK MONITORING WELL LOCATION
SURFACE WATER MONITORING LOCATION
MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE
MW4-09
MW2-08
MW2-07
MW2-06
MW2-05
MW2-04
MW2-03
MW2-02
MW2-01
MW185-13
MW184-13
MW181-13
MW182-13
MW183-13
MW2-10
MW2-11
MW2-12
MW2-13
MW2-14
MW2-15
MW2-16
MW2-17
MW2-18
MW2-19
MW2-20
MW2-21
MW2-22
MW2-23
MW2-24
MW2-25
MW2-26
MW2-27
MW2-28
MW2-29
MW2-30
MW2-31
MW2-32
MW2-33
MW2-34
MW2-35
MW2-36
MW2-37
MW2-38
MW2-39
MW2-40
MW2-41
MW2-42
MW2-43
MW2-44
MW2-45
MW2-46
MW2-47
MW2-48
MW2-49

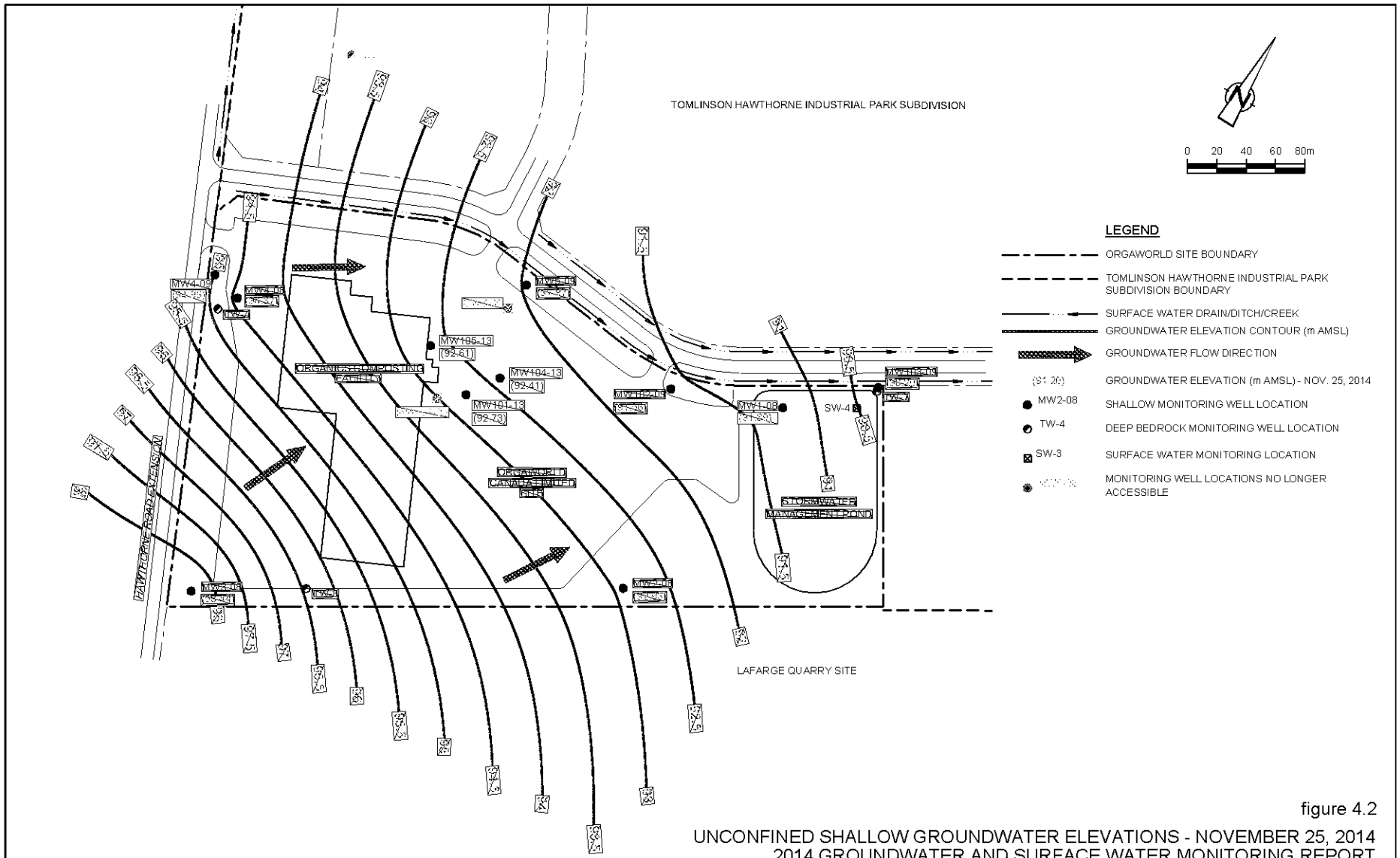


figure 4.2

UNCONFINED SHALLOW GROUNDWATER ELEVATIONS - NOVEMBER 25, 2014
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA003 MAR 9/2015

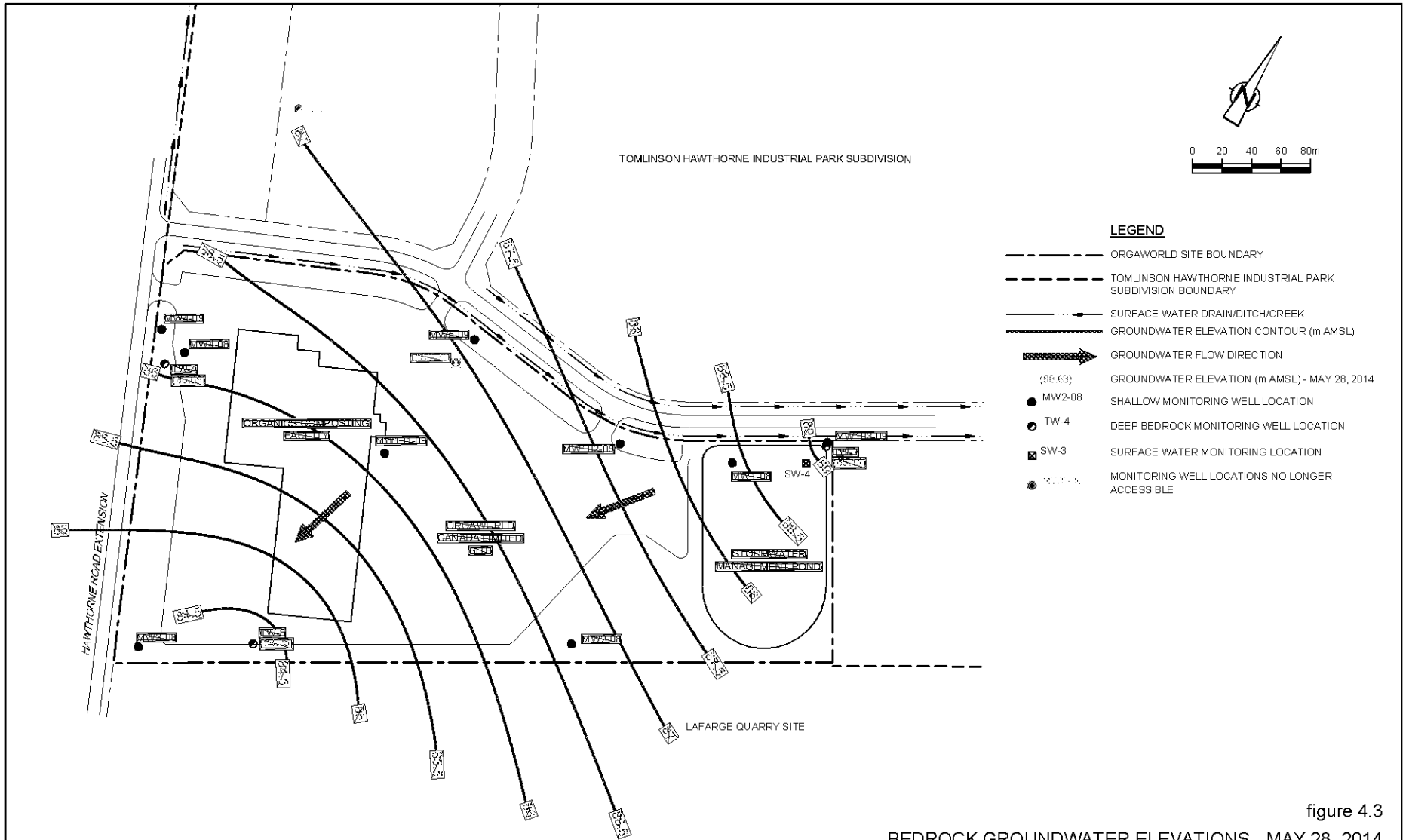


figure 4.3

BEDROCK GROUNDWATER ELEVATIONS - MAY 28, 2014
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA004 MAR 9/2015

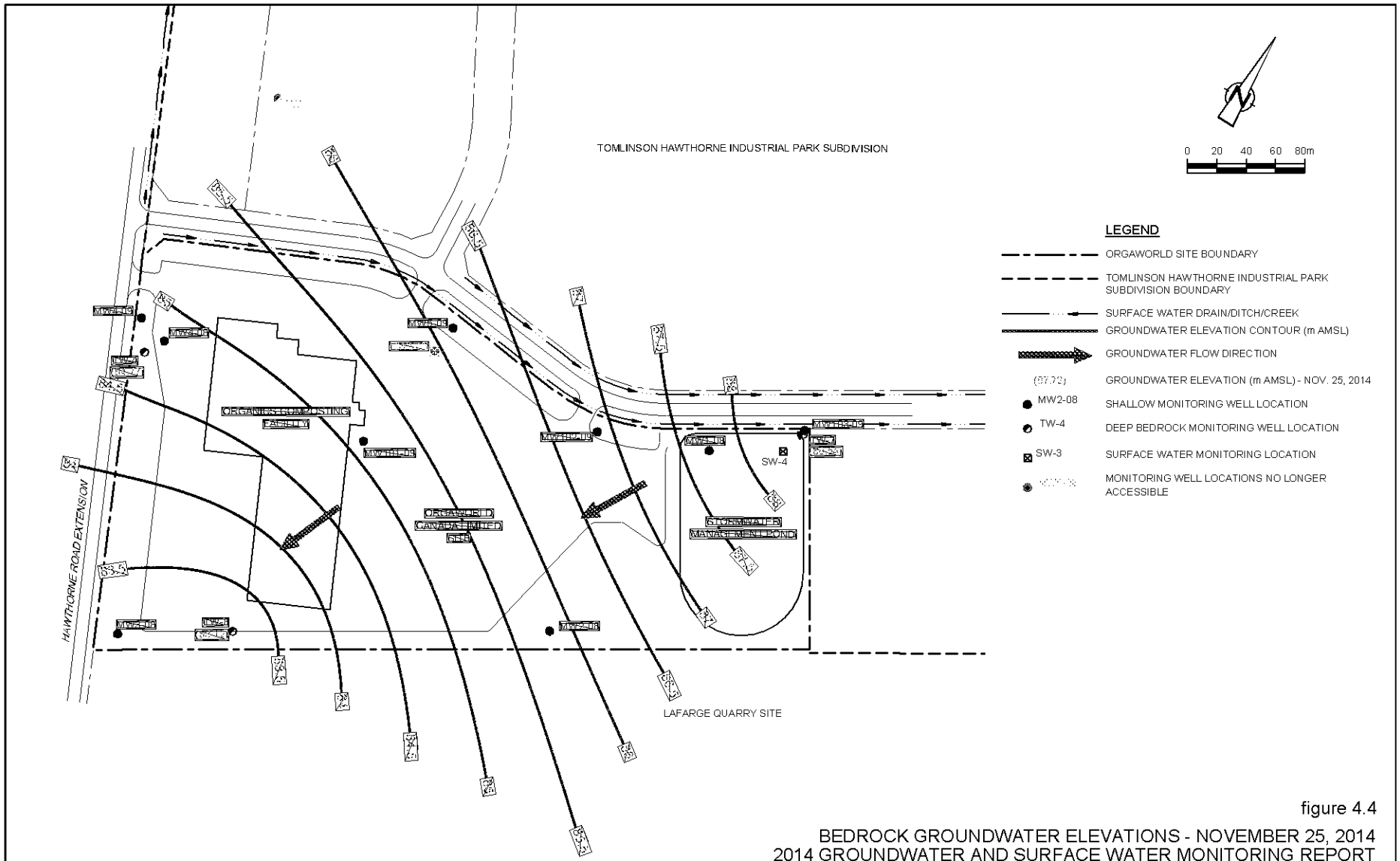


figure 4.4

BEDROCK GROUNDWATER ELEVATIONS - NOVEMBER 25, 2014
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA005 MAR 9/2015

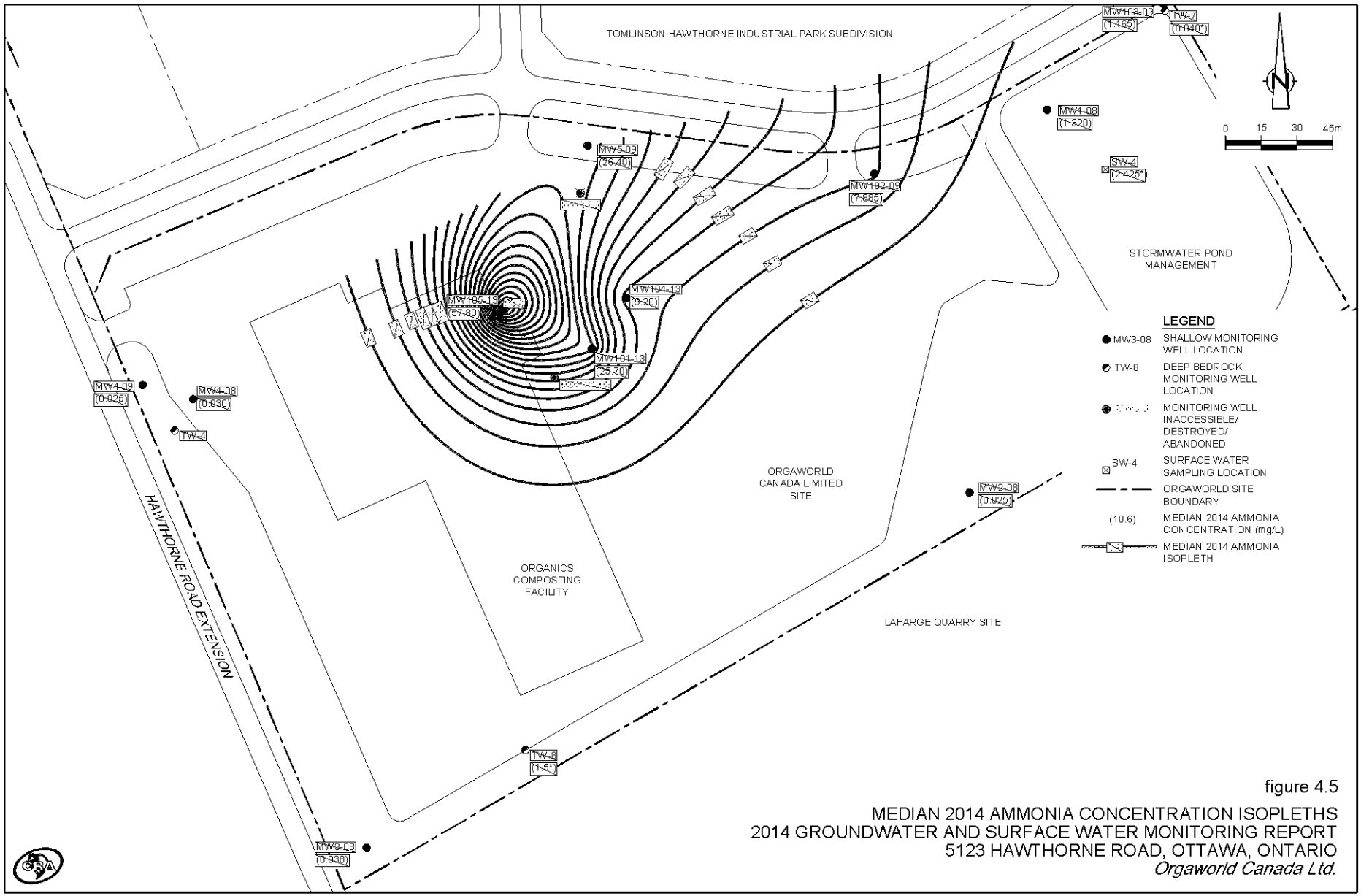


figure 4.5

MEDIAN 2014 AMMONIA CONCENTRATION ISOPLETHS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA007 MAR 9/2015

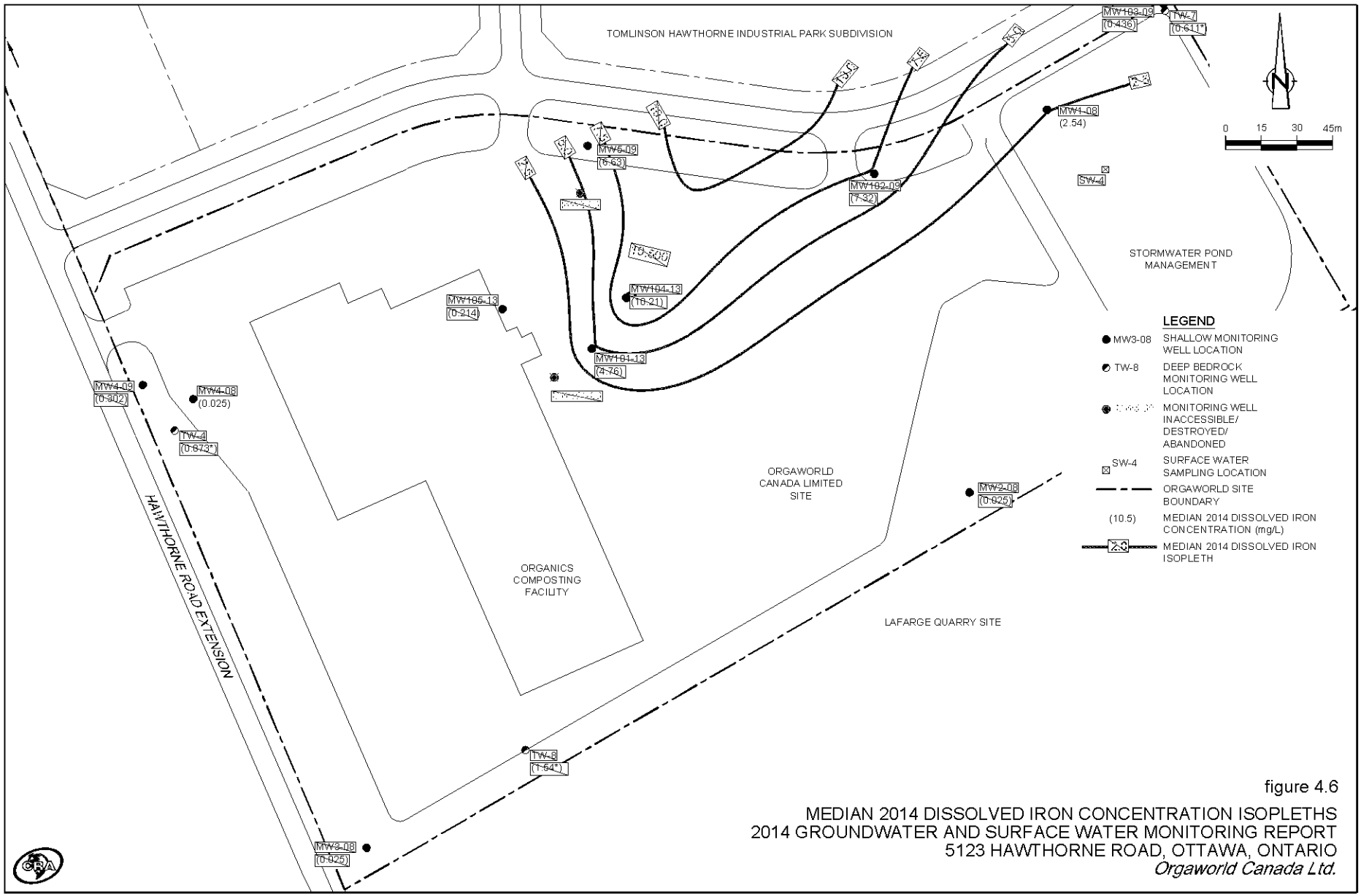


figure 4.6

MEDIAN 2014 DISSOLVED IRON CONCENTRATION ISOPLETHS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA010 MAR 9/2015

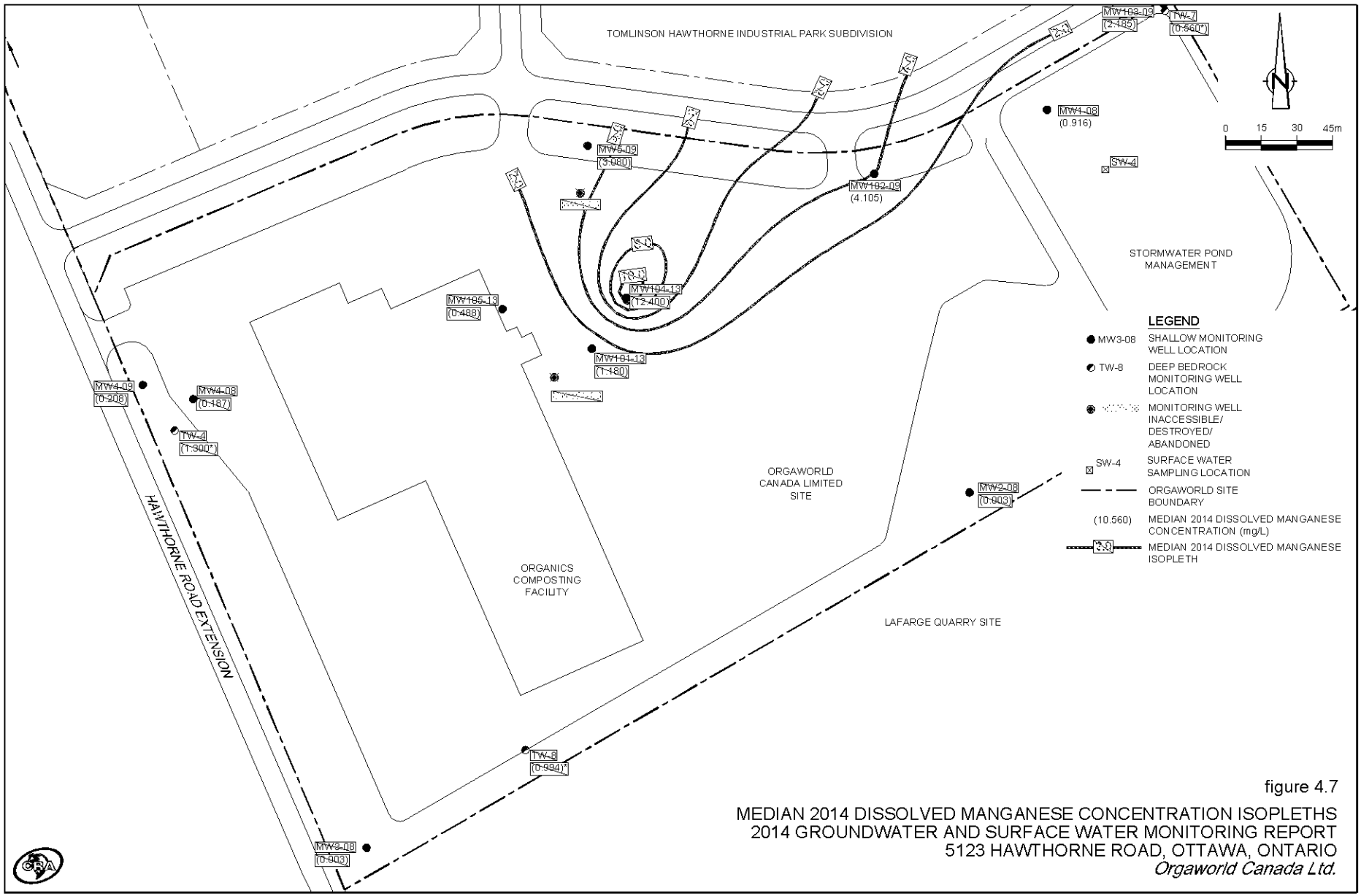


figure 4.7

MEDIAN 2014 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA006 MAR 9/2015

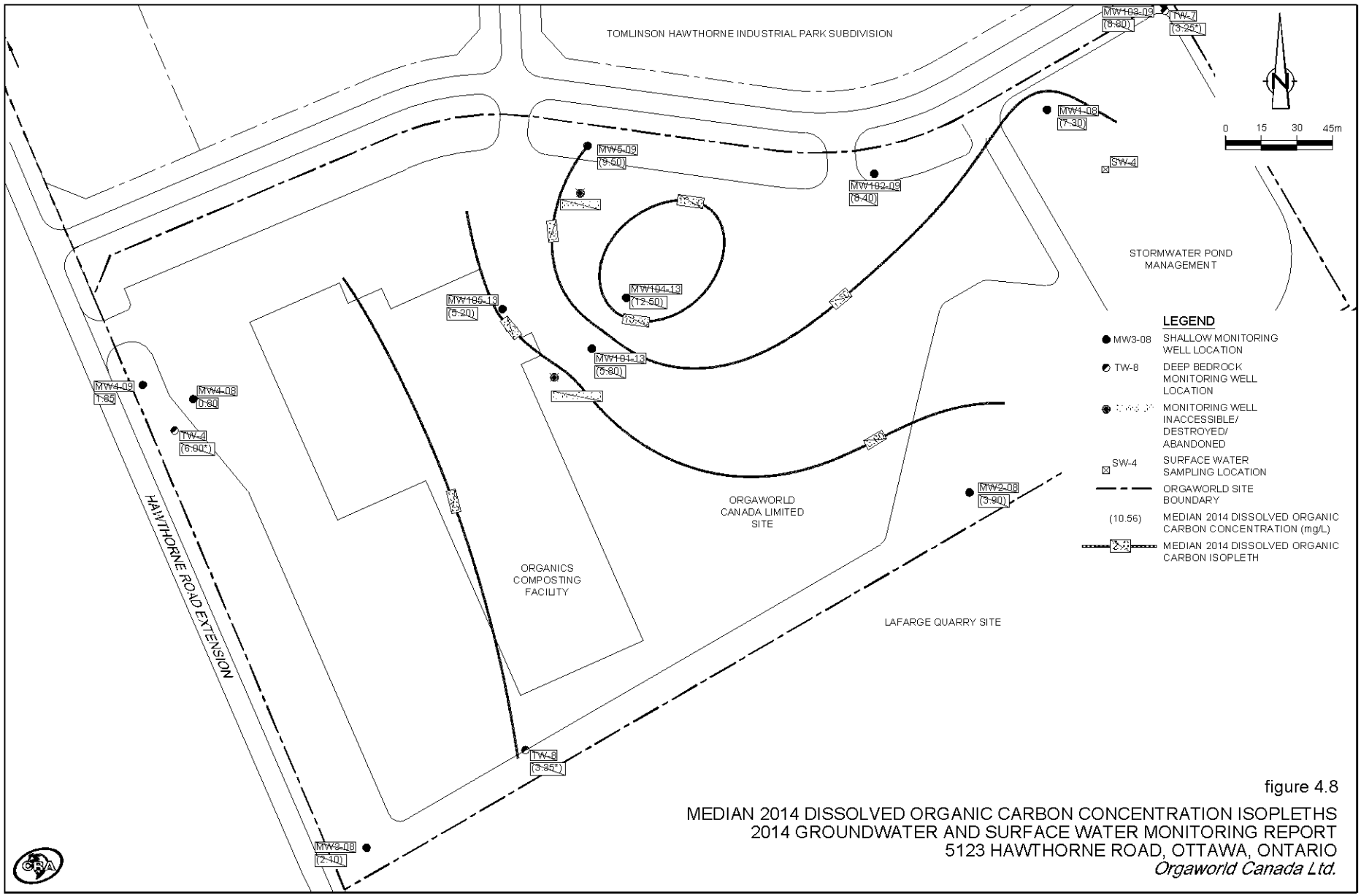


figure 4.8

MEDIAN 2014 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(056)GN-WA009 MAR 9/2015

TABLE 2.1

MONITORING LOCATION DETAILS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ON

Monitoring Location	Ground Surface Elevation [1] (m AMSL)	Reference Elevation [1] (m AMSL)	Screened Interval (m bgs)		Screened Interval [2] (m AMSL)		Geologic Material
			Top	Bottom	Top	Bottom	
Shallow Water Table Wells							
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand
MW6-08[3]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand
MW101-09[5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel
Bedrock Wells							
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock
TW-6 (2008)[4]	83.08	83.73	17.67	83.20	65.41	-0.12	Competent Bedrock
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock

Notes:

m AMSL	metres above mean sea level.
m bgs	metres below ground surface.
NI	No Information.
(1)	The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe, respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010.
(2)	Bedrock wells are open to the rock.

TABLE 3.1

MONITORING PROGRAM SCHEDULE
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ON

Location	Field Test Parameters			Laboratory Test Parameters							Collection Method
	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3/4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4 [8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples to be collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

CRA 045804 (56)

000382

GROUNDWATER ELEVATIONS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO

Location	Reference Elevation [1] [2] (m AMSL)	April 21, 2014		May 28, 2014		August 21, 2014		November 25, 2014	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations									
MW1-08	93.00	NA	NA	1.12	91.88	1.48	91.52	1.61	91.39
MW2-08	93.78	1.68	92.10	1.94	91.84	1.64	92.14	0.85	92.93
MW3-08	104.22	5.52	98.70	5.7	98.52	5.73	98.49	5.78	98.44
MW4-08	96.36	1.6	94.76	1.775	94.59	1.45	94.91	1.99	94.37
MW4-09	97.45	2.12	95.33	2.27	95.18	2.45	95.00	2.46	94.99
MW5-09	94.50	1.5	93.00	1.80	92.70	2.08	92.42	2.53	91.97
MW101-13	94.88	1.17	93.71	1.38	93.50	1.77	93.11	2.15	92.73
MW102-09	93.79	1.65	92.14	1.87	91.92	2.02	91.77	2.23	91.56
MW103-09	93.33	2.73	90.60	2.85	90.48	2.98	90.35	3.13	90.20
MW104-13	94.55	1.58	92.97	1.4	93.15	1.83	92.72	2.14	92.41
MW105-13	94.95	1.1	93.85	1.39	93.56	1.6	93.35	2.34	92.61
Deep Groundwater Elevations									
TW-4	96.90	10.36	86.54	10.82	86.08	11.18	85.72	12.13	84.77
TW-7	92.98	3.58	89.40	3.87	89.11	4.2	88.78	4.44	88.54
TW-8	94.88	10.31	84.57	10.63	84.25	11.17	83.71	11.76	83.12

Notes:

[1] Top of Riser for MW

[2] Top of Cap for TW

m AMSL meters above mean sea level.

NA No access.

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*
Sample ID:			*GW-45804-011410-MB-003*	*GW-45804-011410-MB-004*	*GW-45804-052710-MMD-016*	*GW-45804-110210-TS-007*	*GW-45804-111011-TS-013*	*GW-45804-051412-MB-006*	*GW-45804-052312-MB-001*
Sample Date:			*1/14/2010*	*1/14/2010*	*5/27/2010*	*11/2/2010*	*11/10/2011*	*5/14/2012*	*5/23/2012*
			Original	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]							
Metals									
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	-	0.0056	0.0061	0.0052	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	0.00146	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-
Iron (dissolved)	mg/L	48.3	16.6	17.2	3.56	1.50	0.897	1.92	-
Lead (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-
Magnesium (dissolved)	mg/L	-	82.9	79.6	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	11.0	10.9	1.14	0.640	0.539	0.956	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	ND(0.00010)	-
Molybdenum (dissolved)	mg/L	-	0.0124	0.0118	0.0530	0.0344	0.0056	0.0037	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0020)	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	-
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	633	490	490	207	187	177	254	-
Ammonia-N	mg/L	4.0	0.899	0.828	0.593	0.335	0.410	1.06	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	51	-
Chloride	mg/L	-	66.1	66.6	109	47.5	37.9	99.8	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	220	249	69.2	151	29.5	-	107
Conductivity	umhos/cm	-	1750	1760	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	9.9	6.4	7.0	8.5	9.5	-
Escherichia coli	cfu/100mL	25.6	0	0	3	9	ND(2)	-	13
Fecal coliform bacteria	cfu/100mL	-	0	0	11	14	2	-	6
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-
pH, lab	s.u.	-	7.65	7.59	-	-	-	7.78	-
Phenol	mg/L	-	-	-	-	-	-	ND(0.0010)	-
Phosphorus	mg/L	7.2	0.127	0.067	1.60	5.46	3.13	2.88	-
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	700	50	70	-	470
Total dissolved solids (TDS)	mg/L	-	1310	1320	1010	896	482	700	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	2.29	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	3970	-
Turbidity	NTU	-	63.0	64.0	-	-	-	-	24.0
Un-ionized ammonia	mg/L	-	0.000415	0.000382	0.00645	0.000111	0.00367	-	-
Field Parameters									
Conductivity, field	mS/cm	-	1.09	1.09	0.5	1.62	0.701	1.16	1.24
Dissolved oxygen (DO), field	mg/L	-	2.29	2.29	-	6.87	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-85	-85	-	-143	-	-	-
pH, field	s.u.	-	6.53	6.53	7.47	6.13	7.62	6.65	6.24
Temperature, field	Deg C	-	3.7	3.7	16.5	11.1	9.5	12.98	12.73
Turbidity, field	NTU	-	207	207	-	-	-5	-	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	690	440	930	700	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	690	440	930	700	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	2840	1520	3410	2650	-
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	-	-	8000	4100	10900	9000	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-

000384

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*
Sample ID:			*GW-45804-011410-MB-003*	*GW-45804-011410-MB-004*	*GW-45804-052710-MMD-016*	*GW-45804-110210-TS-007*	*GW-45804-111011-TS-013*	*GW-45804-051412-MB-006*	*GW-45804-052312-MB-001*
Sample Date:			*1/14/2010*	*1/14/2010*	*5/27/2010*	*11/2/2010*	*11/10/2011*	*5/14/2012*	*5/23/2012*
			Original	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0180	0.0397	0.0276	0.0086	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
☐ - Exceedence of the Tier I Trigger Level

000385

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*
Sample ID:		*GW-45804-111212-MB-003*	*GW-45804-052213-TS-004*	*GW-45804-111413-TS-009*	*GW-45804-053014-MB-014*	*GW-45804-112514-TS-007*	*GW-45804-112514-TS-008*
Sample Date:		*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/30/2014*	*11/25/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*
Parameters:	***Units***						
Metals							
Arsenic (dissolved)	mg/L	0.0054	0.0048	0.0031	0.0041	0.0016	0.0015
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00228	0.00077	0.00070	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	6.78	3.03	1.86	2.78	2.54	2.54
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-
Manganese (dissolved)	mg/L	2.17	1.43	1.09	1.23	0.916	0.901
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0058	0.0109	0.0042	0.0045	0.0026	0.0027
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0036	0.0045	ND(0.0030)	0.0058
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	396	206	185	234 J	234	238
Ammonia-N	mg/L	1.66	1.12	0.440	2.08 J	1.22	1.32
Biochemical oxygen demand (carbonaceous)	mg/L	7.5	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	55	49	53	45 J	24	15
Chloride	mg/L	70.7	90	50.2	85.2 J	50	50
Color (apparent)	color unit	-	-	-	146 J	146	136
Color (apparent)	TCU	43.1 J	27.8	34.9	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.2	6.2	7.6	6.4 J	7.4	7.3
Escherichia coli	cfu/100mL	6	20	11	0 J	0	2
Fecal coliform bacteria	cfu/100mL	10	40	15	0 J	0 J	4 J
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)
pH, lab	s.u.	7.78	7.74	7.31	7.77 J	7.90	7.88
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	1.67	3.27	3.32	0.174 J	0.206	0.208
Sulfate	mg/L	397	337	231	194 J	141	137
Total coliform bacteria	cfu/100mL	100	20	900	5 J	290	320
Total dissolved solids (TDS)	mg/L	1110	812	537	644 J	513	511
Total kjeldahl nitrogen (TKN)	mg/L	2.95	2.53	1.37	2.88 J	1.44	1.54
Total suspended solids (TSS)	mg/L	4820	2690	3220	5.6 J	7.6	6.4
Turbidity	NTU	7.50 J	58.0	48.8	15.7 J	29.4	28.2
Un-ionized ammonia	mg/L	0.194	0.000445	0.000151	0.0173 J	0.00696	0.00753
Field Parameters							
Conductivity, field	mS/cm	1.32	1.3	0.857	1.17	0.307	0.307
Dissolved oxygen (DO), field	mg/L	3.01	4.46	7.02	0	3.32	3.32
Oxidation reduction potential (ORP), field	millivolts	-113	-	-	-175	-53	-53
pH, field	s.u.	8.68	6.05	6.18	7.38	7.47	7.47
Temperature, field	Deg C	12.3	15.9	10.0	15.65	8.11	8.11
Turbidity, field	NTU	-5	-5	857	3.1	-	-
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1710	1920	3160	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	8300	13600	20000	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-	-

000386

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*	*MW1-08*
Sample ID:		*GW-45804-111212-MB-003*	*GW-45804-052213-TS-004*	*GW-45804-111413-TS-009*	*GW-45804-053014-MB-014*	*GW-45804-112514-TS-007*	*GW-45804-112514-TS-008*
Sample Date:		*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/30/2014*	*11/25/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*
Semi-Volatiles							
1-Methylnaphthalene	µg/L	0.034	0.040	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	0.068	-	-	-	-	-
2-Methylnaphthalene	µg/L	0.034	0.028	-	-	-	-
Acenaphthene	µg/L	0.024	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.029	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	0.034	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.041	0.033	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.056	0.027	-	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	-	-	-	-
Chrysene	µg/L	0.113	0.070	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	0.034	0.030	-	-	-	-
Fluorene	µg/L	0.040	ND(0.30)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Naphthalene	µg/L	0.047	0.049	-	-	-	-
Phenanthrene	µg/L	0.056	0.061	-	-	-	-
Pyrene	µg/L	0.056	0.040	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

000387

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*
Sample ID:			*GW-45804-011310-TS-004*	*GW-45804-051910-MB-007*	*GW-45804-110210-TS-006*	*GW-45804-051811-MMD-012*	*GW-45804-110911-TS-007*	*GW-45804-111011-TS-007-1*	*GW-45804-051512-MB-007*
Sample Date:			*1/13/2010*	*5/19/2010*	*11/2/2010*	*5/18/2011*	*11/9/2011*	*11/10/2011*	*5/15/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]							
Metals									
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	0.00012	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	0.00122
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	0.0028
Iron (dissolved)	mg/L	48.3	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	26.5	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	0.0070	0.0691	0.0077	0.0110	-	0.177	0.0352
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0064	0.0120	0.0077	0.0104	-	0.0122	0.0098
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0052
Zinc (dissolved)	mg/L	-	0.103	0.0253	0.0127	0.0414	-	0.0126	0.0090
		-							
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	633	209	261	314	281	294	-	273
Ammonia-N	mg/L	4.0	ND(0.050)	0.071	0.090	ND(0.050)	ND(0.050)	-	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	ND(10)
Chloride	mg/L	-	ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	-	ND(2.0)
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	32.7	66.3	15.1	25.2	9.9	-	11.5
Conductivity	umhos/cm	-	465	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.5	1.5	3.2	4.8	10.0	-	3.9
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)	-	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	-	ND(2)
Nitrate (as N)	mg/L	1.3	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)
pH, lab	s.u.	-	8.00	-	-	-	-	-	8.00
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	7.2	0.110	0.039	0.033	0.033	0.038	-	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	1	2	30	210	2	-	ND(2)
Total dissolved solids (TDS)	mg/L	-	258	456	576	518	554	-	518
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.43
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	24.4
Turbidity	NTU	-	6.10	-	-	-	-	-	4.80
Un-ionized ammonia	mg/L	-	ND(0.000057)	0.00045	0.0096	ND(0.000076)	ND(0.000058)	-	-
Field Parameters									
Conductivity, field	mS/cm	-	0.801	0.678	0.971	0.95	0.77	-	-
Dissolved oxygen (DO), field	mg/L	-	-	5.69	4.3	9.19	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	14	-77	213	-	-	-
pH, field	s.u.	-	6.78	7.38	8.68	6.96	7.68	-	-
Temperature, field	Deg C	-	7.8	12.12	10.9	6.14	10.9	-	-
Turbidity, field	NTU	-	255	-	-	3.5	94.4	-	-

000388

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*
Sample ID:			*GW-45804-011310-TS-004*	*GW-45804-051910-MB-007*	*GW-45804-110210-TS-006*	*GW-45804-051811-MMD-012*	*GW-45804-110911-TS-007*	*GW-45804-111011-TS-007-1*	*GW-45804-051512-MB-007*
Sample Date:			*1/13/2010*	*5/19/2010*	*11/2/2010*	*5/18/2011*	*11/9/2011*	*11/10/2011*	*5/15/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]							
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	-	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

000389

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*
Sample ID:		*GW-45804-111212-MB-009*	*GW-45804-111312-MB-009*	*GW-45804-052313-TS-001*	*GW-45804-111413-TS-006*	*GW-45804-052914-MB-011*	*GW-45804-053014-MB-011*	*GW-45804-112514-TS-010*
Sample Date:		*11/12/2012*	*11/13/2012*	*5/23/2013*	*11/14/2013*	*5/29/2014*	*5/30/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	-	0.00022	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00058	-	0.00295	ND(0.00050)	ND(0.00050)	-	ND(0.00050)
Copper (dissolved)	mg/L	0.0036	-	0.0031	0.0038	0.0039	-	0.0027
Iron (dissolved)	mg/L	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)
Lead (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0074	-	0.0381	0.0035	0.0019	-	0.0047
Mercury (dissolved)	mg/L	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0085	-	0.0173	0.0067	0.0123	-	0.0061
Nickel (dissolved)	mg/L	0.0050	-	0.0064	0.0046	0.0048	-	0.0038
Zinc (dissolved)	mg/L	0.0100	-	0.0153	0.0071	0.0105	-	0.0047
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	329	-	263	310	282	-	325
Ammonia-N	mg/L	ND(0.050)	-	ND(0.050)	0.105	ND(0.050)	-	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	19	-	ND(10)	34	10	-	13
Chloride	mg/L	2.8	-	2.7	ND(2.0)	ND(2.0)	-	ND(10)
Color (apparent)	color unit	-	-	-	-	9.5	-	7.0
Color (apparent)	TCU	-	17.1	24.3 J	14.5	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	-	ND(3.8)	5.9	2.2	-	5.6
Escherichia coli	cfu/100mL	ND(2)	-	ND(2)	0	0	-	0
Fecal coliform bacteria	cfu/100mL	ND(2)	-	ND(2)	0	0	-	0
Nitrate (as N)	mg/L	0.31	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)
pH, lab	s.u.	7.83	-	7.98	7.75	7.71	-	7.90
Phenol	mg/L	ND(0.0010)	-	ND(0.0010)	0.0015	0.0016	-	ND(0.0010)
Phosphorus	mg/L	0.054	-	0.073	ND(0.030)	0.052	-	0.031
Sulfate	mg/L	216	-	147	119	108	-	106
Total coliform bacteria	cfu/100mL	10	-	ND(100)	1	5	-	270
Total dissolved solids (TDS)	mg/L	-	588	448	446	402	-	437
Total kjeldahl nitrogen (TKN)	mg/L	0.43	-	0.18	0.41	ND(0.43)	-	0.20
Total suspended solids (TSS)	mg/L	-	59.2	194	65.2	17.2	-	ND(2.0)
Turbidity	NTU	-	19.1	8.88	0.58	2.22	-	0.62
Un-ionized ammonia	mg/L	ND(0.000040)	-	ND(0.0000028)	0.000034	ND(0.00048)	-	-
Field Parameters								
Conductivity, field	mS/cm	1.21	-	1.96	0.832	0.686	0.686	0.681
Dissolved oxygen (DO), field	mg/L	6.66	-	6.41	8.16	6.91	6.91	6.02
Oxidation reduction potential (ORP), field	millivolts	248	-	-	-	94	94	67
pH, field	s.u.	6.50	-	5.30	6.16	7.53	7.53	7.51
Temperature, field	Deg C	11.6	-	13.0	10.1	13.12	13.12	9.16
Turbidity, field	NTU	953	-	325	230	35.6	35.6	-

000390

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*	*MW2-08*
Sample ID:		*GW-45804-111212-MB-009*	*GW-45804-111312-MB-009*	*GW-45804-052313-TS-001*	*GW-45804-111413-TS-006*	*GW-45804-052914-MB-011*	*GW-45804-053014-MB-011*	*GW-45804-112514-TS-010*
Sample Date:		*11/12/2012*	*11/13/2012*	*5/23/2013*	*11/14/2013*	*5/29/2014*	*5/30/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	ND(100)	-	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	-	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	ND(0.020)	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	-	-	-	-	-	-
Acenaphthene	µg/L	ND(0.020)	-	-	-	-	-	-
Acenaphthylene	µg/L	ND(0.020)	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	-	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.010)	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.027	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-	-	-	-
Chrysene	µg/L	ND(0.020)	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-	-	-	-
Fluoranthene	µg/L	ND(0.020)	-	-	-	-	-	-
Fluorene	µg/L	ND(0.020)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-	-	-	-
Naphthalene	µg/L	ND(0.020)	-	-	-	-	-	-
Phenanthrene	µg/L	ND(0.020)	-	-	-	-	-	-
Pyrene	µg/L	ND(0.020)	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*
Sample ID:		*GW-45804-011310-TS-001*	*GW-45804-051910-MB-010*	*GW-45804-051910-MB-011*	*GW-45804-110210-TS-001*	*GW-45804-110210-TS-002*	*GW-45804-051711-MMD-009*	*GW-45804-110911-TS-001*	*GW-45804-051512-MB-011*	*GW-45804-111312-MB-013*	
Sample Date:		*1/13/2010*	*5/19/2010*	*5/19/2010*	*11/2/2010*	*11/2/2010*	*5/17/2011*	*11/9/2011*	*5/15/2012*	*11/13/2012*	
		Original	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	
Parameters:	***Units***										
Metals											
Arsenic (dissolved)	mg/L	0.0049	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)	ND(0.050)	
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00050)	0.00067	
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	
Magnesium (dissolved)	mg/L	62.4	-	-	-	-	-	-	-	-	
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0053	0.0071	0.0016	0.0036	0.0066	0.0273	
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)	
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135	0.0147	0.0132	0.0152	0.0328	0.0203	
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0021	0.0034	
Zinc (dissolved)	mg/L	0.0199	0.0482	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0147	ND(0.0030)	ND(0.0030)	
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	300	279	276	316	322	278	276	250	309	
Ammonia-N	mg/L	0.123	0.077	0.078	0.073	0.058	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	15	36	
Chloride	mg/L	25.1	28.4	31.6	27.5	27.4	21.8	55.7	43.9	65.4	
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	
Color (apparent)	TCU	10.2	16.9	19.7	38.3	42.9	34.4	16.3	52.4	45.5	
Conductivity	umhos/cm	1080	-	-	-	-	-	-	-	-	
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.8	1.7	3.5	9.0	3.1	2.5	ND(5.0)	2.4	
Escherichia coli	cfu/100mL	0	0	0	0	0	0	2	0	ND(2)	
Fecal coliform bacteria	cfu/100mL	0	0	0	1	0	0	4	0	ND(2)	
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	
pH, lab	s.u.	7.97	-	-	-	-	-	-	7.96	7.76	
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	
Phosphorus	mg/L	0.378	0.105	0.090	0.093	0.079	0.075	ND(0.030)	0.240	0.301	
Sulfate	mg/L	-	-	-	-	-	-	-	-	495	
Total coliform bacteria	cfu/100mL	3	1	10	120	430	1	60	0	120	
Total dissolved solids (TDS)	mg/L	736	618	690	766	778	482	1040	790	1130	
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.20	ND(0.15)	
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	303	642	
Turbidity	NTU	2.70	-	-	-	-	-	-	149	11.8	
Un-ionized ammonia	mg/L	0.0000030	0.00116	0.00119	0.000095	0.000076	ND(0.00012)	ND(0.000049)	-	ND(0.00042)	
Field Parameters											
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02	1.02	0.95	1.02	1.3	1.21	
Dissolved oxygen (DO), field	mg/L	4.42	-	-	1.47	1.47	-	1.47	2.87	1.53	
Oxidation reduction potential (ORP), field	millivolts	-	38	38	394	394	-	120	51	16	
pH, field	s.u.	5.05	7.75	7.75	6.82	6.82	7.08	6.68	6.67	7.58	
Temperature, field	Deg C	9.6	12.5	12.5	8.4	8.4	8.61	8.7	9.81	9.8	
Turbidity, field	NTU	424	-	-	-	-	150	99	504	473	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*
Sample ID:		*GW-45804-011310-TS-001*	*GW-45804-051910-MB-010*	*GW-45804-051910-MB-011*	*GW-45804-110210-TS-001*	*GW-45804-110210-TS-002*	*GW-45804-051711-MMD-009*	*GW-45804-110911-TS-001*	*GW-45804-051512-MB-011*	*GW-45804-111312-MB-013*
Sample Date:		*1/13/2010*	*5/19/2010*	*5/19/2010*	*11/2/2010*	*11/2/2010*	*5/17/2011*	*11/9/2011*	*5/15/2012*	*11/13/2012*
		Original	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***									
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073	0.0052
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
□ - Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW3-08*	*MW3-08*	*MW3-08*	*MW3-08*
Sample ID:		*GW-45804-052213-TS-008*	*GW-45804-111413-TS-014*	*GW-45804-052914-MB-016*	*GW-45804-112614-TS-014*
Sample Date:		*5/22/2013*	*11/14/2013*	*5/29/2014*	*11/26/2014*
		Original	*Original*	*Original*	*Original*
Parameters:	***Units***				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	0.0019	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	0.0014	0.0042	0.0055	ND(0.0010)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0148	0.0165	0.0459	0.0300
Nickel (dissolved)	mg/L	0.0021	0.0023	ND(0.0020)	0.0028
Zinc (dissolved)	mg/L	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	275	295	262	283
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	0.051
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	11	30	12	ND(10)
Chloride	mg/L	46	43.1	46.8	52.5
Color (apparent)	color unit	-	-	10.4	13.3
Color (apparent)	TCU	34.0	50.7	-	-
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.2	2.9	2.7	1.5
Escherichia coli	cfu/100mL	ND(2)	0	0	1
Fecal coliform bacteria	cfu/100mL	ND(2)	2	0	1
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	7.67	7.62	7.62	7.52
Phenol	mg/L	0.0030	0.0012	0.0045	ND(0.0010)
Phosphorus	mg/L	0.038	0.166	0.074	ND(0.030)
Sulfate	mg/L	292	445	222	456
Total coliform bacteria	cfu/100mL	ND(100)	200	5	50
Total dissolved solids (TDS)	mg/L	714	1020	613	994
Total kjeldahl nitrogen (TKN)	mg/L	0.16	1.34	ND(0.52)	0.18
Total suspended solids (TSS)	mg/L	99.0	209	106	72.8
Turbidity	NTU	13.5	6.82	4.84	44.8
Un-ionized ammonia	mg/L	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00030
Field Parameters					
Conductivity, field	mS/cm	1.16	1.46	0.946	434
Dissolved oxygen (DO), field	mg/L	5.1	7.8	4.73	8.64
Oxidation reduction potential (ORP), field	millivolts	-	-	105	80
pH, field	s.u.	5.09	6.16	7.24	7.48
Temperature, field	Deg C	11.3	10.4	8.09	8.44
Turbidity, field	NTU	393	25	194	-
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)

000394

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		***MW3-08***	***MW3-08***	***MW3-08***	***MW3-08***
Sample ID:		***GW-45804-052213-TS-008***	***GW-45804-111413-TS-014***	***GW-45804-052914-MB-016***	***GW-45804-112614-TS-014***
Sample Date:		***5/22/2013***	***11/14/2013***	***5/29/2014***	***11/26/2014***
		Original	***Original***	***Original***	***Original***
Parameters:	***Units***				
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	0.094	-	-	-
2-Methylnaphthalene	µg/L	0.212	-	-	-
Acenaphthene	µg/L	ND(0.020)	-	-	-
Acenaphthylene	µg/L	ND(0.020)	-	-	-
Acridine	µg/L	ND(4.0)	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	ND(0.060)	-	-	-
Chrysene	µg/L	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-
Fluoranthene	µg/L	ND(0.020)	-	-	-
Fluorene	µg/L	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-
Naphthalene	µg/L	0.113	-	-	-
Phenanthrene	µg/L	ND(0.020)	-	-	-
Pyrene	µg/L	ND(0.020)	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

000395

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*
Sample ID:		*GW-45804-051910-MB-008*	*GW-45804-051711-MMD-006*	*GW-45804-110911-TS-003*	*GW-45804-051412-MB-001*	*GW-45804-052312-MB-006*
Sample Date:		*5/19/2010*	*5/17/2011*	*11/9/2011*	*5/14/2012*	*5/23/2012*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Boron (dissolved)	mg/L	-	-	-	0.052	-
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	-
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	-
Cobalt (dissolved)	mg/L	-	-	-	0.00122	-
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	-
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	-
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	-
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	-
Molybdenum (dissolved)	mg/L	0.0299	0.0180	0.0235	0.0192	-
Nickel (dissolved)	mg/L	-	-	-	0.0110	-
Zinc (dissolved)	mg/L	0.0691	0.0131	0.0090	ND(0.0030)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	367	416	378	388	-
Ammonia-N	mg/L	0.069	ND(0.050)	ND(0.050)	ND(0.050)	-
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)	-
Chloride	mg/L	94.6	73.6	70.4	81.3	-
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	20.3	36.5	77.5	-	91.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0	-
Escherichia coli	cfu/100mL	0	0	ND(2)	-	0
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-
pH, lab	s.u.	-	-	-	7.54	-
Phenol	mg/L	-	-	-	ND(0.0010)	-
Phosphorus	mg/L	0.158	0.098	0.479	0.100	-
Sulfate	mg/L	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	40	2	-	16
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21	-
Total suspended solids (TSS)	mg/L	-	-	-	24.0	-
Turbidity	NTU	-	-	-	-	22.0
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	-	-
Field Parameters						
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-
pH, field	s.u.	7.44	5.95	7.00	6.43	6.27
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.51
Turbidity, field	NTU	-	455	389	-	-

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*
Sample ID:		*GW-45804-051910-MB-008*	*GW-45804-051711-MMD-006*	*GW-45804-110911-TS-003*	*GW-45804-051412-MB-001*	*GW-45804-052312-MB-006*
Sample Date:		*5/19/2010*	*5/17/2011*	*11/9/2011*	*5/14/2012*	*5/23/2012*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	340	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	-
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the Tier I Trigger Level

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*
Sample ID:		*GW-45804-111212-MB-010*	*GW-45804-052213-TS-007*	*GW-45804-111413-TS-012*	*GW-45804-052914-MB-005*	*GW-45804-112514-TS-001*
Sample Date:		*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/29/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.072	0.056	0.058	0.052	0.062
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00020	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00373	0.00056	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.320	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.320	0.416	0.220	0.270	0.0861
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0461	0.0204	0.0195	0.0201	0.0233
Nickel (dissolved)	mg/L	0.0053	0.0083	0.0063	0.0061	0.0051
Zinc (dissolved)	mg/L	0.0053	0.0105	0.0041	ND(0.0030)	0.0097
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	387	405	372	360	338
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.067)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	23	13	21	ND(10)	ND(10)
Chloride	mg/L	72.3	78	69.2	68.1	68
Color (apparent)	color unit	-	-	-	1.7 J	10.9
Color (apparent)	TCU	39.4 J	29.7	61.7	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.7	1.6	2.0	ND(1.0)	1.1
Escherichia coli	cfu/100mL	ND(2)	ND(10)	0	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.13	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	7.67	7.60	7.58	7.40	7.66
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.228	0.058	0.109	ND(0.030)	0.032
Sulfate	mg/L	697	731	691	621	695
Total coliform bacteria	cfu/100mL	2	ND(100)	ND(10)	0	0
Total dissolved solids (TDS)	mg/L	1540	1450	1510	1370	1390
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	ND(0.15)	0.18	ND(0.21)	ND(0.15)
Total suspended solids (TSS)	mg/L	1370	100	361	7.2	10.0
Turbidity	NTU	4.60 J	10.3	6.56	0.22	4.22
Un-ionized ammonia	mg/L	ND(0.00049)	ND(0.0000023)	ND(0.000019)	0.00024	ND(0.00012)
Field Parameters						
Conductivity, field	mS/cm	1.75	1.99	0.96	2.04	-
Dissolved oxygen (DO), field	mg/L	4.99	6.26	7.73	0.58	-
Oxidation reduction potential (ORP), field	millivolts	18	47	-	99	-
pH, field	s.u.	7.57	5.20	6.20	7.11	7.07
Temperature, field	Deg C	12.0	13.4	10.4	12.62	8.5
Turbidity, field	NTU	355	594	56	57	-

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*	*MW4-08*
Sample ID:		*GW-45804-111212-MB-010*	*GW-45804-052213-TS-007*	*GW-45804-111413-TS-012*	*GW-45804-052914-MB-005*	*GW-45804-112514-TS-001*
Sample Date:		*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/29/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Acenaphthene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	ND(0.010)	ND(0.0050)	0.0061	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	-	-	-
Chrysene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Fluorene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Naphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Phenanthrene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Pyrene	µg/L	ND(0.020)	ND(0.020)	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*
Sample ID:		*GW-45804-051910-MB-009*	*GW-45804-110210-TS-011*	*GW-45804-051711-MMD-007*	*GW-45804-110911-TS-002*	*GW-45804-051412-MB-002*	*GW-45804-052312-MB-005*	*GW-45804-111212-MB-008*	*GW-45804-052213-TS-009*	*GW-45804-111413-TS-013*	*GW-45804-052914-MB-004*	*GW-45804-112514-TS-002*
Sample Date:		*5/19/2010*	*11/2/2010*	*5/17/2011*	*11/9/2011*	*5/14/2012*	*5/23/2012*	*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/29/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***											
Metals												
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	0.059	-	0.059	0.065	0.070	0.059	0.071
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00010	-	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	0.00231	-	0.00186	0.00287	0.00144	0.00061	0.00145
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.400	0.487	0.301	0.791	0.099	-	ND(0.050)	0.247	1.86	0.221	0.382
Lead (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.292	0.372	-	0.422	0.317	0.218	0.182	0.234
Mercury (dissolved)	mg/L	-	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0360	0.0317	-	0.0226	0.0462	0.0361	0.0445	0.0397
Nickel (dissolved)	mg/L	-	-	-	-	0.0054	-	0.0110	0.0058	0.0023	0.0022	ND(0.0020)
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0030)	-	0.0073	0.0054	ND(0.0030)	ND(0.0030)	0.0095
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	459	427	376	387	351	-	396	383	350	309	329
Ammonia-N	mg/L	0.117	0.084	0.081	0.052	ND(0.050)	-	ND(0.050)	0.066	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	ND(10)	-	13	21	42	ND(10)	ND(10)
Chloride	mg/L	81.4	203	87.3	83.4	78.0	-	80.4	66	67.4	73.5	69
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	12.0	16.9
Color (apparent)	TCU	25.4	93.5	139	66.4	-	271	11.2 J	33.5	117	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.0	2.7	3.1	1.7	-	1.8	1.6	2.0	2.0	1.7
Escherichia coli	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	0.13	-	ND(0.10)	ND(0.50)	ND(0.10)	0.24	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	-	-	-	-	7.67	-	7.74	7.73	7.58	7.48	7.72
Phenol	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0040	ND(0.0010)	0.0018	ND(0.0010)
Phosphorus	mg/L	0.974	1.05	1.23	1.48	0.672	-	0.293	0.906	1.75	0.070	0.097
Sulfate	mg/L	-	-	-	-	-	-	718	796	702	646	710
Total coliform bacteria	cfu/100mL	0	4	3	2	-	0	10	ND(10)	ND(10)	5	0
Total dissolved solids (TDS)	mg/L	1950	1920	1700	1730	1740	-	1600	1540	1480	1380	1460
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.19	-	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	-	-	-	-	5280	-	528	1710	2950	110	61.2
Turbidity	NTU	-	-	-	-	-	67.0	2.60 J	94.0	19.4	22.0	9.33
Un-ionized ammonia	mg/L	0.00085	0.000021	0.00030	0.00014	-	-	ND(0.0065)	0.0000073	ND(0.000018)	ND(0.00018)	ND(0.00016)
Field Parameters												
Conductivity, field	mS/cm	1.96	2.41	2.55	2.46	2.13	2.1	1.88	1.98	2.01	2	0.059
Dissolved oxygen (DO), field	mg/L	-	3.39	-	-	-	-	5.47	8.74	6.45	8.95	8.44
Oxidation reduction potential (ORP), field	millivolts	-	5	-	-	-	-	-78	-8	-	10	19
pH, field	s.u.	7.46	6.00	7.3	7.04	6.27	6.27	8.70	5.54	6.17	7.2	7.21
Temperature, field	Deg C	11.4	11.4	7.68	11.4	10.32	13.03	13.3	14.5	11.2	9.82	10.23
Turbidity, field	NTU	-	-	-	-5	-	-	640	-5	556	54.5	-
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1520	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	300
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	3900	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	-	-	-	-	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(380)	580

000400

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*	*MW4-09*
Sample ID:		*GW-45804-051910-MB-009*	*GW-45804-110210-TS-011*	*GW-45804-051711-MMD-007*	*GW-45804-110911-TS-002*	*GW-45804-051412-MB-002*	*GW-45804-052312-MB-005*	*GW-45804-111212-MB-008*	*GW-45804-052213-TS-009*	*GW-45804-111413-TS-013*	*GW-45804-052914-MB-004*	*GW-45804-112514-TS-002*
Sample Date:		*5/19/2010*	*11/2/2010*	*5/17/2011*	*11/9/2011*	*5/14/2012*	*5/23/2012*	*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/29/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	*Units*											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	0.038	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	0.0309	0.0159	0.0050	0.0074	0.0121	-	ND(0.010)	0.0063	ND(0.0050)	0.0064	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.039)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:			*GW-45804-011310-TS-002*	*GW-45804-051810-MB-001*	*GW-45804-110210-TS-003*	*GW-45804-051611-MMD-005*	*GW-45804-110911-TS-004*	*GW-45804-110911-TS-005*	*GW-45804-021512-MB-003*	*GW-45804-021512-MB-004*	*GW-45804-032112-MB-005*	*GW-45804-032112-MB-008*	*GW-45804-051412-MB-003*
Sample Date:			*1/13/2010*	*5/18/2010*	*11/2/2010*	*5/16/2011*	*11/9/2011*	*11/9/2011*	*2/15/2012*	*2/15/2012*	*3/21/2012*	*3/21/2012*	*5/14/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*
Parameters:	*Units*	*TLP* [1]											
Metals													
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0010	ND(0.0010)	-	-	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L		-	-	-	-	-	-	0.054	0.056	-	-	0.067
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)
Calcium (dissolved)	mg/L		-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L		-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00080)	ND(0.00080)	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Iron (dissolved)	mg/L	48.3	1.99	4.88	4.18	5.18	3.92	3.83	6.27	6.24	-	-	5.88
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	116	-	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.65	3.25	2.99	3.59	3.42	3.47	4.73	4.79	-	-	3.88
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.024	0.018	0.022	0.0095	0.0133	0.0129	0.0088	0.0088	-	-	0.0093
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0020)	ND(0.0020)	-	-	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.139	ND(0.030)	ND(0.030)	0.0093	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0087	-	-	0.0030
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry													
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	360	408	487	485	541	534	527	517	477	-	442
Ammonia-N	mg/L	4.0	0.698	0.663	0.320	3.90	4.77	4.76	7.39	6.85	9.99	10.3	10.1
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.9)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	45	35	-	-	30
Chloride	mg/L	-	94.4	147	68.5	103	108	108	-	-	104	-	116
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	23.1	25.9	128	102	29.2	23.8	10.9	13.0	26.6	-	-
Conductivity	umhos/cm	-	2150	-	-	-	-	-	-	-	2170	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.6	5.5	6.6	10.0	10.0	10.0	11.0	9.4	8.0	-	9.4
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)	ND(2)	0	0	0	0	-
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	ND(2)	0	0	0 J	0 J	-
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)
Petroleum Products	mg/L	-	-	-	-	-	-	-	ND(1.0)	ND(1.0)	-	-	-
pH, lab	s.u.	-	7.68	-	-	-	-	-	7.56	7.53	7.08	-	7.58
Phenol	mg/L	-	-	-	-	-	-	-	0.0010	0.0010	-	-	ND(0.0010)
Phosphorus	mg/L	7.2	6.11	1.20	0.758	0.167	0.482	0.519	0.638	0.631	0.706	-	0.560
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	3	0	6	10	4	ND(2)	0	0	1	0	-
Total dissolved solids (TDS)	mg/L	-	1750	1620	1350	1740	1610	1610	1800	1780	1790	-	1720
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	10.8	9.87	-	-	11.8
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	2010 J	770 J	-	-	380
Turbidity	NTU	-	4.10	-	-	-	-	-	116	156	18.6	-	-

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:			*GW-45804-011310-TS-002*	*GW-45804-051810-MB-001*	*GW-45804-110210-TS-003*	*GW-45804-051611-MMD-005*	*GW-45804-110911-TS-004*	*GW-45804-110911-TS-005*	*GW-45804-021512-MB-003*	*GW-45804-021512-MB-004*	*GW-45804-032112-MB-005*	*GW-45804-032112-MB-008*	*GW-45804-051412-MB-003*
Sample Date:			*1/13/2010*	*5/18/2010*	*11/2/2010*	*5/16/2011*	*11/9/2011*	*11/9/2011*	*2/15/2012*	*2/15/2012*	*3/21/2012*	*3/21/2012*	*5/14/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]											
Field Parameters		-											
		-											
Conductivity, field	mS/cm	-	2.56	0.957	2.15	2.87	2.48	-	2.51	2.51	2.56	2.56	2.45
Dissolved oxygen (DO), field	mg/L	-	-	-	4.92	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-57	-	-	-	-	-	-	-	-
pH, field	s.u.	-	5.54	6.93	5.72	6.52	7.15	7.15	6.57	6.57	5.23	5.23	6.26
Temperature, field	Deg C	-	9.6	11.6	14.9	6.8	13.7	13.7	7.52	7.52	8.4	8.4	10.23
Turbidity, field	NTU	-	0	-	-	288	852	-	-5	-5	-5	-5	-
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	12500	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	ND(2500)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	12400	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	36800	4400	2010	550	1770	1640	2470 J	610 J	4700	-	690
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	104000	13800	4500	-	4500	4100	6300	-	10300	-	ND(2500)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	-	-	-	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	49300	4400	2830	550	2370	2200	3190 J	610 J	4700	-	690
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	0.27	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	0.24	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	0.25	0.141	0.023	0.100	0.151	0.074	0.069	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	0.80	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.848	0.520	0.0435	0.244 J	0.470 J	0.234	0.218	-	-	0.0225 J
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.54	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.88	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.64	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.51	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.79	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.41	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:		*GW-45804-051412-MB-004*	*GW-45804-052312-MB-004*	*GW-45804-08-08-12-MB-001*	*GW-45804-111212-MB-006*	*GW-45804-022713-TS-002*	*GW-45804-022713-TS-004*	*GW-45804-052213-TS-013*	*GW-45804-080713-TS-004*	*GW-45804-111413-TS-011*	*GW-45804-042114-TS-008*	*GW-45804-052914-MB-012*
Sample Date:		*5/14/2012*	*5/23/2012*	*8/8/2012*	*11/12/2012*	*2/27/2013*	*2/27/2013*	*5/22/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*
		Duplicate	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***											
Metals												
Aluminum (dissolved)	mg/L	-	-	ND(0.10)	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	ND(0.050)	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	0.0019	0.0012	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	-	-	0.15	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	ND(0.010)	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	ND(0.010)	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.064	-	ND(0.50)	0.073	0.057	0.055	0.064	0.074	0.080	ND(0.050)	0.063
Cadmium (dissolved)	mg/L	ND(0.00010)	-	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	292	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	0.0015	-	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	-	ND(0.0050)	0.00333	0.00063	0.00056	0.00121	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.95	-	5.58	6.79	7.31	7.34	7.47	4.79	5.00	6.73	6.53
Lead (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	92.0	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.95	-	3.40	4.27	4.40	4.65	4.29	3.45	3.36	3.08	3.28
Mercury (dissolved)	mg/L	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0094	-	0.014	0.0158	0.0110	0.0108	0.0163	0.0103	0.0102	0.0061	0.0066
Nickel (dissolved)	mg/L	ND(0.0020)	-	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	ND(0.50)	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	19	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	ND(0.0040)	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	10	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	ND(0.0010)	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	101	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	3.31	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	ND(0.0030)	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	ND(0.010)	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	ND(0.020)	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	ND(0.10)	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	ND(0.050)	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	ND(0.010)	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	-	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	ND(0.040)	-	-	-	-	-	-	-	-
General Chemistry												
Alkalinity, bicarbonate	mg/L	-	-	488	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	ND(10)	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	ND(10)	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	438	-	490	525	488	494	483	495	596	860	-
Ammonia-N	mg/L	10.0	-	8.90	3.35	12.1	12.6	10.3	16.3	18.4	26.4	30.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	25	-	36	44	59	57	38	30	55	ND(43)	41
Chloride	mg/L	116	-	176	143	149	149	320	144	149	209	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	163 J	-
Color (apparent)	TCU	-	106	57.4	52.1 J	55.0	46.4	28.0	86.5	130	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	-	8.1	8.3	12.1	11.1	8.3	9.5	8.8	7.5	7.1
Escherichia coli	cfu/100mL	-	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	-
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	-
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.58	-	7.75	7.57	7.54	7.66	7.58	7.41	7.51	7.31	-
Phenol	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0012	0.0076	0.0011
Phosphorus	mg/L	0.408	-	0.651	0.183	0.474	0.628	0.332	0.148	0.404	0.183	0.198
Sulfate	mg/L	-	-	-	424	872	872	581	773	630	297	-
Total coliform bacteria	cfu/100mL	-	ND(10)	0	2	ND(2)	2	100	10	ND(10)	0	0
Total dissolved solids (TDS)	mg/L	1710	-	1740	1430	2030	2020	1910	1920	1760	1480	-
Total kjeldahl nitrogen (TKN)	mg/L	12.2	-	10.8	3.99	13.5	14.1	10.8	16.8	20.3	26.9	29.0
Total suspended solids (TSS)	mg/L	246	-	304	88.0	700 J	1400 J	650	16.4	391	21.5	-
Turbidity	NTU	-	26.0	29.0	6.90 J	39.0 J	20.7 J	19.2	28.0	50.0	87.0	51.0

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:		*GW-45804-051412-MB-004*	*GW-45804-052312-MB-004*	*GW-45804-08-08-12-MB-001*	*GW-45804-111212-MB-006*	*GW-45804-022713-TS-002*	*GW-45804-022713-TS-004*	*GW-45804-052213-TS-013*	*GW-45804-080713-TS-004*	*GW-45804-111413-TS-011*	*GW-45804-042114-TS-008*	*GW-45804-052914-MB-012*
Sample Date:		*5/14/2012*	*5/23/2012*	*8/8/2012*	*11/12/2012*	*2/27/2013*	*2/27/2013*	*5/22/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*
		Duplicate	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***											
Field Parameters												
Conductivity, field	mS/cm	-	3.06	2.21	1.94	2.85	-	2.84	2.54	2.55	2.57	2.86
Dissolved oxygen (DO), field	mg/L	-	-	5.69	3.34	5.71	-	5.71	5.69	7.15	4.86	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-87	-	-	-87	-101	-	-132	-168
pH, field	s.u.	-	6.17	7.87	8.37	7.31	7.31	5.75	6.68	6.24	7.15 D 7.15	7.31
Temperature, field	Deg C	-	10.17	16.54	14.8	7.8	7.8	11.5	17.4	13.2	9.9 D 9.85	9.44
Turbidity, field	NTU	-	-	463	199	939	-	818	2.2	243	22.9	5.7
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	-	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	120	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	840	-	1600	510	ND(420)	ND(250)	730	ND(250)	1010	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	2700	-	4400	ND(2500)	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	840	-	2140	510	ND(420)	ND(250)	990	ND(250)	1280	ND(380)	ND(380)
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.027)	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.020)	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	0.26	0.098	-	-	0.142	-	-	0.184	-
Acenaphthylene	µg/L	-	-	0.23	0.093	-	-	0.162	-	-	ND(0.187)	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	-	-	ND(4.0)	-
Anthracene	µg/L	0.023	-	ND(0.20)	0.060	ND(0.20)	ND(0.20)	0.048	ND(0.020)	0.029	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	0.31	0.220	-	-	0.181	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.0282 J	-	0.28	0.197	0.11 J	0.31 J	0.159	ND(0.0050)	0.0634	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	0.33	0.184	-	-	0.199	-	-	ND(0.020)	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	0.23	0.117	-	-	0.113	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	0.20	0.162	-	-	0.167	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	0.257	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	0.38	0.228	-	-	0.196	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	0.038	-	-	0.029	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	1.02	0.548	-	-	0.525	-	-	0.121	-
Fluorene	µg/L	-	-	ND(0.20)	0.034	-	-	ND(0.13)	-	-	0.043	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.20)	0.120	-	-	0.117	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-	0.024 J	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	0.29	0.153	-	-	0.132	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	0.85	0.480	-	-	0.458	-	-	0.079	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
☐ - Exceedence of the Tier I Trigger Level

000405

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:		*GW-45804-053014-MB-012*	*GW-45804-082114-TS-006*	*GW-45804-112614-TS-015*
Sample Date:		*5/30/2014*	*8/21/2014*	*11/26/2014*
		Original	*Original*	*Original*
Parameters:	***Units***			
Metals				
Aluminum (dissolved)	mg/L	-	-	-
Antimony (dissolved)	mg/L	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.0027
Barium (dissolved)	mg/L	-	-	-
Beryllium (dissolved)	mg/L	-	-	-
Bismuth (dissolved)	mg/L	-	-	-
Boron (dissolved)	mg/L	-	0.096	0.066
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00173
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	-	4.68	782
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-
Manganese (dissolved)	mg/L	-	2.50	2.45
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0144	0.0339
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.0037
Phosphorus (dissolved)	mg/L	-	-	-
Potassium (dissolved)	mg/L	-	-	-
Selenium (dissolved)	mg/L	-	-	-
Silicon (dissolved)	mg/L	-	-	-
Silver (dissolved)	mg/L	-	-	-
Sodium (dissolved)	mg/L	-	-	-
Strontium (dissolved)	mg/L	-	-	-
Thallium (dissolved)	mg/L	-	-	-
Tin (dissolved)	mg/L	-	-	-
Titanium (dissolved)	mg/L	-	-	-
Tungsten (dissolved)	mg/L	-	-	-
Uranium (dissolved)	mg/L	-	-	-
Vanadium (dissolved)	mg/L	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-
General Chemistry				
Alkalinity, bicarbonate	mg/L	-	-	-
Alkalinity, carbonate	mg/L	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-
Alkalinity, total (as CaCO3)	mg/L	742 J	673 J	445
Ammonia-N	mg/L	-	26.0 J	6.91
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	34 J	33
Chloride	mg/L	231 J	207 J	244
Color (apparent)	color unit	260 J	102 J	101
Color (apparent)	TCU	-	-	-
Conductivity	umhos/cm	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	8.4 J	9.2
Escherichia coli	cfu/100mL	-	0 J	0
Fecal coliform bacteria	cfu/100mL	-	1 J	0
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)
Petroleum Products	mg/L	-	-	-
pH, lab	s.u.	7.52 J	7.43 J	7.48
Phenol	mg/L	-	0.0011 J	0.0010
Phosphorus	mg/L	-	0.161 J	0.105
Sulfate	mg/L	421 J	411 J	172
Total coliform bacteria	cfu/100mL	-	2 J	0
Total dissolved solids (TDS)	mg/L	1640 J	1420 J	1130
Total kjeldahl nitrogen (TKN)	mg/L	-	25.9 J	9.31
Total suspended solids (TSS)	mg/L	17.6 J	9.6 J	208
Turbidity	NTU	-	48.7 J	116

000406

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW5-09*	*MW5-09*	*MW5-09*
Sample ID:		*GW-45804-053014-MB-012*	*GW-45804-082114-TS-006*	*GW-45804-112614-TS-015*
Sample Date:		*5/30/2014*	*8/21/2014*	*11/26/2014*
		Original	*Original*	*Original*
Parameters:	***Units***			
Field Parameters				
Conductivity, field	mS/cm	2.86	2.57	1.107
Dissolved oxygen (DO), field	mg/L	0	1.06	3.93
Oxidation reduction potential (ORP), field	millivolts	-140	-139	-63
pH, field	s.u.	7.4	8.53	6.92
Temperature, field	Deg C	9.5	18.99	10.38
Turbidity, field	NTU	32.2	44	-
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250) J	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380) J	ND(380)
Semi-Volatiles				
1+2-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acridine	µg/L	-	-	-
Anthracene	µg/L	-	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

000407

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*
Sample ID:		*GW-45804-011410-MB-001*	*GW-45804-051810-MB-006*	*GW-45804-081910-MMD-003*	*GW-45804-110210-TS-004*	*GW-45804-021511-MB-004*	*GW-45804-051711-MMD-008*	*GW-45804-081611-TS-004*	*GW-45804-111011-TS-009*	*GW-45804-021512-MB-002*	*GW-45804-032112-MB-001*
Sample Date:		*1/14/2010*	*5/18/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*5/17/2011*	*8/16/2011*	*11/10/2011*	*2/15/2012*	*3/21/2012*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***										
Metals											
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0032	0.0098	0.0101	0.0196	ND(0.010)	0.0026	0.0073	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L										
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.050)	-
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	-
Calcium (dissolved)	mg/L										
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.0026	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.00080	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)	-
Iron (dissolved)	mg/L	0.068	ND(0.050)	0.179	0.252	ND(0.050)	0.058	2.89	0.154	ND(0.050)	
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)	-
Magnesium (dissolved)	mg/L	98.1	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.462	0.570	0.859	1.61	0.797	1.50	1.66	1.11	0.636	-
Mercury (dissolved)	mg/L									ND(0.00010)	
Molybdenum (dissolved)	mg/L	0.0633	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)	0.0021	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.0041	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L										
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L										
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.190	0.0074	0.0256	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)	ND(0.0030)	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	175	831	442	510	499	366	452	477	941	288
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1	15.8	23.0	98.9	10.6
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	8.5	40.6	2.5	12.6	149	ND(2.8)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	524	-
Chloride	mg/L	29.7	38.8	93.4	166	63.7	82.1	87.6	74.1	-	92.9
Color (apparent)	TCU	6.1	161	53.2	187	239	102	114	17.0	310	61.2
Conductivity	umhos/cm	1920	-	-	-	-	-	-	-	-	1810
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	266	9.0	90.0	16.7	25.0	9.3	7.7	104	5.6
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2	2970	28
Fecal coliform bacteria	cfu/100mL	0	50	90	6000	80	160	20	10	150000	100 J
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)	ND(1.0)	ND(0.5)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)	ND(1.0)	ND(0.5)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	ND(2.0)	-
Petroleum Products	s.u.	7.90	-	-	-	-	-	-	-	7.95	7.37
Phenol	mg/L	-	-	-	-	-	-	-	-	0.0890	-
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570	0.127	0.134	1.36	0.150
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	80	350	18000	13700	1510	290	210	93000	93000
Total dissolved solids (TDS)	mg/L	1720	1960	1700	1640	1330	2290	1660	1610	1160	1560
Total kjeldahl nitrogen (TKN)	mg/L									127	
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	10.0	-
Turbidity	NTU	1.04	-	-	-	-	-	-	-	200	7.00
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0645	0.0623	0.0858	-	0.000764

000408

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*
Sample ID:		*GW-45804-011410-MB-001*	*GW-45804-051810-MB-006*	*GW-45804-081910-MMD-003*	*GW-45804-110210-TS-004*	*GW-45804-021511-MB-004*	*GW-45804-051711-MMD-008*	*GW-45804-081611-TS-004*	*GW-45804-111011-TS-009*	*GW-45804-021512-MB-002*	*GW-45804-032112-MB-001*
Sample Date:		*1/14/2010*	*5/18/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*5/17/2011*	*8/16/2011*	*11/10/2011*	*2/15/2012*	*3/21/2012*
		Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***										
Field Parameters											
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43	2.62	2.29
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	-	-	0	2.48	-	-
Oxidation reduction potential (ORP), field	millivolts	23	-341	-268	-292	-333	-	-279	-238	-	-
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.26	6.86	6.97	6.9	5.39
Temperature, field	Deg C	4.8	14.07	22.3	17.3	11.0	15.99	21.7	17.5	11.87	13.3
Turbidity, field	NTU	185	-	-	-	-	-	166	15.3	50.3	169
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	49	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	110	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-	-	-	-	110	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles											
1-Methylnaphthalene	µg/L										
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L										
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
Exceedence of the Tier I Trigger Level

000409

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW101-09*	*MW101-09*	*MW101-09*	*MW101-09*
Sample ID:		*GW-45804-032112-MB-002*	*GW-45804-051612-MB-012*	*GW-45804-08-08-12-MB-004*	*GW-45804-111312-MB-011*
Sample Date:		*3/21/2012*	*5/16/2012*	*8/8/2012*	*11/13/2012*
		Duplicate	*Original*	*Original*	*Original*
Parameters:	***Units***				
Metals					
Aluminum (dissolved)	mg/L	-	-	ND(0.10)	-
Antimony (dissolved)	mg/L	-	-	ND(0.050)	-
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	-	-	0.11	-
Beryllium (dissolved)	mg/L			ND(0.010)	
Bismuth (dissolved)	mg/L	-	-	ND(0.010)	-
Boron (dissolved)	mg/L	-	0.064	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	ND(0.00010)
Calcium (dissolved)	mg/L			292	
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L		1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	88.9	-
Manganese (dissolved)	mg/L	-	1.21	1.12	1.17
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	-	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	ND(0.50)	-
Potassium (dissolved)	mg/L			24	
Selenium (dissolved)	mg/L	-	-	ND(0.0040)	-
Silicon (dissolved)	mg/L	-	-	ND(10)	-
Silver (dissolved)	mg/L	-	-	ND(0.0010)	-
Sodium (dissolved)	mg/L			54.2	
Strontium (dissolved)	mg/L	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	ND(0.0030)	-
Tin (dissolved)	mg/L	-	-	ND(0.010)	-
Titanium (dissolved)	mg/L	-	-	ND(0.020)	-
Tungsten (dissolved)	mg/L	-	-	ND(0.10)	-
Uranium (dissolved)	mg/L	-	-	ND(0.050)	-
Vanadium (dissolved)	mg/L	-	-	ND(0.010)	-
Zinc (dissolved)	mg/L	-	0.0052	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	ND(0.040)	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	442	-
Alkalinity, carbonate	mg/L	-	-	ND(10)	-
Alkalinity, hydroxide	mg/L	-	-	ND(10)	-
Alkalinity, total (as CaCO3)	mg/L	285	284	445	466
Ammonia-N	mg/L	10.6	7.89	108	36.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.8)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	-	11	42	114
Chloride	mg/L	95.9	106	87.3	157
Color (apparent)	TCU	48.9	60.4	34.4	189
Conductivity	umhos/cm	1820	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.3	6.2	8.7	38.0
Escherichia coli	cfu/100mL	41	1	30	10
Fecal coliform bacteria	cfu/100mL	400 J	1	126	20
Nitrate (as N)	mg/L	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	-	ND(0.20)	-	-
Petroleum Products	s.u.	7.74	7.87	7.75	7.82
Phenol	mg/L	-	ND(0.0010)	0.0030	0.0280
Phosphorus	mg/L	0.143	0.079	0.310	0.138
Sulfate	mg/L	-	-	-	1060
Total coliform bacteria	cfu/100mL	96000	21	190	110
Total dissolved solids (TDS)	mg/L	1570	1530	1780	2240
Total kjeldahl nitrogen (TKN)	mg/L		9.54	110	40.6
Total suspended solids (TSS)	mg/L	-	6.8	7.2	17.0
Turbidity	NTU	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	0.000763	-	-	0.668

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		***MW101-09***	***MW101-09***	***MW101-09***	***MW101-09***
Sample ID:		***GW-45804-032112-MB-002***	***GW-45804-051612-MB-012***	***GW-45804-08-08-12-MB-004***	***GW-45804-111312-MB-011***
Sample Date:		***3/21/2012***	***5/16/2012***	***8/8/2012***	***11/13/2012***
		Duplicate	***Original***	***Original***	***Original***
Parameters:	***Units***				
Field Parameters					
Conductivity, field	mS/cm	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	-	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	-	123	-271	-546
pH, field	s.u.	5.39	6.8	8.2	7.70
Temperature, fielc	Deg C	13.3	15.79	24.2	16.5
Turbidity, field	NTU	169	52.3	4.3	0
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L			ND(0.020)	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	ND(0.020)	-
Acenaphthylene	µg/L			ND(0.020)	
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-
Chrysene	µg/L	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	ND(0.053)	-
Phenanthrene	µg/L	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	ND(0.020)	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
☐ - Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*
Sample ID:			*GW-45804-03052013-TS-006*	*GW-45804-052313-TS-016*	*GW-45804-080713-TS-007*	*GW-45804-111413-TS-004*	*GW-45804-042114-TS-003*	*GW-45804-052914-MB-010*	*GW-45804-082114-TS-001*	*GW-45804-082114-TS-002*	*GW-45804-112514-TS-004*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*	*8/21/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*
Parameters:	***Units***	***TLP*** [1]									
Metals											
Arsenic (dissolved)	mg/L	-	0.0045	0.0025	0.0012	0.0063	ND(0.0010)	0.0019	0.0138	0.0146	0.0067
Boron (dissolved)	mg/L	-	0.076	0.116	0.158	0.150	0.151	0.112	0.161	0.157	0.079
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00227	0.00085	ND(0.00050)	0.00351	ND(0.00050)	ND(0.00050)	0.00166	0.00174	0.00056
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0026	ND(0.0010)	0.0022	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	48.3	34.5	4.06	ND(0.050)	12.8	ND(0.050)	0.209	4.76	4.95	10.7
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	2.24	1.21	0.179	0.711	0.0299	0.530	1.16	1.23	1.62
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0543	0.0196	0.0177	0.0270	0.0160	0.0230	0.0263	0.0281	0.0161
Nickel (dissolved)	mg/L	-	0.0030	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030	0.0046	0.0050	ND(0.0020)
Zinc (dissolved)	mg/L	-	0.0085	0.0146	0.0074	0.0063	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0052	0.0111
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	633	368	464	409	667	476	460	507 J	519 J	485
Ammonia-N	mg/L	4.0	6.96	11.6	9.32	13.7	22.1	34.9	25.9 J	25.7 J	19.6
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	74	27	30	55	ND(41)	14	23 J	32 J	26
Chloride	mg/L	-	157	141	135	164	194	140	114 J	115 J	111
Color (apparent)	color unit	-	-	-	-	-	16.8 J	15.9	39.4 J	35.6 J	101
Color (apparent)	TCU	-	76.5	29.8 J	8.2	121	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	14.6	ND(7.8)	5.6	13.0	5.4	3.6	5.8 J	5.8 J	6.7
Escherichia coli	cfu/100mL	25.6	ND(2)	ND(2)	ND(2)	ND(2)	60	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL	-	ND(2) J	ND(2)	2	ND(2)	90	0	0 J	0 J	0
Nitrate (as N)	mg/L	1.3	0.21	5.52	2.15	0.18	0.64	0.64	0.31 J	0.34 J	ND(0.50)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
pH, lab	s.u.	-	7.26	7.82	7.20	7.37	7.23	7.42	7.15 J	7.15 J	7.66
Phenol	mg/L	-	ND(0.0010)	ND(0.0030)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)	ND(0.0010) J	ND(0.0010) J	ND(0.0010)
Phosphorus	mg/L	7.2	0.097	0.313	ND(0.030)	1.13	ND(0.030)	0.032	0.066 J	0.062 J	0.151
Sulfate	mg/L	-	1060	797	807	669	887	834	592 J	595 J	695
Total coliform bacteria	cfu/100mL	-	2	30	300	200	4200	50	0 J	0 J	1
Total dissolved solids (TDS)	mg/L	-	2160	1860	1860	1910	2040	1840	1430 J	1410 J	1560
Total kjeldahl nitrogen (TKN)	mg/L	-	11.4	13.5	9.62	14.3	23.0	31.6	28.1 J	26.0 J	21.7
Total suspended solids (TSS)	mg/L	-	153	386	10.0	226	6.6	3.6	15.2 J	10.4 J	230
Turbidity	NTU	-	380	22.0	0.71	65.3	13.6	0.85	21.7 J	16.3 J	43.0
Un-ionized ammonia	mg/L	-	0.00228	0.00241	0.00211	0.00858	0.0436	0.162	1.50 J	1.49 J	0.0664
Field Parameters											
Conductivity, field	mS/cm	-	2.89	2.62	2.37	2.67	3.09	2.82	2.46	2.46	1.4
Dissolved oxygen (DO), field	mg/L	-	3.22	2.93	3.73	8.15	3.7	0.61	0.36	0.36	4.14
Oxidation reduction potential (ORP), field	millivolts	-	-73	-	38	-	59	-52	-96	-96	-75
pH, field	s.u.	-	6.32	5.74	5.60	6.26	7 D 7.00	7.06	8.02	8.02	7.07
Temperature, field	Deg C	-	5.4	16.5	22.32 D 22.3	15.5	8.31 D 8.3	17.67	22.61	22.61	13.19
Turbidity, field	NTU	-	329	97.5	24	73.9	38.6	37.6	16.2	16.2	-
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	360	ND(250)	2130	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	350	ND(250)	2110	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	920	ND(250)	7080	ND(250)	ND(250)	ND(250) J	ND(250) J	290
Petroleum hydrocarbons F4 gravimetric- silica gell (GHH)	µg/L	-	-	-	-	51400	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	1280	ND(250)	9210	ND(380)	ND(380)	ND(380) J	ND(380) J	ND(380)

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*	*MW101-13*
Sample ID:			*GW-45804-03052013-TS-006*	*GW-45804-052313-TS-016*	*GW-45804-080713-TS-007*	*GW-45804-111413-TS-004*	*GW-45804-042114-TS-003*	*GW-45804-052914-MB-010*	*GW-45804-082114-TS-001*	*GW-45804-082114-TS-002*	*GW-45804-112514-TS-004*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*	*8/21/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*
Parameters:	***Units***	***TLP*** [1]									
Semi-Volatiles											
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-	-	-	-
Anthracene	µg/L	-	0.048	0.59	ND(0.020)	0.67	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	0.026
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.097	1.26	0.0179	1.74	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	0.0863
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:			*GW-45804-011310-TS-003*	*GW-45804-051810-MB-002*	*GW-45804-081910-MMD-004*	*GW-45804-110210-TS-005*	*GW-45804-021511-MB-001*	*GW-45804-021511-MB-002*	*GW-45804-051611-MMD-001*	*GW-45804-051611-MMD-002*	*GW-45804-081611-TS-003*	*GW-45804-110911-TS-006*	
Sample Date:			*1/13/2010*	*5/18/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*2/15/2011*	*5/16/2011*	*5/16/2011*	*8/16/2011*	*11/9/2011*	
			Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	
Parameters:	***Units***	***TLP*** [1]											
Metals													
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054	ND(0.010)	0.0067	
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Boron (dissolved)	mg/L												
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)	
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Iron (dissolved)	mg/L	48.5	10.0	6.20	17.5	15.9	24.0	24.7	10.5	10.4	8.84	7.95	
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Magnesium (dissolved)	mg/L	-	77.4	-	-	-	-	-	-	-	-	-	
Manganese (dissolved)	mg/L	17.1	2.41	1.95	2.06	2.14	3.36	3.30	4.01	4.02	3.37	2.58	
Mercury (dissolved)	mg/L												
Molybdenum (dissolved)	mg/L		0.037	0.059	0.058	0.055	0.026	0.024	0.0249	0.0252	0.051	0.0250	
Nickel (dissolved)	mg/L												
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Thallium (dissolved)	mg/L												
Tin (dissolved)	mg/L												
Titanium (dissolved)	mg/L												
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)	
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
General Chemistry													
Alkalinity, bicarbonate	mg/L												
Alkalinity, carbonate	mg/L												
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Alkalinity, total (as CaCO3)	mg/L	633	530	220	444	428	698	710	277	281	380	483	
Ammonia-N	mg/L	4.0	0.952	1.12	1.82	0.823	0.931	0.832	0.935	1.06	3.17	3.16	
Biochemical oxygen demand (carbonaceous)	mg/L		3.0	ND(2.0)	ND(2.0)	ND(2.0)	2.5	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	5.5	
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Chloride	mg/L	-	58.1	106	58.1	71.6	78.7	78.5	107	105	141	112	
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-	-	
Color (apparent)	TCU	-	36.8	51.3	31.2	36.2	87.4	56.9	39.3	19.1	44.4	30.2	
Conductivity	umhos/cm	-	1800	-	-	-	-	-	-	-	-	-	
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.4	7.7	13.0	10.6	14.9	15.2	10.5	10.6	9.9	18.5	
Escherichia coli	cfu/100mL	25.6	0	0	0	ND(2)	0	0	0	0	0	ND(2)	
Fecal coliform bacteria	cfu/100mL	-	1	0	9	ND(2)	0	0	0	0	0	ND(2)	
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.30)	
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.30)	
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-	-	-	
pH, lab	s.u.	-	7.77	-	-	-	-	-	-	-	-	-	
Phenol	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Phosphorus	mg/L	7.2	1.36	4.90	1.94	2.61	0.628	0.701	1.09	0.400	0.511	0.710	
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Total coliform bacteria	cfu/100mL	-	2	0	30	10	0	0	1	1	1	2	
Total dissolved solids (TDS)	mg/L	-	1340	1280	1350	1260	1190	1200	1820	1860	1680	1580	
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-	-	-	
Total suspended solids (TSS)	mg/L												
Turbidity	NTU		4.90										
Un-ionized Ammonia	mg/L		0.000525	0.00324	0.00102	0.000267	0.000218	0.000195	0.000910	0.00103	0.0329	0.0184	

CRA 045804 (56)

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:			*GW-45804-011310-TS-003*	*GW-45804-051810-MB-002*	*GW-45804-081910-MMD-004*	*GW-45804-110210-TS-005*	*GW-45804-021511-MB-001*	*GW-45804-021511-MB-002*	*GW-45804-051611-MMD-001*	*GW-45804-051611-MMD-002*	*GW-45804-081611-TS-003*	*GW-45804-110911-TS-006*	
Sample Date:			*1/13/2010*	*5/18/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*2/15/2011*	*5/16/2011*	*5/16/2011*	*8/16/2011*	*11/9/2011*	
			Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	
Parameters:	***Units***	***TLP*** [1]											
Field Parameters													
Conductivity, field	mS/cm	-	2.3	1.67	1.54	2.07	2.35	2.35	2.79	2.79	2.26	2.39	
Dissolved oxygen (DO), field	mg/L	-	-	-	-	8	-	-	-	-	-	-	
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-125	-130	-130	-	-	-	-	
pH, field	s.u.	-	6.22	7.11	6.09	5.99	6.20	6.20	5.73	5.73	7.34	7.29	
Temperature, field	Deg C	-	8.8	9.9	19.3	15.0	4.7	4.7	7.21	7.21	19.9	13.7	
Turbidity, field	NTU	-	-5	-	-	-	-	-	427	427	-	881	
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	290	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydroc	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	290	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	14300	13900	3120	1860	630	1800	4200	ND(2500)	520	1130	
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	46900	52900	8800	5900	-	5800	12200	-	-	3400	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(1000)	ND(1000)	ND(100)	ND(100)							
Total Petroleum Hydrocarbons (C6-C50)	µg/L		17600	16800	3870	2340	630	2270	4200	ND(2500)	520	1420	
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-	-	
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	
Acenaphthene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	
Acenaphthylene	µg/L			ND(0.20)									
Acridine	µg/L												
Anthracene	µg/L			ND(0.20)	ND(0.20)	0.098	0.031	0.069	ND(0.020)	ND(0.020)	0.032	0.021	
Benzo(a)anthracene	µg/L	-	-	0.44	-	-	-	-	-	-	-	-	
Benzo(a)pyrene	µg/L	-	-	0.509	0.082	0.292	0.113	0.232	0.0141	0.0821	0.135	0.0923	
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.39	-	-	-	-	-	-	-	-	
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-	
Benzo(g,h,i)perylene	µg/L	-	-	0.48	-	-	-	-	-	-	-	-	
Benzo(k)fluoranthene	µg/L	-	-	0.42	-	-	-	-	-	-	-	-	
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-	
Chrysene	µg/L			0.59									
Dibenz(a,h)anthracene	µg/L			ND(0.20)									
Fluoranthene	µg/L	-	-	1.41	-	-	-	-	-	-	-	-	
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-	
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.36	-	-	-	-	-	-	-	-	
Naphthalene	µg/L	-	-	0.22	-	-	-	-	-	-	-	-	
Phenanthrene	µg/L	-	-	0.91	-	-	-	-	-	-	-	-	
Pyrene	µg/L	-	-	1.32	-	-	-	-	-	-	-	-	

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:		*GW-45804-021512-MB-001*	*GW-45804-032112-MB-004*	*GW-45804-032112-MB-009*	*GW-45804-051412-MB-005*	*GW-45804-052312-MB-002*	*GW-45804-052312-MB-003*	*GW-45804-08-08-12-MB-002*	*GW-45804-08-08-12-MB-003*	*GW-45804-111212-MB-004*	*GW-45804-111212-MB-005*	*GW-45804-022713-TS-001*
Sample Date:		*2/15/2012*	*3/21/2012*	*3/21/2012*	*5/14/2012*	*5/23/2012*	*5/23/2012*	*8/8/2012*	*8/8/2012*	*11/12/2012*	*11/12/2012*	*2/27/2013*
		Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*
Parameters:	***Units***											
Metals												
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	ND(0.10)	ND(0.10)	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)	-	-	-
Arsenic (dissolved)	mg/L	0.0042	-	-	0.0047	-	-	ND(0.010)	ND(0.010)	0.0044	0.0044	0.0020
Barium (dissolved)	mg/L	-	-	-	-	-	-	0.13	0.13	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.010)	ND(0.010)	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	ND(0.010)	ND(0.010)	-	-	-
Boron (dissolved)	mg/L	ND(0.050)			0.056			ND(0.50)	ND(0.50)	0.068	0.065	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)			ND(0.00010)			ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	282	273	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	-	-	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00080)	-	-	ND(0.00050)	-	-	ND(0.0050)	ND(0.0050)	0.00087	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	-	-	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.3	-	-	9.87	-	-	8.83	8.05	5.48	4.85	8.39
Lead (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	-	-	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	70.1	69.6	-	-	-
Manganese (dissolved)	mg/L	3.72	-	-	3.47	-	-	2.83	2.75	1.99	2.10	4.08
Mercury (dissolved)	mg/L	ND(0.00010)			ND(0.00010)			ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0119			0.0168			0.024	0.024	0.0115	0.0127	0.0069
Nickel (dissolved)	mg/L	ND(0.0020)			ND(0.0020)			ND(0.020)	ND(0.020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	ND(0.50)	ND(0.50)	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	23	23	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0040)	ND(0.0040)	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	15	15	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	79.1	78.8	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	2.74	2.60	-	-	-
Thallium (dissolved)	mg/L							ND(0.0030)	ND(0.0030)			
Tin (dissolved)	mg/L							ND(0.010)	ND(0.010)			
Titanium (dissolved)	mg/L							ND(0.020)	ND(0.020)			
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	ND(0.10)	ND(0.10)	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.010)	ND(0.010)	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	-	-	ND(0.0030)	-	-	ND(0.030)	ND(0.030)	0.0044	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.040)	ND(0.040)	-	-	-
General Chemistry												
Alkalinity, bicarbonate	mg/L							562	555			
Alkalinity, carbonate	mg/L							ND(10)	ND(10)			
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	ND(10)	ND(10)	-	-	-
Alkalinity, total (as CaCO3)	mg/L	511	426	-	364	-	-	567	560	535	528	476
Ammonia-N	mg/L	4.06	2.58	2.74	3.74	-	-	4.82	5.22	4.95	4.77	3.68
Biochemical oxygen demand (carbonaceous)	mg/L	5.2	ND(3.0)		3.2			ND(2.0)	ND(2.0)	3.9 J	6.8 J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	49	-	-	36	-	-	53	51	42 J	55 J	63
Chloride	mg/L	-	173	-	182	-	-	119	119	120	116	184
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	13.2	23.3	-	-	158	112	184	88.6	65.6 J	79.5 J	23.6
Conductivity	umhos/cm	-	1950	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	13.1	11.3	-	11.0	-	-	10.9	10.2	11.7	12.0	17.6
Escherichia coli	cfu/100mL	0	0	0	-	0	0	0	0	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0 J	0 J	-	0	0	0	0	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.50)	ND(0.5)		ND(0.10)			ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.5)		ND(0.10)			ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Petroleum Products	mg/L	ND(1.0)	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.61	7.09	-	7.59	-	-	7.96	8.00	7.83	7.63	7.61
Phenol	mg/L	ND(0.0010)	-	-	ND(0.0010)	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.475	0.592	-	0.321	-	-	0.756	0.527	0.564	0.718	0.662
Sulfate	mg/L	-	-	-	-	-	-	-	-	435	430	587
Total coliform bacteria	cfu/100mL	0	0	0	-	2	4	0	0	20 J	ND(2) J	ND(2)
Total dissolved solids (TDS)	mg/L	1560	1510	-	1620	-	-	1430	1410	1370	1380	1660
Total kjeldahl nitrogen (TKN)	mg/L	5.55	-	-	5.33	-	-	5.61	6.74	6.21	5.74	5.28
Total suspended solids (TSS)	mg/L	465			567			484	594	466	775	2680
Turbidity	NTU	162	27.0			58.0 J	230 J	54.0	50.0	9.30 J	5.70 J	32.0
Un-ionized Ammonia	mg/L		U.UUU556	U.UUU59U						U.U917	U.U883	U.U388

CRA 045804 (56)

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:		*GW-45804-021512-MB-001*	*GW-45804-032112-MB-004*	*GW-45804-032112-MB-009*	*GW-45804-052412-MB-005*	*GW-45804-052312-MB-002*	*GW-45804-052312-MB-003*	*GW-45804-08-08-12-MB-002*	*GW-45804-08-08-12-MB-003*	*GW-45804-111212-MB-004*	*GW-45804-111212-MB-005*	*GW-45804-022713-TS-001*
Sample Date:		*2/15/2012*	*3/21/2012*	*3/21/2012*	*5/14/2012*	*5/23/2012*	*5/23/2012*	*8/8/2012*	*8/8/2012*	*11/12/2012*	*11/12/2012*	*2/27/2013*
		Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*
Parameters:	***Units***											
Field Parameters												
Conductivity, field	mS/cm	2.36	2.46	2.46	2.34	2.5	-	1.82	-	2.29	-	2.47
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	-	5.1	-	8.24	-	5.86
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-	-132	-	-
pH, field	s.u.	5.9	5.09	5.09	6.46	6.29	-	7.7	-	7.75	7.75	7.78
Temperature, field	Deg C	4.65	6.8	5.8	10.77	11.08	-	18.24	-	15.1	15.1	5.9
Turbidity, field	NTU	-5	-5	-5	-	-	-	3.92	-	840	-	-5
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(25)	ND(100)	-	ND(100)	-	-	ND(25)	ND(25)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	ND(100)	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	-	ND(250)	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydroc	µg/L	ND(250)	-	-	ND(250)	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	450	690	-	ND(250)	-	-	480	520	630 J	ND(250) J	ND(630)
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	-	-	-	-	-	2500	ND(2500)	3000	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)						ND(100)	ND(100)	ND(100)	ND(100)	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	450	690		ND(250)			480	520	630 J	ND(250) J	ND(630)
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.28)	ND(0.28)	ND(0.028)	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L							ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	
Acridine	µg/L											
Anthracene	µg/L	ND(0.020)			ND(0.020)			ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.036	0.037	-
Benzo(a)pyrene	µg/L	0.014	-	-	0.0299	-	-	ND(0.10)	ND(0.10)	0.040	0.042	ND(0.10)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.040	0.040	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.051	0.071	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.033	0.034	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L							ND(0.20)	ND(0.20)	0.046	0.053	
Dibenz(a,h)anthracene	µg/L							ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.20)	0.34	0.129	0.145	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	ND(0.020)	0.021	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.026	0.032	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.034	0.034	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.20)	ND(0.20)	0.072 J	0.094 J	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.20)	0.35	0.154	0.178	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:		*GW-45804-052213-TS-014*	*GW-45804-052213-TS-015*	*GW-45804-080713-TS-005*	*GW-45804-080713-TS-006*	*GW-45804-111413-TS-010*	*GW-45804-042114-TS-007*	*GW-45804-053014-MB-013*	*GW-45804-082114-TS-007*	*GW-45804-112514-TS-009*
Sample Date:		*5/22/2013*	*5/22/2013*	*8/7/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
		Duplicate	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	0.0035	0.0034	0.0071	0.0068	0.0029	0.0012	0.0024	0.0040	0.0017
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.069	0.067	0.076	0.075	0.067	ND(0.050)	0.075	0.092	0.066
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0023	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.87	8.75	5.95	5.90	6.07	9.19	8.82	5.81	5.12
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	4.27	4.50	3.20	3.10	3.74	4.90	5.02	3.17	3.31
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0130	0.0130	0.0191	0.0199	0.0107	0.0049	0.0084	0.0151	0.0063
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L									
Tin (dissolved)	mg/L									
Titanium (dissolved)	mg/L									
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)	0.0070
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L									
Alkalinity, carbonate	mg/L									
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	399	401	447	446	511	474	475 J	534 J	545
Ammonia-N	mg/L	4.49	4.35	7.02	6.93	7.12	5.47	7.40 J	10.4 J	8.37
Biochemical oxygen demand (carbonaceous)	mg/L	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20)	ND(20) J	ND(20) J	ND(20)
Chemical oxygen demand (COD)	mg/L	49	44	36 J	148 J	51	ND(58)	102 J	43 J	39
Chloride	mg/L	190	186	148	147	145	176	179 J	160 J	126
Color (apparent)	color unit	-	-	-	-	-	191 J	230 J	82.2 J	159
Color (apparent)	TCU	34.0	33.7	126	80.0	176	-	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	15.8	16.5	13.9	14.7	11.6	8.6	8.2 J	7.7 J	10.9
Escherichia coli	cfu/100mL	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J	0
Fecal coliform bacteria	cfu/100mL	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.70	7.67	7.49	7.50	7.61	7.30	7.68 J	7.51 J	7.84
Phenol	mg/L	0.0030	0.0030	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J	0.0018 J	ND(0.0010)
Phosphorus	mg/L	0.728	0.705	0.095	0.118	0.638	0.046	0.127 J	0.079 J	0.088
Sulfate	mg/L	683	689	582	675	546	477	504 J	497 J	425
Total coliform bacteria	cfu/100mL	ND(100)	ND(100)	10	10	ND(2)	0	ND(2) J	0 J	0
Total dissolved solids (TDS)	mg/L	1650	1640	1760	1770	1580	1450	1510 J	1450 J	1340
Total kjeldahl nitrogen (TKN)	mg/L	5.52	5.98	6.98	7.01	7.89	6.21	7.43 J	9.80 J	9.06
Total suspended solids (TSS)	mg/L	646	748	26.8	23.6	905	24.5	38.0 J	12.0 J	16.4
Turbidity	NTU	20.5 J	40.0 J	34.0	32.0	53.8	11.7	96.0 J	62.2 J	52.6
Un-ionized Ammonia	mg/L	0.00156	0.00151	0.0151	0.0149	0.00916	0.00215	0.00364 J	1.90 J	0.0287

CRA 045804 (56)

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*	*MW102-09*
Sample ID:		*GW-45804-052213-TS-014*	*GW-45804-052213-TS-015*	*GW-45804-080713-TS-005*	*GW-45804-080713-TS-006*	*GW-45804-111413-TS-010*	*GW-45804-042114-TS-007*	*GW-45804-053014-MB-013*	*GW-45804-082114-TS-007*	*GW-45804-112514-TS-009*
Sample Date:		*5/22/2013*	*5/22/2013*	*8/7/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
		Duplicate	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***									
Field Parameters										
Conductivity, field	mS/cm	-	2.38	2.32	-	2.24	2.38	2.39	2.34	0.579
Dissolved oxygen (DO), field	mg/L	-	5.54	5.46	-	8.06	5.69	0	2.02	3.03
Oxidation reduction potential (ORP), field	millivolts	-	-131	-119	-	-	-148	-176	-154	-103
pH, field	s.u.	6.11	6.11	6.63	6.63	6.21	7.34 D 7.34	7.32	8.64	7.14
Temperature, field	Deg C	12.3	12.3	20.7	20.7	12.5	7.2 D 7.17	10.58	20.31	11.26
Turbidity, field	NTU	-	-5	0	-	641	33.8	30.1	45.1	-
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydroc	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	490	420	ND(250)	ND(250)	1240	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L									
Total Petroleum Hydrocarbons (C6-C50)	µg/L	490	420	ND(250)	ND(250)	1530	ND(380)	ND(380) J	ND(380) J	ND(380)
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-	ND(0.020)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-	ND(0.020)	-	-	-
Acenaphthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	ND(0.020)	-	-	-
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)				ND(0.020)			
Acridine	µg/L	ND(4.0)	ND(4.0)				ND(4.0)			
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	0.033	0.022	-	-	-	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	0.0342	0.0252	ND(0.0050)	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.047	0.035	-	-	-	ND(0.020)	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	ND(0.040)	-	-	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	0.054	0.044	-	-	-	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	0.036	0.024	-	-	-	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	ND(0.060)	ND(0.060)	-	-	-	ND(0.060)	-	-	-
Chrysene	µg/L	0.041	0.031				ND(0.020)			
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)				ND(0.020)			
Fluoranthene	µg/L	0.104 J	0.080 J	-	-	-	ND(0.020)	-	-	-
Fluorene	µg/L	ND(0.13)	ND(0.097)	-	-	-	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.029	0.024	-	-	-	ND(0.020)	-	-	-
Naphthalene	µg/L	0.036 J	0.033 J	-	-	-	ND(0.050)	-	-	-
Phenanthrene	µg/L	0.062	0.056	-	-	-	ND(0.020)	-	-	-
Pyrene	µg/L	0.131	0.101	-	-	-	ND(0.020)	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:			*GW-45804-051810-MB-004*	*GW-45804-051810-MB-005*	*GW-45804-081910-MMD-001*	*GW-45804-081910-MMD-002*	*GW-45804-110210-TS-009*	*GW-45804-021511-MB-003*	*GW-45804-051611-MMD-003*	*GW-45804-081611-TS-001*
Sample Date:			*5/18/2010*	*5/18/2010*	*8/19/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*5/16/2011*	*8/16/2011*
			Original	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]								
Metals										
Arsenic (dissolved)	mg/L	-	0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	22.9	23.8	10.9	11.1	7.64	7.87	6.33	6.79
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	6.78	7.00	7.77	7.70	5.63	6.44	4.06	4.38
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0062	ND(0.010)
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	264	266	186	192	152	189	202	190
Ammonia-N	mg/L	4.0	2.35	2.26	1.50	1.21	0.855	0.606	0.552	0.656
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	107	106	78.7	78.4	40.1	44.3	58.9	50.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	83.8	87.8	520	498	367	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.0	8.9	8.7	10.2	8.6	10.0	9.0	11.2
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0	1
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	0	10
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	0	0	1	0	10	20
Total dissolved solids (TDS)	mg/L	-	970	990	926	892	670	680	778	558
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	-	0.00799	0.00769	0.00108	0.000871	0.000396	0.000132	0.000262	0.00404
Field Parameters										
Conductivity, field	mS/cm	-	1.423	1.423	0.99	0.99	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L	-	1.89	1.89	0	0	0	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-123	-123	-152	-152	-143	-129	-	-165
pH, field	s.u.	-	7.05	7.05	6.20	6.20	6.17	6.17	6.43	7.17
Temperature, field	Deg C	-	13.82	13.82	19.2	19.2	14.3	4.7	6.88	18.1
Turbidity, field	NTU	-	-	-	-	-	-	-	14.3	89.1

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:			*GW-45804-051810-MB-004*	*GW-45804-051810-MB-005*	*GW-45804-081910-MMD-001*	*GW-45804-081910-MMD-002*	*GW-45804-110210-TS-009*	*GW-45804-021511-MB-003*	*GW-45804-051611-MMD-003*	*GW-45804-081611-TS-001*
Sample Date:			*5/18/2010*	*5/18/2010*	*8/19/2010*	*8/19/2010*	*11/2/2010*	*2/15/2011*	*5/16/2011*	*8/16/2011*
			Original	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-	-	-	-	-

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:		*GW-45804-081611-TS-002*	*GW-45804-111011-TS-011*	*GW-45804-111011-TS-012*	*GW-45804-021512-MB-005*	*GW-45804-051512-MB-008*	*GW-45804-111212-MB-001*	*GW-45804-022713-TS-003*	*GW-45804-052213-TS-006*	*GW-45804-080713-TS-008*
Sample Date:		*8/16/2011*	*11/10/2011*	*11/10/2011*	*2/15/2012*	*5/15/2012*	*11/12/2012*	*2/27/2013*	*5/22/2013*	*8/7/2013*
		Duplicate	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***									
Metals										
Arsenic (dissolved)	mg/L	0.011	0.0092	-	0.0071	0.0067	0.0087	0.0074	0.0061	0.0103
Boron (dissolved)	mg/L	-	-	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.056
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00080)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	6.41	5.99	-	7.59	7.12	8.77	11.6	7.17	5.03
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.31	4.37	-	5.45	4.72	7.35	6.51	4.03	2.73
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0078	-	0.0049	0.0041	0.0063	0.0044	0.0060	0.0061
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0080	0.0147
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183	212	272	309	201	179
Ammonia-N	mg/L	0.665	0.508	0.517	0.642	0.814	0.939	1.08	1.11	1.28
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	28	30	46	44	36	27
Chloride	mg/L	51.0	38.9	37.7	-	81.5	62.4	111	92	65
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	269	103	75.3	14.2	277	322 J	75.5	42.0	208
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2	11.0	9.9	13.6	17.9	10.6
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	ND(1.0)	-	-	-	-	-
pH, lab	s.u.	-	-	-	7.61	7.87	7.74	7.60	7.52	7.44
Phenol	mg/L	-	-	-	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	ND(0.030)	0.046	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	328	278	317	195
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2	10	100
Total dissolved solids (TDS)	mg/L	564	546	546	612	748	860	900	734	630
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.47	1.61	1.66	2.08	1.65	2.31
Total suspended solids (TSS)	mg/L	-	-	-	13.0	7.0	15.0	32.0	14.0	3.2
Turbidity	NTU	-	-	-	77.0	81.0	8.50 J	108	59.0	18.7
Un-ionized ammonia	mg/L	0.00410	0.00168	0.00171	-	-	0.197	0.00658	0.000496	0.00423
Field Parameters										
Conductivity, field	mS/cm	-	0.75	-	1.05	1.21	1	1.62	1.28	1.06
Dissolved oxygen (DO), field	mg/L	-	1.55	-	-	1.66	9.47	1.62	2.38	4.62
Oxidation reduction potential (ORP), field	millivolts	-	-153	-	-	-139	-119	-109	-	174
pH, field	s.u.	-	7.10	7.10	5.78	6.64	8.84	7.48	6.15	6.91
Temperature, field	Deg C	-	12.0	12.0	6	12.98	16.3	6.6	14.3	17.7
Turbidity, field	NTU	-	13.4	-	484	94.3	129	74.4	117	32.1

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:		*GW-45804-081611-TS-002*	*GW-45804-111011-TS-011*	*GW-45804-111011-TS-012*	*GW-45804-021512-MB-005*	*GW-45804-051512-MB-008*	*GW-45804-111212-MB-001*	*GW-45804-022713-TS-003*	*GW-45804-052213-TS-006*	*GW-45804-080713-TS-008*
Sample Date:		*8/16/2011*	*11/10/2011*	*11/10/2011*	*2/15/2012*	*5/15/2012*	*11/12/2012*	*2/27/2013*	*5/22/2013*	*8/7/2013*
		Duplicate	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.030	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.025	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	0.070	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	0.054	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	0.022	-
Pyrene	ug/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)	-

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:		*GW-45804-111413-TS-008*	*GW-45804-042114-TS-006*	*GW-45804-053014-MB-015*	*GW-45804-082114-TS-008*	*GW-45804-112514-TS-006*
Sample Date:		*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	0.0100	0.0031	0.0063	0.0101	0.0081
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00096	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	0.0020	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.22	2.69	3.16	3.91	4.80
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.75	1.78	2.95	1.96	2.41
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0052	0.0060	0.0042	0.0049	0.0047
Nickel (dissolved)	mg/L	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	183	341	224 J	202 J	209
Ammonia-N	mg/L	0.674	0.667	1.30 J	1.49 J	1.03
Biochemical oxygen demand (carbonaceous)	mg/L	3.6	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	82	ND(34)	54 J	30 J	30
Chloride	mg/L	51.9	71.1	87.2 J	62.7 J	52
Color (apparent)	color unit	-	59.4 J	283 J	138 J	203
Color (apparent)	TCU	60.0	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.3	7.7	6.9 J	11.3 J	9.9
Escherichia coli	cfu/100mL	ND(2)	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0 J	1 J	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	-	-
pH, lab	s.u.	7.11	7.26	7.89 J	7.54 J	7.92
Phenol	mg/L	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)
Phosphorus	mg/L	1.54	ND(0.030)	0.043 J	ND(0.030) J	0.039
Sulfate	mg/L	171	272	193 J	109 J	126
Total coliform bacteria	cfu/100mL	ND(10)	7	0 J	7 J	300
Total dissolved solids (TDS)	mg/L	524	828	650 J	458 J	479
Total kjeldahl nitrogen (TKN)	mg/L	0.81	ND(1.57)	2.15 J	2.10 J	1.32
Total suspended solids (TSS)	mg/L	2750	535	4.0 J	ND(2.0) J	3.6
Turbidity	NTU	106	47.0	34.0 J	7.03 J	19.6
Un-ionized ammonia	mg/L	0.000291	0.00164	0.00788 J	0.317 J	0.00646
Field Parameters						
Conductivity, field	mS/cm	0.868	1.76	1.19	0.719	0.517
Dissolved oxygen (DO), field	mg/L	7.53	4.62	0	0.21	3.82
Oxidation reduction potential (ORP), field	millivolts	-	-101	-154	-147	-96
pH, field	s.u.	6.19	7.06 D 7.06	7.43	8.77	7.41
Temperature, field	Deg C	12.7	9.34 D 9.3	9.98	18.75	11.08
Turbidity, field	NTU	250	28.1	38.8	28.9	-

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:		*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:		*GW-45804-111413-TS-008*	*GW-45804-042114-TS-006*	*GW-45804-053014-MB-015*	*GW-45804-082114-TS-008*	*GW-45804-112514-TS-006*
Sample Date:		*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
		Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	420	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	420	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1280	ND(250)	ND(250) J	ND(250) J	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	1700	ND(380)	ND(380) J	ND(380) J	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	ND(0.020)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	0.037	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-
Anthracene	µg/L	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	-	-	-
Chrysene	µg/L	-	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	ND(0.020)	-	-	-
Fluorene	µg/L	-	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-
Naphthalene	µg/L	-	ND(0.050)	-	-	-
Phenanthrene	µg/L	-	ND(0.020)	-	-	-
Pyrene	ug/L	-	ND(0.020)	-	-	-

Notes:

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*
Sample ID:			*GW-45804-03052013-TS-007*	*GW-45804-052313-TS-002*	*GW-45804-080713-TS-002*	*GW-45804-111413-TS-001*	*GW-45804-042114-TS-001*	*GW-45804-052914-MB-006*	*GW-45804-082114-TS-004*	*GW-45804-112614-TS-011*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*	*8/21/2014*	*11/26/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]								
Metals										
Arsenic (dissolved)	mg/L		0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00090)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	0.00204	0.0086	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)
Copper (dissolved)	mg/L	-	0.0043	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)
Iron (dissolved)	mg/L	48.3	0.932	19.6	23.9	4.96	4.62	18.2	15.8	2.74
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Manganese (dissolved)	mg/L	17.1	1.82	19.4	17.5	7.70	5.35	13.3	14.6	11.5
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.186	0.0164	0.0172	0.0814	0.0232	0.0191	0.0139	0.0177
Nickel (dissolved)	mg/L		0.0073	ND(0.010)	0.0023	0.0102	0.0028	ND(0.010)	ND(0.010)	ND(0.010)
Zinc (dissolved)	mg/L	-	0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)	ND(0.030)	ND(0.030)
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	290	389	263	308	207	575	493 J	536
Ammonia-N	mg/L	4.0	7.46	4.69	8.87	14.3	4.80	13.2	11.2 J	7.20
Biochemical oxygen demand (carbonaceous)	mg/L	-	16.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	99	72	68	95	ND(54)	74	76 J	55
Chloride	mg/L	-	170	219	162	147	185	189	128 J	129
Color (apparent)	color unit	-	-	-	-	-	120 J	153 J	85.8 J	210
Color (apparent)	TCU	-	829	173 J	362	76.7	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	25.3	51.2	18.5	21.0	10.3	11.1	14.3 J	13.9
Escherichia coli	cfu/100mL	25.6	0	4	ND(2)	ND(2)	0	0	0 J	0
Fecal coliform bacteria	cfu/100mL	-	ND(0) J	6	10	ND(2)	0	0	0 J	0
Nitrate (as N)	mg/L	13	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)
pH, lab	s.u.	-	7.86	7.73	7.50	7.57	7.55	7.58	7.34 J	7.52
Phenol	mg/L	-	0.0016	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0117	ND(0.0010) J	ND(0.0010)
Phosphorus	mg/L	7.2	0.060	0.082	0.070	0.640	0.066	0.111	0.693 J	0.069
Sulfate	mg/L	-	685	531	800	713	452	507	539 J	512
Total coliform bacteria	cfu/100mL	-	100	1700	10400	10	1	0	ND(10) J	2
Total dissolved solids (TDS)	mg/L	-	1770	1800	2030	1600	1170	1580	1270 J	1470
Total kjeldahl nitrogen (TKN)	mg/L	-	9.95	6.85	8.80	14.8	5.67	13.6	15.0 J	9.81
Total suspended solids (TSS)	mg/L	-	720	78.0	106	564	320	202	647 J	610
Turbidity	NTU	-	510	162	430	750	540	132	578 J	124
Un-ionized ammonia	mg/L	-	0.0198	0.0292	0.0214	0.0536	0.0281	0.101	0.856 J	0.0259
Field Parameters										
Conductivity, field	mS/cm	-	2.15	2.17	2.53	2.5	2.41	2.55	2.53	0.628
Dissolved oxygen (DO), field	mg/L	-	3.61	3.67	7.86	7.24	6.62	2	6.28	6.19
Oxidation reduction potential (ORP), field	millivolts	-	-176	-	-122	-	-118	-145	-134	-90
pH, field	s.u.	-	7.14	7.20	6.65	7.12	7.03 D 7.40	7.3	8.13	7.15
Temperature, field	Deg C		8.0	17.3	21.59 D 21.6	13.1	9.32 D 10.5	17.06	22.61	11.56
Turbidity, field	NTU	-	76.4	150	150	104	148	444	684	-

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*	*MW104-13*
Sample ID:			*GW-45804-03052013-TS-007*	*GW-45804-052313-TS-002*	*GW-45804-080713-TS-002*	*GW-45804-111413-TS-001*	*GW-45804-042114-TS-001*	*GW-45804-052914-MB-006*	*GW-45804-082114-TS-004*	*GW-45804-112614-TS-011*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/29/2014*	*8/21/2014*	*11/26/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	610 J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	600 J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)
Petroleum hydrocarbons F4 gravimetric - silicagell (GHH)	µg/L	-	-	-	-	-	-	-	12600 J	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3040 J	ND(380)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	-	0.024	ND(0.0050)	0.0079	0.391	0.0212	0.0435	0.426 J	0.0183
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	0.029	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L						ND(0.060)			
Chrysene	µg/L	-	-	-	-	-	0.023	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	0.041	-	-	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	-	-	-	0.035	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level

000427

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*
Sample ID:			*GW-45804-03052013-TS-008*	*GW-45804-052313-TS-010*	*GW-45804-080713-TS-003*	*GW-45804-111413-TS-002*	*GW-45804-111413-TS-003*	*GW-45804-042114-TS-004*	*GW-45804-042114-TS-005*	*GW-45804-052914-MB-007*	*GW-45804-052914-MB-008*	*GW-45804-082114-TS-005*	*GW-45804-112514-TS-003*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*11/14/2013*	*4/21/2014*	*4/21/2014*	*5/29/2014*	*5/29/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*
Parameters:	***Units***	***TLP*** [1]											
Metals													
Arsenic (dissolved)	mg/L	-	0.0059	0.0142	0.0078	0.0029	0.0029	0.0092	0.0078	0.0040	0.0049	ND(0.0010)	0.0011
Boron (dissolved)	mg/L	-	0.073	0.052	0.063	0.076	0.074	0.062	0.061	0.065	0.067	0.068	0.073
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	48.3	2.09	5.31	4.58	2.07	2.11	0.216	0.212	0.080	0.095	0.296	2.75
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	0.487	0.650	0.630	0.512	0.518	0.443	0.413	0.443	0.532	0.568	0.580
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0090	0.0141	0.0106	0.0087	0.0086	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0070
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	-	ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0059	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0211
		-											
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	633	482	365	382	429	427	911	980	600	608	438 J	406
Ammonia-N	mg/L	4.0	34.3	22.3	26.2	25.5	27.2	76.0	75.5	57.8	57.8	18.2 J	18.6
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1	8.1	6.6	3.0 J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	46	15	13	32	30	ND(54)	65	34	30	19 J	11
Chloride	mg/L	-	173	128	199	164	164	246	245	238	217	114 J	111
Color (apparent)	color unit	-	-	-	-	-	-	46.9 J	53.9 J	55.5 J	70.7 J	12.4 J	67.7
Color (apparent)	TCU	-	27.1	58.9 J	52.9	83.5	73.7	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.5	ND(5.2)	5.1	4.5	4.1	9.3	9.4	5.2	5.2	4.4 J	4.2
Escherichia coli	cfu/100mL	25.6	7	ND(2)	ND(2)	0	0	390	380	0	0	0 J	0
Fecal coliform bacteria	cfu/100mL	-	50 J	ND(2)	ND(2)	0	0	450	430	0	0	0 J	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)
pH, lab	s.u.	-	7.82	7.76	7.41	7.54	7.51	7.25	7.26	7.55	7.59	7.41 J	7.76
Phenol	mg/L	-	ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0083	0.0103	0.0074	0.0090	0.0023 J	ND(0.0010)
Phosphorus	mg/L	7.2	0.048	0.045	0.035	0.051	ND(0.030)	0.067	0.067	0.134	0.107	0.072 J	0.089
Sulfate	mg/L	-	970	963	1050	674	678	429	427	648	648	509 J	738
Total coliform bacteria	cfu/100mL	-	180	110	2	2	ND(10)	4400	4800	2	1	ND(10) J	10
Total dissolved solids (TDS)	mg/L	-	2100	1880	2140	1610	1600	1610	1600	1740	1730	1290 J	1480
Total kjeldahl nitrogen (TKN)	mg/L	-	38.2	24.5	30.0	25.8	27.2	74.3	75.0	48.4	51.2	19.3 J	20.7
Total suspended solids (TSS)	mg/L	-	16.0	31.0	44.4	8.4	6.4	20.0 J	4.4 J	11.6 J	4.0 J	16.8 J	21.3
Turbidity	NTU	-	19.0	33.0	36.0	19.2	22.7	51.0	59.0	18.2	28.0	3.47 J	20.9
Un-ionized ammonia	mg/L	-	0.141	0.0793	0.0695	0.0296	0.0316	0.174	0.173	0.396	0.396	17.0 J	0.0553
Field Parameters													
Conductivity, field	mS/cm	-	3.01	2.59	2.75	2.43	-	2.12	-	3.02	3.02	2.02	0.695
Dissolved oxygen (DO), field	mg/L	-	2.68	1.21	4.33	6.79	-	4.53	-	5.33	5.33	0.26	2.72
Oxidation reduction potential (ORP), field	millivolts	-	-215	-	-101	-	-	-73	-	-318	-318	-276	-71
pH, field	s.u.	-	7.11	6.90	6.63	6.47	6.47	7.40 D 7.03	7.03	7.19	7.19	9.87	6.93
Temperature, field	Deg C	-	14.5	19.1	22.6 D 22.55	17.3	17.3	9.3 D 10.47	9.3	18.92	18.92	21.66	16.4
Turbidity, field	NTU	-	170	119	34.2	11.2	-	31.8	-	24.6	24.6	108	-
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330 J	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(380)	ND(380)	ND(380)	ND(380)	ND(380) J	ND(380)

TABLE 4.2

UNCONFINED SHALLOW GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*	*MW105-13*
Sample ID:			*GW-45804-03052013-TS-008*	*GW-45804-052313-TS-010*	*GW-45804-080713-TS-003*	*GW-45804-111413-TS-002*	*GW-45804-111413-TS-003*	*GW-45804-042114-TS-004*	*GW-45804-042114-TS-005*	*GW-45804-052914-MB-007*	*GW-45804-052914-MB-008*	*GW-45804-082114-TS-005*	*GW-45804-112514-TS-003*
Sample Date:			*3/5/2013*	*5/23/2013*	*8/7/2013*	*11/14/2013*	*11/14/2013*	*4/21/2014*	*4/21/2014*	*5/29/2014*	*5/29/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*
Parameters:	*Units*	*TLP* [1]											
Semi-Volatiles													
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	ND(4.0)	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	ND(0.040)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	ND(0.060)	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
Exceedence of the Tier I Trigger Level

000429

TABLE 4.2A

MW103-09 ANALYTICAL RESULTS – PWQO COMPARISON
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:			*GW-45804-022713-TS-003*	*GW-45804-052213-TS-006*	*GW-45804-080713-TS-008*	*GW-45804-111413-TS-008*	*GW-45804-042114-TS-006*	*GW-45804-053014-MB-015*	*GW-45804-082114-TS-008*	*GW-45804-112514-TS-006*
Sample Date:			*2/27/2013*	*5/22/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO*** [1]								
Metals										
Arsenic (dissolved)	mg/L	0.005	0.0074	0.0061	0.0103	0.01	0.0031	0.0065	0.0103	0.0084
Boron (dissolved)	mg/L	0.2	ND(0.050)	ND(0.050)	0.056	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)
Cadmium (dissolved)	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00096	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.002	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	11.6	7.17	5.83	5.22	2.69	6.16	3.93	4.2
Lead (dissolved)	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	-	6.51	4.03	2.73	2.75	1.78	2.99	1.96	2.41
Mercury (dissolved)	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.04	0.0044	0.006	0.0061	0.0052	0.006	0.0042	0.0049	0.0047
Nickel (dissolved)	mg/L	0.025	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.03	ND(0.0030)	0.008	0.0147	ND(0.0030)	0.0146	0.007	ND(0.0030)	0.0092
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	309	201	179	183	341	224 J	202 J	205
Ammonia-N	mg/L	-	1.08	1.11	1.28	0.674	0.667	1.30 J	1.49 J	1.03
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	3.6	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	44	36	27	82	ND(34)	54 J	30 J	30
Chloride	mg/L	-	111	92	65	51.5	71.1	87.2 J	62.7 J	52
Color (apparent)	color unit	-	-	-	-	-	59.4 J	283 J	138 J	203
Color (apparent)	TCU	-	75.5	42	208	60	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	13.6	17.9	10.6	9.3	7.7	6.9 J	11.3 J	9.5
Escherichia coli	cfu/100mL	100	ND(2)	ND(10)	ND(2)	ND(2)	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL	4800	ND(2)	ND(10)	ND(2)	ND(2)	0	0 J	1 J	0
Nitrate (as N)	mg/L	1.82	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.6	7.52	7.44	7.11	7.26	7.89 J	7.54 J	7.92
Phenol	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0048	0.0024	0.00614 J	0.0023 J	0.00381 J
Phosphorus	mg/L	0.01	ND(0.030)	ND(0.030)	ND(0.030)	1.54	ND(0.030)	0.043 J	ND(0.030) J	0.035
Sulfate	mg/L	-	278	317	195	171	272	193 J	109 J	126
Total coliform bacteria	cfu/100mL	-	2	10	100	ND(10)	7	0 J	7 J	300
Total dissolved solids (TDS)	mg/L	-	900	734	630	524	828	650 J	458 J	475
Total kjeldahl nitrogen (TKN)	mg/L	-	2.08	1.65	2.31	0.81	ND(1.57)	2.15 J	2.10 J	1.32
Total suspended solids (TSS)	mg/L	-	32	14	3.2	2750	535	4.0 J	ND(2.0) J	3.6
Turbidity	NTU	-	108	59	18.7	106	47	34.0 J	7.63 J	19.6
Un-ionized ammonia	mg/L	0.02	0.00558	0.000496	0.00423	0.000291	0.00164	0.00788 J	0.317 J	0.00646
Field Parameters										
Conductivity, field	mS/cm	-	1.62	1.28	1.06	0.868	1.76	1.19	0.719	0.517
Dissolved oxygen (DO), field	mg/L	-	1.62	2.38	4.62	7.53	4.62	0	0.21	3.82
Oxidation reduction potential (ORP), field	millivolts	-	-109	-	174	-	-101	-154	-147	-96
pH, field	s.u.	6.5-8.5	7.48	6.15	6.91	6.15	7.06 D 7.06	7.43	8.77	7.41
Temperature, field	Deg C	-	6.6	18.3	17.7	12.7	9.34 D 9.3	9.98	18.75	11.08
Turbidity, field	NTU	-	74.4	117	32.1	250	28.1	38.8	28.5	-

MW103-09 ANALYTICAL RESULTS – PWQO COMPARISON
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*	*MW103-09*
Sample ID:			*GW-45804-022713-TS-003*	*GW-45804-052213-TS-006*	*GW-45804-080713-TS-008*	*GW-45804-111413-TS-008*	*GW-45804-042114-TS-006*	*GW-45804-053014-MB-015*	*GW-45804-082114-TS-008*	*GW-45804-112514-TS-006*
Sample Date:			*2/27/2013*	*5/22/2013*	*8/7/2013*	*11/14/2013*	*4/21/2014*	*5/30/2014*	*8/21/2014*	*11/25/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO*[1]**								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	2	-	0.03	-	-	ND(0.020)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	0.025	-	-	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	0.07	-	-	0.037	-	-	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Acridine	µg/L	-	-	ND(4.0)	-	-	ND(4.0)	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	0.147	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	ND(0.040)	-	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	ND(0.060)	-	-	ND(0.060)	-	-	-
Chrysene	µg/L	0.0001	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Fluoranthene	µg/L	0.0008	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Fluorene	µg/L	0.2	-	0.054	-	-	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	ND(0.020)	-	-	-
Naphthalene	µg/L	7	-	ND(0.020)	-	-	ND(0.050)	-	-	-
Phenanthrene	µg/L	0.03	-	0.022	-	-	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	ND(0.020)	-	-	ND(0.020)	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*
Sample ID:					*GW-45804-011810-MB-001*	*GW-45804-051810-MB-003*	*GW-45804-110210-TS-008*	*GW-45804-051611-MMD-004*	*GW-45804-110911-TS-008*	*GW-45804-051412-mb-007*
Sample Date:					*1/18/2010*	*5/18/2010*	*11/2/2010*	*5/16/2011*	*11/9/2011*	*5/14/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]						
Metals										
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	-	1.76	3.30	0.455	2.30	-
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	-	0.496	1.43	1.11	1.31	-
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.0438	0.0049	0.0058	0.0066	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	-	0.0115	0.308	ND(0.0030)	0.0080	-
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	-	422	559	558	559	-
Ammonia-N	mg/L	-	-	0.2	-	**0.245**	**0.252**	**0.218**	**0.478**	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	-	73.6	333	104	109	-
Color (apparent)	color unit	5	AO	-	-	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	-	27.2	132	42.0	7.6	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	-	4.5	8.0	7.8	6.9	-
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0	ND(2)	-
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0	ND(10)	-
Nitrate (as N)	mg/L	10	AO	0.5	-	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	-
Nitrite (as N)	mg/L	1	AO	-	-	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	-
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	-	0.033	ND(0.030)	ND(0.030)	ND(0.030)	-
Sulfate	mg/L	500	AO	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	0	ND(2)	-
Total dissolved solids (TDS)	mg/L	500	OAO	-	-	808	1580	1360	1380	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	0.0057	0.00152	0.00303	0.00171	-
Field Parameters										
Conductivity, field	mS/cm	-	-	-	0.972	1.228	1.58	2.05	2.26	0.831
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	10.92	-	9.81	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	-	6.68	8.02	7.41	7.76	7.21	6.55
Temperature, field	Deg C	15	AO	-	9.33	9.96	10.6	10.98	9.7	13.8
Turbidity, field	NTU	5	AO	-	125	-	-	16.5	40.7	-

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*
Sample ID:					*GW-45804-011810-MB-001*	*GW-45804-051810-MB-003*	*GW-45804-110210-TS-008*	*GW-45804-051611-MMD-004*	*GW-45804-110911-TS-008*	*GW-45804-051412-mb-007*
Sample Date:					*1/18/2010*	*5/18/2010*	*11/2/2010*	*5/16/2011*	*11/9/2011*	*5/14/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS[1]***	***ODWQS SOURCE***	***TLP[2]***						
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	-
Semi-Volatiles										
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document
for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level
Exceedence of the ODWQS

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*
Sample ID:					*GW-45804-052312-MB-007*	*GW-45804-111212-MB-007*	*GW-45804-052313-TS-011*	*GW-45804-111413-TS-015*	*GW-45804-052814-MB-002*	*GW-45804-112614-TS-016*
Sample Date:					*5/23/2012*	*11/12/2012*	*5/23/2013*	*11/14/2013*	*5/28/2014*	*11/26/2014*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]						
Metals										
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.111	0.078	0.108	0.111	0.079	0.080
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	0.0016	0.0036	0.0030	0.0310	0.0134	0.0691
Iron (dissolved)	mg/L	0.3	AO	10.6	2.36	1.16	1.06	0.733	1.72	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.23	1.94	1.17	1.11	1.30	1.30
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0030	0.0044	0.0043	0.0045	0.0041	0.0048
Nickel (dissolved)	mg/L	-	-	-	0.0038	0.0023	0.0086	0.0031	0.0022	0.0026
Zinc (dissolved)	mg/L	5	AO	-	0.0285	0.0085	0.0064	0.0146	0.0044	0.0065
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	558	541	550	584	570	563
Ammonia-N	mg/L	-	-	0.2	**1.60**	**0.478**	**0.809**	**1.91**	**3.72**	**1.13**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	13	30	34	34	23	19
Chloride	mg/L	250	AO	-	-	140	143	164	170	196
Color (apparent)	color unit	5	AO	-	-	-	-	-	45.7	7.5
Color (apparent)	TCU	5	AO	-	64.6	33.2 J	30.1 J	85.4	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.0	5.3	ND(5.2)	6.1	4.4	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	0	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	0.20	0.16	ND(0.10)	**0.68**
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.74	7.86	7.82	7.43	7.48	7.37
Phenol	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0030)	ND(0.0010)	0.0023	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	0.037	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	446	325	358	355	345
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	ND(2)	ND(10)	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1300	1430	1270	1380	1400	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	3.85	0.69	0.96	2.04	3.52	1.16
Total suspended solids (TSS)	mg/L	-	-	-	5.6	2.0	4.8	7.2	6.4	4.8
Turbidity	NTU	5	AO	-	16.9	5.90 J	8.75	13.8	14.5	ND(0.59)
Un-ionized ammonia	mg/L	-	-	-	-	0.0217	0.000166	0.000746	0.0128	0.00423
Field Parameters										
Conductivity, field	mS/cm	-	-	-	2.02	1.8	1.97	2.1	2.27	0.626
Dissolved oxygen (DO), field	mg/L	-	-	-	-	8.5	8.32	10.4	6.56	8.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-55	-	-	-41	124
pH, field	s.u.	6.5-8.5	OG	-	6.57	8.28	5.84	6.16	7.13	7.08
Temperature, field	Deg C	15	AO	-	11.48	11.2	13.5	12.3	11.63	14.3
Turbidity, field	NTU	5	AO	-	-	113	196	1	4.3	-

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*	*TW-4*
Sample ID:					*GW-45804-052312-MB-007*	*GW-45804-111212-MB-007*	*GW-45804-052313-TS-011*	*GW-45804-111413-TS-015*	*GW-45804-052814-MB-002*	*GW-45804-112614-TS-016*
Sample Date:					*5/23/2012*	*11/12/2012*	*5/23/2013*	*11/14/2013*	*5/28/2014*	*11/26/2014*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	*Units*	*ODWQS* [1]	*ODWQS SOURCE*	*TLP* [2]						
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles										
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	-	ND(0.020)	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document
for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level
Exceedence of the ODWQS

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*
Sample ID:					*GW-45804-052710-MMD-017*	*GW-45804-110510-TS-012*	*GW-45804-111110-TS-002*	*GW-45804-051711-MMD-011*	*GW-45804-111011-TS-010*	*GW-45804-051512-MB-009*
Sample Date:					*5/27/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*	*5/15/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]						
Metals										
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0032	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-	-	0.0017
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	6.60	9.16	-	6.52	7.17	6.97
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-	-	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.12	1.57	-	1.41	1.42	1.37
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0059	0.0042	-	0.0048	0.0057	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	0.110	ND(0.0030)	-	0.0078	ND(0.0030)	0.0033
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	611	309	-	571	597	648
Ammonia-N	mg/L	-	-	0.2	0.157	0.104	-	0.117	0.108	0.127
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	27
Chloride	mg/L	2500	AO	-	64.0	63.0	-	58.1	56.7	76.7
Color (apparent)	color unit	5	AO	-	-	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	137	-	109	232	50.1	258
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	9.4	9.9	-	11.4	11.1	12.9
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.30)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-	-	7.91
Phenol	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.462	-	0.031	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	4	0	ND(2)	42
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	892	-	1020	1000	1030
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	0.53
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	15.0
Turbidity	NTU	5	AO	-	-	-	-	-	-	80.0
Un-ionized ammonia	mg/L	-	-	-	0.00083	0.00022	-	0.000126	0.00028	-
Field Parameters										
Conductivity, field	mS/cm	-	-	-	0.6	1.32	1.36	1.98	1.82	1.83
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.94	0.5	-	2.95	1.27
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-98	-88	-	-98	-77
pH, field	s.u.	6.5-8.5	OG	-	7.2	6.90	6.25	6.69	6.97	6.4
Temperature, field	Deg C	15	AO	-	15.1	12.2	12	9.74	12.8	11.55
Turbidity, field	NTU	5	AO	-	-	-	-	29.7	73.1	94.5

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*
Sample ID:					*GW-45804-052710-MMD-017*	*GW-45804-110510-TS-012*	*GW-45804-111110-TS-002*	*GW-45804-051711-MMD-011*	*GW-45804-111011-TS-010*	*GW-45804-051512-MB-009*
Sample Date:					*5/27/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*	*5/15/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	*Units*	*ODWQS* [1]	*ODWQS SOURCE*	*TLP* [2]						
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level
Exceedence of the ODWQS

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*
Sample ID:					*GW-45804-111212-MB-002*	*GW-45804-052213-TS-005*	*GW-45804-111413-TS-007*	*GW-45804-052814-MB-003*	*GW-45804-112514-TS-005*
Sample Date:					*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/28/2014*	*11/25/2014*
					Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]					
Metals									
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AC	10.6	7.19	7.37	0.082	11.1	1.12
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.71	1.52	0.0838	1.02	0.0934
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0062	0.0053	0.0042	0.0027	0.0010
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AC	-	ND(0.0030)	0.0057	ND(0.0030)	ND(0.0030)	0.0034
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	666	643	74	309	84
Ammonia-N	mg/L	-	-	0.2	0.134	0.141	0.091	0.055	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	8.5	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	34	30	76	34	ND(10)
Chloride	mg/L	2500	AC	-	82.1	94	86.8	76.9	80
Color (apparent)	color unit	5	AC	-	-	-	-	25.3	31.7
Color (apparent)	TCU	5	AC	18.4	38.4 J	31.7	23.7	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AC	18.4	9.5	15.1	6.9	3.0	3.5
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(10)	0	ND(2)	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(10)	0	ND(2)	0
Nitrate (as N)	mg/L	10	AC	0.5	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	1	AC	-	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	6.5-8.5	OG	-	7.67	7.46	8.54	7.67	8.30
Phenol	mg/L	-	-	-	ND(0.0010)	0.0020	0.0133	0.0032	0.0015
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AC	-	198	213	61.4	191	62
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	ND(10)	ND(10)	10	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1090	1090	284	722	269
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.60	0.50	0.40	0.60	ND(0.15)
Total suspended solids (TSS)	mg/L	-	-	-	16.0	42.0	177	292	9.6
Turbidity	NTU	5	AC	-	8.80 J	90.0	8.60	145	6.03
Un-ionized ammonia	mg/L	-	-	-	0.00078	0.000032	0.000038	0.00016	ND(0.0012)
Field Parameters									
Conductivity, field	mS/cm	-	-	-	2	1.87	1.98	1.91	0.329
Dissolved oxygen (DO), field	mg/L	-	-	-	0.87	1.71	11.04	0.15	4.3
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-156	-	-	-122	-154
pH, field	s.u.	6.5-8.5	OG	-	7.32	5.84	6.22	6.98	7.98
Temperature, field	Deg C	15	AC	-	12.8	14.9	11.3	13.8	11.6
Turbidity, field	NTU	5	AC	-	15.7	53	187	44.5	-

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-7*	*TW-7*	*TW-7*	*TW-7*	*TW-7*
Sample ID:					*GW-45804-111212-MB-002*	*GW-45804-052213-TS-005*	*GW-45804-111413-TS-007*	*GW-45804-052814-MB-003*	*GW-45804-112514-TS-005*
Sample Date:					*11/12/2012*	*5/22/2013*	*11/14/2013*	*5/28/2014*	*11/25/2014*
					Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles									
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	ND(4.0)	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level
Exceedence of the ODWQS

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*
Sample ID:					*GW-45804-052610-MMD-015*	*GW-45804-110510-TS-010*	*GW-45804-111110-TS-001*	*GW-45804-051711-MMD-010*	*GW-45804-111011-TS-014*	*GW-45804-051512-MB-010*
Sample Date:					*5/26/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*	*5/15/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]						
Metals										
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0023	-	0.0018	ND(0.0010)	0.0012
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-	-	0.068
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00022	0.00020	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-	-	0.0021
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	3.59	2.85	-	3.37	ND(0.050)	5.77
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-	-	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.52	1.53	-	**2.71**	0.321	**2.95**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0695	0.0527	-	0.0168	0.164	0.0158
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0743	ND(0.0030)	-	0.0123	0.0041	ND(0.0030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	427	490	-	519	291	519
Ammonia-N	mg/L	-	-	0.2	**0.373**	**0.311**	-	**0.476**	ND(0.050)	**1.85**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	23
Chloride	mg/L	250	AO	-	83.5	70.6	-	106	42.8	116
Color (apparent)	color unit	5	AO	-	-	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	143	-	90.6	203	5.0	112
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	8.5	9.7	-	10.5	3.1	10.6
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.30)	0.44	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-	-	7.96
Phenol	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	-	0.072	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	10	2	340	2
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	1080	-	1460	834	1550
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	2.16
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	12.5
Turbidity	NTU	5	AO	-	-	-	-	-	-	79.0
Un-ionized ammonia	mg/L	-	-	-	0.000407	0.00152	-	0.0145	ND(0.00031)	-
Field Parameters										
Conductivity, field	mS/cm	-	-	-	0.52	1.53	1.65	2.31	0.981	2.37
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.91	2.12	0.02	-	1.7
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-124	-31	-60	-	-73
pH, field	s.u.	6.5-8.5	OG	-	6.62	7.24	6.14	8.12	7.48	6.36
Temperature, field	Deg C	15	AO	-	11.9	12.9	7.72	10.59	9.0	9.92
Turbidity, field	NTU	5	AO	-	-	-	-	4.2	62.3	165

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*
Sample ID:					*GW-45804-052610-MMD-015*	*GW-45804-110510-TS-010*	*GW-45804-111110-TS-001*	*GW-45804-051711-MMD-010*	*GW-45804-111011-TS-014*	*GW-45804-051512-MB-010*
Sample Date:					*5/26/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*	*5/15/2012*
					Original	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	*Units*	*ODWQS* [1]	*ODWQS SOURCE*	*TLP* [2]						
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
Exceedence of the Tier I Trigger Level
Exceedence of the ODWQS

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*
Sample ID:					*GW-45804-111312-MB-012*	*GW-45804-052313-TS-012*	*GW-45804-111413-TS-005*	*GW-45804-052814-MB-001*	*GW-45804-112614-TS-013*
Sample Date:					*11/13/2012*	*5/23/2013*	*11/14/2013*	*5/28/2014*	*11/26/2014*
					Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]					
Metals									
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.078	0.074	0.081	0.099	0.204
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	0.00078	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00142
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0016
Iron (dissolved)	mg/L	0.3	AC	10.6	6.02	5.55	6.25	3.06	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	**2.91**	**2.64**	**2.38**	1.34	0.648
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0197	0.0204	0.0211	0.0133	0.0301
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0079
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0119	ND(0.0030)	0.0034	0.0075	0.0075
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	348	507	348	466	489
Ammonia-N	mg/L	-	-	0.2	**2.33**	**2.45**	**4.60**	**2.69**	**0.273**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	51	36	46	19	ND(10)
Chloride	mg/L	250	AC	-	140	94.2	157	103	127
Color (apparent)	color unit	5	AC	-	-	-	-	34.8 J	81.9
Color (apparent)	TCU	5	AC	-	73.0	35.0 J	35.7	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AC	18.4	7.6	ND(5.2)	13.5	4.2	2.5
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AC	0.5	ND(0.10)	0.25	ND(0.10)	0.15	0.40
Nitrite (as N)	mg/L	1	AC	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.60	7.82	7.53	7.76	7.54
Phenol	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0030	0.0015
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AC	-	345	373	639	275	333
Total coliform bacteria	cfu/100mL	ND	MAC	-	10	140	0	10	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1600	1510	1750	1030	1140
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	2.43	2.95	5.09	2.65	0.42
Total suspended solids (TSS)	mg/L	-	-	-	14.0	38.7	26.4	10.0	24.4
Turbidity	NTU	5	AC	-	7.60	53.0	63.6	23.5	11.4
Un-ionized ammonia	mg/L	-	-	-	0.615	0.00202	0.00197	0.0104	0.00386
Field Parameters									
Conductivity, field	mS/cm	-	-	-	1.95	2.17	2.32	1.69	0.557
Dissolved oxygen (DO), field	mg/L	-	-	-	0	5.62	7.89	8.74	10.48
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-104	-	-	-64	24
pH, field	s.u.	6.5-8.5	OG	-	9.17	6.41	6.24	7.22	7.90
Temperature, field	Deg C	15	AC	-	9.8	14.6	11.1	10.44	7.2
Turbidity, field	NTU	5	AC	-	28.7	48	0	5.5	-

TABLE 4.3

DEEP BEDROCK GROUNDWATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:					*TW-8*	*TW-8*	*TW-8*	*TW-8*	*TW-8*
Sample ID:					*GW-45804-111312-MB-012*	*GW-45804-052313-TS-012*	*GW-45804-111413-TS-005*	*GW-45804-052814-MB-001*	*GW-45804-112614-TS-013*
Sample Date:					*11/13/2012*	*5/23/2013*	*11/14/2013*	*5/28/2014*	*11/26/2014*
					Original	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***ODWQS*** [1]	***ODWQS SOURCE***	***TLP*** [2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles									
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Dibenz{a,h}anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	-

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document
for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ]: Exceedence of the Tier I Trigger Level
[ ]: Exceedence of the ODWQS

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*
Sample ID:			*SW-45804-011310-TS*	*SW-45804-051810-MB-002*	*SW-45804-110510-TS-014*	*SW-45804-111110-TS-001*	*SW-45804-051711-MMD-004*	*SW-45804-111711-TS-003*	*SW-45804-051412-MB-005*	*SW-45804-052312-mb-003*	*SW-45804-111312-MB-003*
Sample Date:			*1/13/2010*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/17/2011*	*5/14/2012*	*5/23/2012*	*11/13/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Metals (Total)											
Arsenic	mg/L	0.005	ND(0.0010)	0.0031	ND(0.0010)	-	0.0018	0.0013	0.0011	-	ND(0.0010)
Boron	mg/L	0.2	-	-	-	-	-	-	0.140	-	0.089
Cadmium	mg/L	0.0002	0.000034	0.0001103	0.000046	-	0.0001031	0.000064	0.000012	-	0.0001113
Chromium	mg/L	-	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Cobalt	mg/L	0.0009	-	-	-	-	-	-	0.00024	-	0.00028
Copper	mg/L	0.005	-	-	-	-	-	-	0.0016	-	0.0011
Iron	mg/L	0.3	0.089	ND(0.050)	1.86	-	0.811	ND(0.050)	0.231	-	0.118
Lead	mg/L	0.005	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium	mg/L	-	73.7	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0433	0.0357	0.305	-	0.348	0.0346	0.0536	-	0.185
Mercury	mg/L	0.0002	-	-	-	-	-	-	ND(0.00010)	-	ND(0.00010)
Molybdenum	mg/L	0.04	0.291	0.349	0.339	-	0.315	0.427	0.225	-	0.556
Nickel	mg/L	0.025	-	-	-	-	-	-	0.0113	-	0.0157
Zinc	mg/L	0.03	0.0200	0.0067	0.0304	-	0.149	ND(0.0030)	0.0174	-	ND(0.0030)
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	-	220	201	216	-	188	286	268	-	232
Ammonia-N	mg/L	-	ND(0.050)	0.103	0.096	-	0.110	ND(0.050)	0.073	-	0.100
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	15	-	76
Chloride	mg/L	-	83.1	83.6	79.2	-	122	122	164	-	94.2
Color (apparent)	TCU	-	6.7	9.9	-	9.1	21.3	12.0	-	7.2	15.0
Conductivity	umhos/cm	-	1490	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	3.1	6.7	-	5.2	4.9	4.2	-	3.2
Escherichia coli	cfu/100mL	100	0	1	-	1	35	1	-	45	130
Fecal coliform bacteria	cfu/100mL	4800	1	10	-	1	37	2	-	11	150
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(1.0)	0.57	0.94	-	1.32	0.55	1.10	-	0.34
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)	ND(0.10)	-	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.08	-	-	-	-	-	7.87	-	8.08
Phenol	mg/L	0.005	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.0044	0.0079	0.0395	-	0.0687	0.0061	0.0102	-	0.0093
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	684
Total coliform bacteria	cfu/100mL	-	8	350	-	2100	600	140	-	260	1000
Total dissolved solids (TDS)	mg/L	-	1100	1010	1010	-	1170	1430	1370	-	1420
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.49	-	0.51
Total phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	11.6	-	5.6
Turbidity	NTU	-	0.92	-	-	-	-	-	-	1.11	2.20
Un-ionized ammonia	mg/L	0.02	ND(0.000014)	0.0025	0.00035	-	0.00034	ND(0.000094)	-	-	0.000189

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*
Sample ID:			*SW-45804-011310-TS*	*SW-45804-051810-MB-002*	*SW-45804-110510-TS-014*	*SW-45804-111110-TS-001*	*SW-45804-051711-MMD-004*	*SW-45804-111711-TS-003*	*SW-45804-051412-MB-005*	*SW-45804-052312-mb-003*	*SW-45804-111312-MB-003*
Sample Date:			*1/13/2010*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/17/2011*	*5/14/2012*	*5/23/2012*	*11/13/2012*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Field Parameters											
Conductivity, field	uS/cm	-	1850	1283	1480	1750	1840	1740	2110	1920	1510
Dissolved oxygen (DO), field	mg/L	-	-	-	10.51	10.4	11.2	12.6	-	-	12.19
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	171	-	-	-	66
pH, field	s.u.	6.5-8.5	6.31	7.65	7.27	6.1	7.06	6.96	6.97	7.06	7.02
Temperature, field	Deg C	-	4.0	22	8.1	6.7	12.29	8.8	18.86	17.64	7.2
Turbidity, field	NTU	-	73	-	-	-	6.7	10.8	-	-	67.1
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Semi-Volatiles											
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0093	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*
Sample ID:		*SW-4*	*SW-45804-052313-TS-004*	*SW-45804-111313-TS-004*	*SW-45804-052814-MB-003*	*SW-45804-112614-TS-003*	*SW-45804-051810-MB-003*	*SW-45804-110510-TS-015*	*SW-45804-111110-TS-002*	*SW-45804-051711-MMD-001*	*SW-45804-051711-MMD-002*
Sample Date:			*5/23/2013*	*11/13/2013*	*5/28/2014*	*11/26/2014*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*5/17/2011*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Duplicate*
Parameters:	*Units*	*PWQO*									
Metals (Total)											
Arsenic	mg/L	0.005	0.0027	0.0025	ND(0.010)	ND(0.0010)	0.0011	0.0055	-	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.087	0.105	ND(0.10)	0.096	-	-	-	-	-
Cadmium	mg/L	0.0002	0.00055	0.000061	ND(0.00090)	0.00011	0.000052	0.000054	-	0.000077	0.000083
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0010)	-	-	-	-	-
Cobalt	mg/L	0.0009	0.00086	0.00277	ND(0.0050)	0.00091	-	-	-	-	-
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.010)	0.0013	-	-	-	-	-
Iron	mg/L	0.3	0.089	0.078	ND(0.50)	0.061	0.221	5.36	-	0.180	0.184
Lead	mg/L	0.005	ND(0.0010)	0.0014	ND(0.0050)	ND(0.0010)	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0636	0.0593	0.028	0.0334	0.0750	0.059	-	0.0945	0.0961
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	-	-	-
Molybdenum	mg/L	0.04	0.465	0.488	0.585	0.391	0.398	0.441	-	0.292	0.252
Nickel	mg/L	0.025	0.0138	0.0056	0.016	0.0165	-	-	-	-	-
Zinc	mg/L	0.03	ND(0.0030)	0.0053	ND(0.030)	0.0068	0.0136	0.0459	-	0.0178	0.0161
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	-	145	178	136	235	161	217	-	190	186
Ammonia-N	mg/L	-	0.634	0.463	0.105	0.081	0.079	0.162	-	0.080	0.073
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	4.6	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	38	10	24	-	-	-	-	-
Chloride	mg/L	-	96.8	101	100	224	89.0	66.8	-	70.0	69.8
Color (apparent)	TCU	-	9.4 J	8.8	16.3	9.0	17.4	-	23.7	23.5	19.0
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	2.4	4.5	2.2	5.0	3.6	5.2	-	4.4	4.1
Escherichia coli	cfu/100mL	100	ND(10)	10	10	4	178	-	3	22	19
Fecal coliform bacteria	cfu/100mL	4800	ND(10)	3	20	6	190	-	3	20	30
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	1.28	1.30	0.33	0.56	ND(0.10)	0.74	-	1.16	1.16
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.30)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.11	8.14	8.12	7.88	-	-	-	-	-
Phenol	mg/L	0.005	0.0050	ND(0.0010)	0.0036	ND(0.0010)	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0343	0.0092	0.0083	0.0088	0.0683	0.329	-	0.0090	0.0074
Sulfate	mg/L	-	570	696	489	597	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	ND(1000)	600	2200	1900	270	-	2400	1400	1600
Total dissolved solids (TDS)	mg/L	-	1130	1370	1040	1440	1170	780	-	976	940
Total kjeldahl nitrogen (TKN)	mg/L	-	0.80	0.66	0.49	0.31	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	12.8	15.2	7.2	ND(2.0)	-	-	-	-	-
Turbidity	NTU	-	3.45	12.6	4.83	4.39	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	0.000171	0.000153	0.0068	0.00069	0.0025	0.00053	-	0.000125	0.000113

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW1-09*	*SW1-09*	*SW1-09*	*SW1-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*
Sample ID:		*SW-4*	*SW-45804-052313-TS-004*	*SW-45804-111313-TS-004*	*SW-45804-052814-MB-003*	*SW-45804-112614-TS-003*	*SW-45804-051810-MB-003*	*SW-45804-110510-TS-015*	*SW-45804-111110-TS-002*	*SW-45804-051711-MMD-001*	*SW-45804-051711-MMD-002*
Sample Date:			*5/23/2013*	*11/13/2013*	*5/28/2014*	*11/26/2014*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*5/17/2011*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Duplicate*
Parameters:	***Units***	***PWQO***									
Field Parameters											
Conductivity, field	uS/cm	-	1590	1770	1560	960	1445	1200	1610	1600	1600
Dissolved oxygen (DO), field	mg/L	-	8.13	10.16	8.1	21.17	-	12.6	12.04	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	9	117	-	-	-	-	-
pH, field	s.u.	6.5-8.5	5.78	5.43	8.14	7.84	7.79	7.26	6.56	6.8	6.8
Temperature, field	Deg C	-	20.3	2.4	20.43	2.57	21.3	7.2	6	11.13	11.13
Turbidity, field	NTU	-	58.8	11.5	12.4	-	-	-	-	14.2	14.2
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(380)	ND(380)	ND(250)	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles											
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.022	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0056	-	0.0052	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			SW-4	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:				SW-45804-111711-TS-004	SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004	SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052814-MB-005	SW-45804-112614-TS-001
Sample Date:				11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	5/23/2013	11/13/2013	5/28/2014	11/26/2014
				Original	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	*Units*	*PWQO*										
Metals (Total)												
Arsenic	mg/L	0.005		0.0020	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2		-	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002		0.000057	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-		-	0.0013	-	ND(0.0010)	0.0022 J	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009		-	ND(0.00050)	-	ND(0.00050)	0.00066	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005		-	0.0022	-	ND(0.0010)	0.0027 J	0.0016 J	ND(0.0010)	0.0011	ND(0.0010)
Iron	mg/L	0.3		ND(0.050)	0.757	-	0.157	1.3 J	0.512 J	0.164	0.385	0.439
Lead	mg/L	0.005		-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-		-	-	-	-	-	-	-	-	-
Manganese	mg/L	-		0.201	0.186	-	0.123	0.120	0.0864	0.0716	0.133	0.0850
Mercury	mg/L	0.0002		-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum	mg/L	0.04		0.176	0.0050	-	0.0058	0.0057	0.0058	0.0033	0.0080	0.0082
Nickel	mg/L	0.025		-	0.0021	-	ND(0.0020)	0.0027	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)
Zinc	mg/L	0.03		0.0057	0.0273	-	ND(0.0030)	0.0094	0.0072	0.0059	0.0046	0.0039
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	-		303	215	-	240	168	163	240	234	203
Ammonia-N	mg/L	-		ND(0.050)	0.068	-	ND(0.050)	0.056	0.051	ND(0.050)	0.077	0.102
Biochemical oxygen demand (BOD)	mg/L	-		-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-		ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-		-	40	-	42	32	40	34	25	22
Chloride	mg/L	-		182	88.2	-	121	81.6	82.6	112	119	109
Color (apparent)	TCU	-		13.7	-	67.9	29.6	58.5 J	59.4 J	30.3	37.4	35.2
Conductivity	umhos/cm	-		-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-		5.1	17.6	-	8.0	12.7	12.6	9.2	6.8	8.4
Escherichia coli	cfu/100mL	100		0	-	105	11	40 J	20 J	10	70	50
Fecal coliform bacteria	cfu/100mL	4800		2	-	254	13	80 J	150 J	30	100	70
Mineral oil and grease	mg/L	-		-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82		1.13	ND(0.10)	-	0.11	0.14	0.14	0.18	0.18	0.43
Nitrite (as N)	mg/L	0.3		ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-		-	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-		-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5		-	7.97	-	8.19	8.07	8.07	8.08	8.25	8.01
Phenol	mg/L	0.005		-	ND(0.0010)	-	ND(0.0010)	0.0080 J	0.0050 J	0.0044	0.0020	ND(0.0010)
Phosphorus	mg/L	0.01		0.0043	0.0398	-	0.0126	0.0671	0.0523	0.0213	0.0259	0.0185
Sulfate	mg/L	-		-	-	-	205	119	119	134	188	179
Total coliform bacteria	cfu/100mL	-		130	-	1200	1200	>2000	>2000	3000	2900	1500
Total dissolved solids (TDS)	mg/L	-		1390	514	-	762	474	462	606	730	637
Total kjeldahl nitrogen (TKN)	mg/L	-		-	0.84	-	0.52	0.61	0.54	1.03	0.65	0.49
Total phosphorus	mg/L	-		-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-		-	26.4	-	4.0	69.0	83.0	5.2	5.2	8.0
Turbidity	NTU	-		-	-	4.20	0.85	3.34	4.31	2.49	3.52	7.32
Un-ionized ammonia	mg/L	0.02		ND(0.000086)	-	-	ND(0.00014)	0.000014	ND(0.000013)	ND(0.000016)	0.0049	0.00174

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*	*SW2-09*
Sample ID:		*SW-4*	*SW-45804-111711-TS-004*	*SW-45804-051412-MB-004*	*SW-45804-052312-mb-004*	*SW-45804-111312-MB-004*	*SW-45804-052313-TS-002*	*SW-45804-052313-TS-003*	*SW-45804-111313-TS-003*	*SW-45804-052814-MB-005*	*SW-45804-112614-TS-001*
Sample Date:			*11/17/2011*	*5/14/2012*	*5/23/2012*	*11/13/2012*	*5/23/2013*	*5/23/2013*	*11/13/2013*	*5/28/2014*	*11/26/2014*
			Original	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Field Parameters											
Conductivity, field	uS/cm	-	1830	812	973	900	750	-	1040	1220	473
Dissolved oxygen (DO), field	mg/L	-	17.19	-	-	13.84	7.64	-	10.24	10.3	21.98
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	57	-	-	-	54	123.1
pH, field	s.u.	6.5-8.5	7.03	7.04	7.42	7.22	5.75	5.75	6.42	8.21	8.17
Temperature, field	Deg C	-	5.7	19.03	21.28	6.3	19.1	19.1	2.1	17.97	1.83
Turbidity, field	NTU	-	24.7	-	-	35.7	43.9	-	0	9.2	-
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Semi-Volatiles											
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*
Sample ID:		*SW-4*	*SW-45804-051810-MB-004*	*SW-45804-051810-MB-005*	*SW-45804-110510-TS-016*	*SW-45804-111110-TS-003*	*SW-45804-051711-MMD-003*	*SW-45804-111711-TS-005*	*SW-45804-051412-MB-003*	*SW-45804-052312-mb-005*	*SW-45804-111312-MB-005*
Sample Date:			*5/18/2010*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/17/2011*	*5/14/2012*	*5/23/2012*	*11/13/2012*
			Original	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	*Units*	*PWQO*									
Metals (Total)											
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0014	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)
Boron	mg/L	0.2	-	-	-	-	-	-	ND(0.050)	-	ND(0.050)
Cadmium	mg/L	0.0002	0.000011	0.000033	0.00013	-	0.00020	ND(0.00010)	0.00032	-	ND(0.00010)
Chromium	mg/L	-	-	-	-	-	-	-	ND(0.0010)	-	0.0011
Cobalt	mg/L	0.0009	-	-	-	-	-	-	0.00085	-	ND(0.00050)
Copper	mg/L	0.005	-	-	-	-	-	-	0.0019	-	0.0014
Iron	mg/L	0.3	0.178	0.166	1.69	-	0.153	0.523	0.471	-	0.521
Lead	mg/L	0.005	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.110	0.105	0.199	-	0.101	0.116	0.167	-	0.149
Mercury	mg/L	0.0002	-	-	-	-	-	-	ND(0.00010)	-	ND(0.00010)
Molybdenum	mg/L	0.04	0.115	0.128	0.0330	-	0.0599	0.0064	0.117	-	0.0265
Nickel	mg/L	0.025	-	-	-	-	-	-	0.0049	-	0.0032
Zinc	mg/L	0.03	0.0127	0.0040	0.0104	-	0.0062	0.0043	0.0094	-	0.0045
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	-	214	208	229	-	239	242	209	-	246
Ammonia-N	mg/L	-	0.105	0.153	0.058	-	ND(0.050)	ND(0.050)	0.122	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	21	-	51
Chloride	mg/L	-	100	107	74.3	-	68.1	81.2	94.0	-	120
Color (apparent)	TCU	-	33.1	26.8	-	35.1	39.8	30.3	-	55.2	34.0
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.9	5.5	8.2	-	11.2	7.0	13.0	-	7.8
Escherichia coli	cfu/100mL	100	28	109	-	12	31	24	-	77	11
Fecal coliform bacteria	cfu/100mL	4800	120	170	-	23	39	10	-	360	12
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	0.51	0.14	-	ND(0.30)	ND(0.10)	0.49	-	0.14
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)	ND(0.10)	-	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	-	-	-	8.06	-	8.24
Phenol	mg/L	0.005	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.0581	0.0390	0.0578	-	0.0366	0.0254	0.0455	-	0.0458
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	226
Total coliform bacteria	cfu/100mL	-	240	260	-	300	1500	290	-	1000	1500
Total dissolved solids (TDS)	mg/L	-	960	942	572	-	634	518	738	-	792
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.61	-	0.57
Total phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	20.8	-	19.2
Turbidity	NTU	-	-	-	-	-	-	-	-	4.50	1.36
Un-ionized ammonia	mg/L	0.02	0.0070	0.0102	0.00034	-	ND(0.00022)	ND(0.000071)	-	-	ND(0.000058)

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*
Sample ID:		*SW-4*	*SW-45804-051810-MB-004*	*SW-45804-051810-MB-005*	*SW-45804-110510-TS-016*	*SW-45804-111110-TS-003*	*SW-45804-051711-MMD-003*	*SW-45804-111711-TS-005*	*SW-45804-051412-MB-003*	*SW-45804-052312-mb-005*	*SW-45804-111312-MB-005*
Sample Date:			*5/18/2010*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/17/2011*	*5/14/2012*	*5/23/2012*	*11/13/2012*
			Original	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Field Parameters											
Conductivity, field	uS/cm	-	1219	1219	970	1060	739	799	1200	3620	999
Dissolved oxygen (DO), field	mg/L	-	-	-	12.49	11.84	9.64	15.93	-	-	13.97
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	231	-	-	-	98
pH, field	s.u.	6.5-8.5	8.02	8.02	7.55	6.97	7.25	6.91	7	7.64	6.87
Temperature, field	Deg C	-	24.6	24.6	6.0	5.54	11.18	6.7	18.31	22.78	5.4
Turbidity, field	NTU	-	-	-	-	-	3.6	28.2	-	-	46.7
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Semi-Volatiles											
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0147	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-45804-052313-TS-001*	*SW-45804-111313-TS-002*	*SW-45804-052814-MB-004*	*SW-45804-112614-TS-002*	*SW-45804-051810-MB-001*	*SW-45804-110510-TS-013*	*SW-45804-111110-TS-004*	*SW-45804-051711-MMD-005*	*SW-45804-111011-TS-001*
Sample Date:			*5/23/2013*	*11/13/2013*	*5/28/2014*	*11/26/2014*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Metals (Total)											
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	0.0011	0.0012
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	-	-	-	-
Cadmium	mg/L	0.0002	0.00012	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	0.0011	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	-	-	-	-
Cobalt	mg/L	0.0009	ND(0.00050)	0.00066	0.00051	ND(0.00050)	-	-	-	-	-
Copper	mg/L	0.005	0.0018	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	-	-	-	-
Iron	mg/L	0.3	0.634	0.369	0.229	0.339	0.271	0.475	-	0.129	0.630
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0924	0.106	0.110	0.0871	0.0542	0.0262	-	0.0757	0.132
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0308	0.0722	0.357	0.0221	0.0536	0.0230	-	0.0163	0.0124
Nickel	mg/L	0.025	0.0028	0.0053	0.0056	0.0031	-	-	-	-	-
Zinc	mg/L	0.03	0.0052	0.0116	ND(0.0030)	0.0057	0.0056	ND(0.0030)	-	0.0124	0.0033
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	-	175	239	216	214	135	116	-	135	143
Ammonia-N	mg/L	-	0.076	0.126	0.071	0.097	0.142	0.354	-	0.146	0.056
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.3	ND(2.0)	-	ND(2.0)	19.5
Chemical oxygen demand (COD)	mg/L	-	38	38	21	24	-	-	-	-	-
Chloride	mg/L	-	84.0	110	120	109	108	36.9	-	60.6	35.3
Color (apparent)	TCU	-	53.8 J	27.6	30.9	31.2	21.2	-	43.4	26.7	25.8
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	12.4	9.8	5.3	9.3	6.8	9.6	-	11.9	11.2
Escherichia coli	cfu/100mL	100	130	10	40	70	5	-	6	80	44
Fecal coliform bacteria	cfu/100mL	4800	140	20	50	80	2	-	15	140	70
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.19	0.37	0.25	0.61	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.30)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.09	8.11	8.23	8.02	-	-	-	-	-
Phenol	mg/L	0.005	0.0050	0.0016	0.0044	ND(0.0010)	-	-	-	-	-
Phosphorus	mg/L	0.01	0.081	0.0265	0.0281	0.0335	0.0258	0.0353	-	0.0357	0.0352
Sulfate	mg/L	-	145	235	305	303	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	17000	1000	2700	1800	50	-	90	2900	600 J
Total dissolved solids (TDS)	mg/L	-	518	758	875	837	936	548	-	792	474
Total kjeldahl nitrogen (TKN)	mg/L	-	0.54	0.46	0.51	0.45	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	67.0	4.8	6.8	8.4	-	-	-	-	-
Turbidity	NTU	-	5.35	8.96	3.24	7.27	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	0.0000144	0.000034	0.0045	0.00158	0.0029	0.00078	-	0.00101	0.0040

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW3-09*	*SW3-09*	*SW3-09*	*SW3-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-45804-052313-TS-001*	*SW-45804-111313-TS-002*	*SW-45804-052814-MB-004*	*SW-45804-112614-TS-002*	*SW-45804-051810-MB-001*	*SW-45804-110510-TS-013*	*SW-45804-111110-TS-004*	*SW-45804-051711-MMD-005*	*SW-45804-111011-TS-001*
Sample Date:			*5/23/2013*	*11/13/2013*	*5/28/2014*	*11/26/2014*	*5/18/2010*	*11/5/2010*	*11/11/2010*	*5/17/2011*	*11/10/2011*
			Original	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***									
Field Parameters											
Conductivity, field	uS/cm	-	800	1230	1440	582	1207	910	980	873	677
Dissolved oxygen (DO), field	mg/L	-	7.75	8.35	10.59	21.46	-	12.47	12.91	10.95	18.38
Oxidation reduction potential (ORP), field	millivolts	-	-	-	45	98.1	-	-	-	218	-
pH, field	s.u.	6.5-8.5	5.62	6.37	8.22	8.13	7.6	7.13	6.6	7.37	8.62
Temperature, field	Deg C	-	19.2	1.8	17.62	2.36	21	5.9	6.68	13.5	7.2
Turbidity, field	NTU	-	94.7	4.1	8.2	-	-	-	-	0	57
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(380)	ND(380)	ND(250)	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles											
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	0.0060
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-45804-111011-TS-002*	*SW-4*	*SW-4*	*SW-4*	*'-45804-051412-MB-(*	*SW-45804-051412-MB-002*	*SW-45804-052312-MB-001*	*SW-45804-052312-MB-002*	*SW-4*	*SW-4*	*SW-4*
Sample Date:			*11/10/2011*	*3/1/2012*	*4/1/2012*	*5/1/2012*	*5/14/2012*	*5/14/2012*	*5/23/2012*	*5/23/2012*	*6/1/2012*	*7/1/2012*	*8/1/2012*
			Duplicate	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***											
Metals (Total)													
Arsenic	mg/L	0.005	0.001J	ND(0.0005)	0.0009	0.0027	0.0014	0.0014	-	-	0.0024	0.0006	0.0019
Boron	mg/L	0.2	-	0.011	0.039	0.044	ND(0.050)	ND(0.050)	-	-	0.041	0.047	0.047
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	-	-	ND(0.005)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	-	ND(0.002)	0.003	ND(0.002)	ND(0.0010)	ND(0.0010)	-	-	ND(0.002)	ND(0.002)	0.003
Cobalt	mg/L	0.0009	-	ND(0.005)	ND(0.005)	ND(0.005)	0.00071	0.00069	-	-	ND(0.005)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	-	0.002	0.004	0.002	0.0015	0.0014	-	-	ND(0.002)	ND(0.002)	ND(0.002)
Iron	mg/L	0.3	0.585	-	-	-	0.830	0.817	-	-	-	-	-
Lead	mg/L	0.005	-	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	-	-	ND(0.02)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.117	-	-	-	0.443	0.399	-	-	-	-	-
Mercury	mg/L	0.0002	-	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00002)	ND(0.00002)	ND(0.00002)
Molybdenum	mg/L	0.04	0.0119	-	-	-	0.0087	0.0086	-	-	-	-	-
Nickel	mg/L	0.025	-	ND(0.01)	ND(0.01)	ND(0.01)	0.0025	0.0024	-	-	ND(0.01)	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	ND(0.0030)	ND(0.005)	0.011	0.006	0.0041	ND(0.0030)	-	-	0.006	0.006	0.008
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	-	138	-	-	-	87	85	-	-	-	-	-
Ammonia-N	mg/L	-	0.053	0.15	0.78	0.09	ND(0.050)	ND(0.050)	-	-	ND(0.01)	ND(0.01)	0.24
Biochemical oxygen demand (BOD)	mg/L	-	-	7	28	8	-	-	-	-	3	6	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	18.7	-	-	-	9.1	8.3	-	-	-	-	-
Chemical oxygen demand (COD)	mg/L	-	-	33	88	61	78	72	-	-	40	58	52
Chloride	mg/L	-	36.1	-	-	-	80.3	81.0	-	-	-	-	-
Color (apparent)	TCU	-	24.9	-	-	-	-	-	126	116	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.7	5.6	12.4	11.7	21.2	21.8	-	-	10.3	10.8	10.3
Escherichia coli	cfu/100mL	100	58	ND(10)	ND(2)	4	-	-	156	152	28	249	428
Fecal coliform bacteria	cfu/100mL	4800	80	-	-	-	-	-	1880 J	880 J	-	-	-
Mineral oil and grease	mg/L	-	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	ND(0.30)	ND(0.1)	0.2	0.1	ND(0.10)	ND(0.10)	-	-	0.1	ND(0.1)	0.1
Nitrite (as N)	mg/L	0.3	ND(0.30)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	-	-	ND(0.1)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	ND(1.0)	1.9	ND(1.0)	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
pH, lab	s.u.	6.5-8.5	-	7.95	8.14	8.33	8.49	8.57	-	-	8.21	7.76	7.86
Phenol	mg/L	0.005	-	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	ND(0.0010)	-	-	ND(0.001)	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.337	-	-	-	0.081	0.084	-	-	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	300 J	-	-	-	-	-	420 J	1100 J	-	-	-
Total dissolved solids (TDS)	mg/L	-	468	-	-	-	578	596	-	-	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	1.55	3.48	2.38	2.19	1.66	-	-	1.73	2.94	1.76
Total phosphorus	mg/L	-	-	0.12	0.21	0.21	-	-	-	-	0.11	0.29	0.19
Total suspended solids (TSS)	mg/L	-	-	9	40	23	17.2	18.0	-	-	11	20	11
Turbidity	NTU	-	-	-	-	-	-	-	14.5	16.3	-	-	-
Un-ionized ammonia	mg/L	0.02	0.003E	-	-	-	-	-	-	-	-	-	-

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-45804-111011-TS-002*	*SW-4*	*SW-4*	*SW-4*	*'-45804-051412-MB-0*	*SW-45804-051412-MB-002*	*SW-45804-052312-MB-001*	*SW-45804-052312-MB-002*	*SW-4*	*SW-4*	*SW-4*
Sample Date:			*11/10/2011*	*3/1/2012*	*4/1/2012*	*5/1/2012*	*5/14/2012*	*5/14/2012*	*5/23/2012*	*5/23/2012*	*6/1/2012*	*7/1/2012*	*8/1/2012*
			Duplicate	*Original*	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***											
Field Parameters													
Conductivity, field	uS/cm	-	-	489	1020	1010	1000	-	1020	-	980	1030	947
Dissolved oxygen (DO), field	mg/L	-	-	16	10.1	9.4	-	-	-	-	8.5	1.6	2
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	8.62	-	-	-	7.6	-	7.14	-	-	-	-
Temperature, field	Deg C	-	7.2	-	-	-	22.73	-	21.02	-	-	-	-
Turbidity, field	NTU	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-	-	ND(100)	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-	-	ND(100)	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-	-	ND(250)	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	-	ND(250)	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-	-	ND(250)	ND(250)	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-	-	ND(250)	ND(250)	-	-	-	-	-
Semi-Volatiles													
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	-	-	ND(0.0050)	ND(0.0050)	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	0.023	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-	-	-	-

Notes:

(a) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-4*	*SW-4*	*SW-4*	*'-45804-111212-MB-(*	*SW-45804-111212-MB-002*	*SW-4*	*SW-4*	*'-45804-052313-TS-0*	*SW-4*	*SW-4*	*SW-4*	*SW-4*
Sample Date:			*9/1/2012*	*10/1/2012*	*11/1/2012*	*11/12/2012*	*11/12/2012*	*4/1/2013*	*5/1/2013*	*5/23/2013*	*6/1/2013*	*7/1/2013*	*8/1/2013*	*9/1/2013*
			Original	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***												
Metals (Total)														
Arsenic	mg/L	0.005	0.001	0.0012	0.0008	ND(0.0010)	ND(0.0010)	0.0009	0.0011	0.0010	0.0012	0.0015	0.0002	0.0003
Boron	mg/L	0.2	0.038	0.049	0.057	ND(0.050)	ND(0.050)	0.03	0.038	ND(0.050)	0.023	0.026	0.025	0.007
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	0.008	0.076	0.02	0.0013	0.0017	ND(0.002)	ND(0.002)	ND(0.0010)	ND(0.002)	0.002	ND(0.002)	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	0.00074	0.00076	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.003	0.005	0.004	0.0026	0.0027	0.002	0.002	0.0014	0.002	0.002	ND(0.002)	ND(0.002)
Iron	mg/L	0.3	-	-	-	0.745	0.820	-	-	0.152	-	-	-	-
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	0.346	0.343	-	-	0.203	-	-	-	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)
Molybdenum	mg/L	0.04	-	-	-	0.0120	0.0123	-	-	0.0174	-	-	-	-
Nickel	mg/L	0.025	0.02	0.07	0.02	0.0035	0.0035	ND(0.01)	ND(0.01)	0.0025	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	ND(0.005)	0.016	0.009	0.0059	0.0061	0.033	0.013	ND(0.0030)	ND(0.005)	0.006	ND(0.005)	0.005
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	155	163	-	-	106	-	-	-	-
Ammonia-N	mg/L	-	ND(0.01)	0.31	0.08	0.161	0.171	0.88	0.47	0.797	ND(0.01)	0.02	ND(0.01)	ND(0.01)
Biochemical oxygen demand (BOD)	mg/L	-	3	8	13	-	-	ND(3)	ND(3)	-	ND(3)	ND(3)	5	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	14.0	13.5	-	-	2.8	-	-	-	-
Chemical oxygen demand (COD)	mg/L	-	30	70	52	82	86	34	26	27	27	29	33	25
Chloride	mg/L	-	-	-	-	47.5	48.5	-	-	90.5	-	-	-	-
Color (apparent)	TCU	-	-	-	-	76.6 J	53.3 J	-	-	28.2 J	-	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.3	9.2	11.5	12.0	11.3	6.2	7.2	9.9	8.5	9.2	10.1	8.9
Escherichia coli	cfu/100mL	100	600	300	100	60	80	22	76	ND(10)	3	50	2	18
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	140	210	-	-	40	-	-	-	-
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	ND(1.0)	ND(1.0)	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	ND(0.1)	0.1	ND(0.1)	ND(0.10)	ND(0.10)	0.2	0.2	0.11	0.4	0.1	ND(0.1)	0.1
Nitrite (as N)	mg/L	0.3	ND(1.0)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.1)	ND(0.1)	ND(0.10)	0.4	ND(0.1)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	ND(1.0)	ND(0.1)	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5	ND(1.0)	2
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5	ND(1.0)	2
pH, lab	s.u.	6.5-8.5	7.99	8	8	8.18	8.15	7.72	8.35	8.18	8.09	8.15	8.2	8.33
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	ND(0.0010)	ND(0.001)	ND(0.001)	0.0030	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	-	-	-	0.009	0.005	-	-	0.0052	-	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-	-	340	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	1000	1100	-	-	1000	-	-	-	-
Total dissolved solids (TDS)	mg/L	-	-	-	-	566	566	-	-	718	-	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	1.26	2.62	3.14	2.00	2.01	1.94	2.06	1.85	1.14	1.92	1.26	0.87
Total phosphorus	mg/L	-	0.12	0.32	0.21	-	-	0.13	0.08	-	0.05	0.19	0.1	0.04
Total suspended solids (TSS)	mg/L	-	9	69	34	50.0	44.0	7	14	4.4	5	48	8	ND(3)
Turbidity	NTU	-	-	-	-	39.0 J	31.0 J	-	-	2.71	-	-	-	-
Un-ionized ammonia	mg/L	0.02	-	-	-	0.032	0.038	-	-	0.000323	-	-	-	-

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-4*	*SW-4*	*SW-4*	*'-45804-111212-MB-(*	*SW-45804-111212-MB-002*	*SW-4*	*SW-4*	*SW-4*	*/-45804-052313-TS-0*	*SW-4*	*SW-4*	*SW-4*	*SW-4*
Sample Date:			*9/1/2012*	*10/1/2012*	*11/1/2012*	*11/12/2012*	*11/12/2012*	*4/1/2013*	*5/1/2013*	*5/23/2013*	*5/23/2013*	*6/1/2013*	*7/1/2013*	*8/1/2013*	*9/1/2013*
			Original	*Original*	*Original*	*Original*	*Duplicate*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*	*Original*
Parameters:	***Units***	***PWQO***													
Field Parameters															
Conductivity, field	uS/cm	-	718	982	810	865	-	837	1080	1160	980	851	775	699	
Dissolved oxygen (DO), field	mg/L	-	8.1	11.1	11.9	18.17	-	5.4	13.1	8.09	8.9	-	11.1	13.3	
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-126	-	-	-	-	-	-	-	-	
pH, field	s.u.	6.5-8.5	-	-	-	9.09	9.09	-	-	9.99	-	-	-	-	
Temperature, field	Deg. C	-	-	-	-	8.1	8.1	-	-	20.8	-	-	-	-	
Turbidity, field	NTU	-	-	-	-	357	-	-	-	119	-	-	-	-	
Petroleum Products															
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	ND(100)	-	-	-	-	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	ND(100)	-	-	-	-	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	ND(100)	-	-	-	-	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	ND(250)	-	-	-	-	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	ND(250)	-	-	-	-	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	ND(250)	-	-	-	-	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	ND(250)	-	-	-	-	
Semi-Volatiles															
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	ND(0.028)	-	-	-	-	-	-	-	
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	
Anthracene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-	-	ND(0.020)	-	-	-	-	
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Benzo(a)pyrene	µg/L	-	-	-	-	ND(0.010)	ND(0.010)	-	-	ND(0.0050)	-	-	-	-	
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-	-	-	-	-	-	
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Fluorene	µg/L	0.2	-	-	-	ND(0.028)	ND(0.020)	-	-	-	-	-	-	-	
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Naphthalene	µg/L	7	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	
Phenanthrene	µg/L	0.03	-	-	-	0.021	ND(0.020)	-	-	-	-	-	-	-	
Pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	

Notes:

(a) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:				*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:			*SW-4*	*SW-4*	*/-45804-111313-TS-0*	*SW-45804-111313-TS-005*	*SW-45804-052814-MB-001*	*SW-45804-052814-MB-002*	*SW-45804-112614-TS-004*	*SW-45804-112614-TS-005*
Sample Date:				*11/1/2013*	*11/13/2013*	*11/13/2013*	*5/28/2014*	*5/28/2014*	*11/26/2014*	*11/26/2014*
				Original	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*
Parameters:	***Units***	***PWQO***								
Metals (Total)										
Arsenic	mg/L	0.005		ND(0.0001)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2		0.027	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002		ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-		ND(0.002)	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009		ND(0.005)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005		ND(0.002)	0.0016 J	0.0028 J	0.0011	0.0012	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3		-	0.360	0.557	0.226	0.239	0.180	0.173
Lead	mg/L	0.005		ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-		-	-	-	-	-	-	-
Manganese	mg/L	-		-	0.150	0.165	0.0571	0.0546	0.170	0.166
Mercury	mg/L	0.0002		ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum	mg/L	0.04		-	0.0078	0.0075	0.0124	0.0120	0.0055	0.0053
Nickel	mg/L	0.025		ND(0.01)	0.0022 J	0.0043 J	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc	mg/L	0.03		0.009	0.0072 J	0.0133 J	ND(0.0030)	ND(0.0030)	0.0046	0.0043
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-		-	160	170	145	143	176	162
Ammonia-N	mg/L	-		0.99	0.659	0.696	0.190	0.193	1.68	1.93
Biochemical oxygen demand (BOD)	mg/L	-		8	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-		-	3.3	3.9	ND(2.0)	ND(2.0)	4.7	4.1
Chemical oxygen demand (COD)	mg/L	-		11	70	72	39	30	43	41
Chloride	mg/L	-		-	51.4	50.5	84.2	84.5	47.2	46.9
Color (apparent)	TCU	-		-	43.5	46.6	32.0	32.4	35.0	38.5
Conductivity	umhos/cm	-		-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-		11.3	10.6	10.5	9.1	8.8	10.9	11.2
Escherichia coli	cfu/100mL	100		96	30	20	1 J	4 J	100	90
Fecal coliform bacteria	cfu/100mL	4800		-	50	50	3 J	7 J	110	100
Mineral oil and grease	mg/L	-		ND(1.0)	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82		0.2	ND(0.10)	0.14	ND(0.10)	ND(0.10)	0.10	ND(0.10)
Nitrite (as N)	mg/L	0.3		ND(0.1)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-		ND(1.0)	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-		ND(1.0)	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5		8.03	8.16	8.23	8.20	8.19	7.94	7.95
Phenol	mg/L	0.005		ND(0.001)	ND(0.0010)	0.0019	0.0014 J	0.0034 J	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.01		-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sulfate	mg/L	-		-	183	181	240	241	115	114
Total coliform bacteria	cfu/100mL	-		-	4000	5000	300 J	500 J	800	900
Total dissolved solids (TDS)	mg/L	-		-	488	486	636	632	406	404
Total kjeldahl nitrogen (TKN)	mg/L	-		2.69	2.26	1.71	1.25	1.01	2.94	2.29
Total phosphorus	mg/L	-		0.1	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-		10	8.8 J	14.0 J	4.4	4.0	9.2	8.8
Turbidity	NTU	-		-	6.76	10.0	3.15	2.76	9.18	8.17
Un-ionized ammonia	mg/L	0.02		-	0.000227	0.000240	0.0194	0.0198	[illegible]	[illegible]

TABLE 4.4

SURFACE WATER ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD.
OTTAWA, ONTARIO

Sample Location:			*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*	*SW4-09*
Sample ID:		*SW-4*	*SW-4*	*/-45804-111313-TS-0*	*SW-45804-111313-TS-005*	*SW-45804-052814-MB-001*	*SW-45804-052814-MB-002*	*SW-45804-112614-TS-004*	*SW-45804-112614-TS-005*
Sample Date:			*11/1/2013*	*11/13/2013*	*11/13/2013*	*5/28/2014*	*5/28/2014*	*11/26/2014*	*11/26/2014*
			Original	*Original*	*Duplicate*	*Original*	*Duplicate*	*Original*	*Duplicate*
Parameters:	***Units***	***PWQO***							
Field Parameters									
Conductivity, field	uS/cm	-	765	824	-	1120	-	319	-
Dissolved oxygen (DO), field	mg/L	-	12.5	14.72	-	1.53	-	16.58	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	5	-	16.5	-
pH, field	s.u.	6.5-8.5	-	6.36	6.36	8.34	-	8.34	8.34
Temperature, field	Deg C	-	-	4.9	4.9	20.8	-	3.16	3.2
Turbidity, field	NTU	-	-	7.6	-	7	-	-	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-
Acridine	µg/L	-	-	-	-	ND(4.0)	ND(4.0)	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.030)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	-	-	0.0089 J	0.0118 J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	ND(0.040)	ND(0.050)	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	ND(0.060)	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	ND(0.020)	-	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-	-
Fluorene	µg/L	0.2	-	-	-	ND(0.020)	ND(0.020)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-
Naphthalene	µg/L	7	-	-	-	ND(0.050)	ND(0.050)	-	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	ND(0.020)	-	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

TABLE 4.5

SW4-09 MONTHLY SAMPLING ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO

Location Name:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample Name:			Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-052814-MB-001	SW-45804-052814-MB-002	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-112614-TS-004	SW-45804-112614-TS-005
Sample Type Code:			Original	Original	Original	Original	Duplicate	Original	Original	Original	Original	Original	Original	Original	Duplicate
Sample Date:			04/14/2014	05/16/2014	05/21/2014	5/28/2014	5/28/2014	06/11/2014	06/12/2014	07/24/2014	08/25/2014	09/26/2014	10/31/2014	11/26/2014	11/26/2014
Sampler:			Orgaworld	Orgaworld	Orgaworld	CRA	CRA	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	CRA	CRA
Parameters:	**Units**	**PWQO**													
Metals															
Arsenic	mg/L	0.005	0.0006	ND(0.001)	-	ND(0.001)	ND(0.001)	ND(0.001)	-	ND(0.001)	ND(0.001)	-	ND(0.001)	ND(0.001)	ND(0.001)
Boron	mg/L	0.2	0.024	0.038	-	ND(0.050)	ND(0.050)	0.032	-	-	0.040	-	0.033	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.0009)	-	ND(0.0001)	ND(0.0001)	ND(0.0009)	-	ND(0.0009)	ND(0.0009)	-	ND(0.0009)	ND(0.0001)	ND(0.0001)
Chromium	mg/L	0.001	ND(0.002)	ND(0.0005)	-	ND(0.001)	ND(0.001)	0.00457	-	ND(0.0005)	ND(0.0005)	-	0.00107	ND(0.001)	ND(0.001)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.0005)	-	ND(0.0005)	ND(0.0005)	0.0035	-	ND(0.0005)	ND(0.0005)	-	ND(0.0005)	ND(0.0005)	ND(0.0005)
Copper	mg/L	0.005	0.004	0.0015	-	0.0011	0.0012	0.0043	-	ND(0.001)	ND(0.001)	-	ND(0.001)	ND(0.001)	ND(0.001)
Iron	mg/L	0.3	-	-	-	0.226	0.239	-	-	-	-	-	-	0.18	0.173
Lead	mg/L	0.005	ND(0.020)	ND(0.0005)	-	ND(0.001)	ND(0.001)	0.00108	-	ND(0.0005)	ND(0.0005)	-	ND(0.0005)	ND(0.001)	ND(0.001)
Manganese	mg/L	-	-	-	-	0.0571	0.0546	-	-	-	-	-	-	0.17	0.166
Mercury	mg/L	0.0002	ND(0.0002)	ND(0.0001)	-	ND(0.0001)	ND(0.0001)	-	-	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)	ND(0.0001)
Molybdenum	mg/L	0.04	-	-	-	0.0124	0.012	-	-	-	-	-	-	0.0055	0.0053
Nickel	mg/L	0.025	ND(0.010)	0.0	-	ND(0.002)	ND(0.002)	0.0042	-	0.0012	ND(0.001)	-	0.0016	ND(0.002)	ND(0.002)
Zinc	mg/L	0.03	0.022	0.0056	-	ND(0.003)	ND(0.003)	0.0143	-	-	0.0044	-	0.0062	0.0046	0.0043
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	145	143	-	-	-	-	-	-	176	162
Ammonia-N	mg/L	-	0.047	0.345	-	0.19	0.193	0.075	-	ND(0.050)	0.102	0.312	1.37	1.68	1.93
Biochemical oxygen demand (BOD)	mg/L	-	6	ND(2)	-	-	-	ND(2)	-	11.1	7.2	ND(2)	2.9	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(3)	ND(2)	-	ND(2)	ND(2)	ND(2)	-	10	5.8	ND(2)	2.8	4.7	4.1
Chemical oxygen demand (COD)	mg/L	-	-	28	-	39	30	36	-	47	50	36	41	43	41
Chloride	mg/L	-	-	-	-	84.2	84.5	-	-	-	-	-	-	47.2	46.9
Color (apparent)	TCU	-	-	-	-	32	32.4	-	-	-	-	-	-	35	38.5
Dissolved organic carbon (DOC)	mg/L	-	8.8	8.6	-	9.1	8.8	ND(10)	-	10.3	23.6	11.3	11	10.9	11.2
Escherichia coli	cfu/100mL	100	34	<2	2	1 J	4 J	-	240	36	32	20	30.2	100	90
Fecal coliform bacteria	cfu/100mL					3 J	7 J							110	100
Mineral oil and grease	mg/L	-	ND(1)	-	-	-	-	ND(1)	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	-	0.3	0.25	-	ND(0.1)	ND(0.1)	ND(0.1)	-	ND(1)	ND(1)	ND(0.1)	ND(0.1)	0.1	ND(0.1)
Nitrite (as N)	mg/L	-	ND(0.1)	ND(0.1)	-	ND(0.1)	ND(0.1)	ND(0.1)	-	ND(1)	ND(1)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	1.8	-	-	-	-	ND(2)	-	ND(2)	-	-	ND(2)	-	-
Oil and grease, animal and vegetable	mg/L	-	1.8	ND(2)	-	-	-	ND(2)	-	ND(2)	ND(1)	ND(1)	-	-	-
pH, lab	s.u.	5.5-8.5	7.92	8.03	-	8.2	8.19	9.22	-	8.22	8.84	8.43	8.08	7.94	7.95
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	-	0.0014 J	0.0034 J	ND(0.001)	-	0.0034	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.32	0.059	-	0.0556 J	0.0581 J	0.0063	-	0.229	0.0251	0.11	0.063	0.155	0.17
Sulfate	mg/L	-	-	-	-	240	241	-	-	-	-	-	-	115	114
Total coliform bacteria	cfu/100mL					300 J	500 J							800	900
Total dissolved solids (TDS)	mg/L	-	-	-	-	636	532	-	-	-	-	-	-	406	404
Total kjeldahl nitrogen (TKN)	mg/L	-	1.91	1.26	-	1.25	1.01	1.21	-	1.19	1.38	1.34	2.33	2.94	2.29
Total suspended solids (TSS)	mg/L	-	9	ND(2)	-	4.4	4	24.8	-	14	16.4	2.8	13.5	9.2	8.8
Turbidity	NTU	-	-	-	-	3.15	2.76	-	-	-	-	-	-	9.18	8.17
Un-ionized ammonia	mg/L	0.02	0.02	0.0148	-	0.0194	0.0198	0.035	-	ND(0.003)	0.035	0.0322	0.0459	0.0488	0.0537

TABLE 4.5

SW4-09 MONTHLY SAMPLING ANALYTICAL RESULTS
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO

Location Name:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample Name:			Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-052814-MB-001	SW-45804-052814-MB-002	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-112614-TS-004	SW-45804-112614-TS-005
Sample Type Code:			Original	Original	Original	Original	Duplicate	Original	Original	Original	Original	Original	Original	Original	Duplicate
Sample Date:			04/14/2014	05/16/2014	05/21/2014	5/28/2014	5/28/2014	06/11/2014	06/12/2014	07/24/2014	08/25/2014	09/26/2014	10/31/2014	11/26/2014	11/26/2014
Sampler:			Orgaworld	Orgaworld	Orgaworld	CRA	CRA	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	CRA	CRA
Parameters:	**Units**	**PWQO**													
Metals															
Field Parameters															
Conductivity, field	µS/cm	-	651	1040	-	1120	1120	871	-	715	619	620	600	319	319
Dissolved oxygen (DO), field	mg/L	-	8.55	8.74	-	1.53	1.53	10.8	-	10.6	9.54	9.56	11	16.58	16.58
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	5	5	-	-	-	-	-	-	16.5	16.5
pH, field	s.u.	5.5-8.5	-	-	-	8.34	8.34	-	-	-	5.24	-	-	8.34	8.34
Temperature, field	Deg C			18		20.8	20.8	19		20	25	18	13	3.16	3.16
Turbidity, field	NTU	-	-	-	-	7	7	-	-	-	-	-	-	-	-
Petroleum Products															
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	-	-	-	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	-	-	-	-	-	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L					ND(250)	ND(250)							ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(380)	ND(380)	-	-	-	-	-	-	ND(380)	ND(380)
Semi-Volatiles															
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	ND(4.0)	ND(4.0)	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008				ND(0.020)	ND(0.020)							ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	-	-	ND(0.0050)	ND(0.0050)	-	-	-	-	-	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	ND(0.040)	ND(0.050)	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	ND(0.060)	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	ND(0.050)	ND(0.050)	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-	-

Notes:

PWQO - Provincial Water Quality Objectives
Exceedance of the PWQO
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.

Appendix A

Environmental Compliance Approval (No. 7251 8GKRPD)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2-year	5-year	25-year	100-year
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate*.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate*.

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any

CONTENT COPY OF ORIGINAL

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director,* in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works,* other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate,* and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works,* a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works,* carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWMPond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner*shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate.*

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works,*the *Owner*shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works*prepared in accordance with Condition (8) is submitted to the *District Manager*for comments and concurrance;

(2) Upon commencement of operation of the *Works,*the *Owner*shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works*and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;* and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works.* Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall keep the **SWMPond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWMPond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWMPond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWMPond.**

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner* shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner* shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works* to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works,* the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;* and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works.* Upon request, the *Owner* shall make the manual available to *Ministry* staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,* the O*wner* shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit;

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works,* the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works,* the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works,* on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry ofthe Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Appendix B

Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

□51 □□□y □r□□, □ a□□r□□, □nt□ar□, □anada □2□ 1□2
□□□□□□n□□ □51□□88□0510 □a□□ □51□□88□0525
□□□□□□□□rd□□□

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Appendix C

Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Oxford Street, Waterloo, Ontario, Canada N2L 1C2
Telephone: 519 884 0510 Fax: 519 884 0525
www.craworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

REGISTERED COMPANY ISO 9001 ENVIRONMENTAL MANAGEMENT

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

	Field Test Parameters			Laboratory Test Parameters							
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3/4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	Collection Method
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4 [8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

o Samples are collected annually (typically spring)

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry*[1]	*SW General Chemistry*[2]	*Metals*[3/4]	*Bacteriological Components*[5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix D

Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.06 93.00 91.89						
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug	SS1	X	35		0.0
1	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS2	X	27		0.0
2			Well Screen					
3	END OF BOREHOLE @ 2.97m BGS	88.92						
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

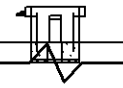
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17					
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40	WELL DETAILS Screened interval: 92.54 to 90.40m 0.63 to 2.77m BGS Length: 2.13m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.02 to 92.71m 0.15 to 0.46m BGS Material: Bentonite Sand Pack: 92.71 to 90.40m 0.46 to 2.77m BGS Material: Silica Sand			
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

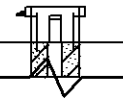
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1
2
3
4
5
6
7
8
9
10
11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug				
	BEDROCK - fractured limestone						
1							
2							
3							
4							
5							
6							
7							
8							
9			Filter Sand				
10			Well Screen				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
12							
13							
14							
15							
16							
17							
	END OF BOREHOLE @ 17.37m BGS	86.18	WELL DETAILS				
18	Borehole advanced with a Tamroc D-1 Paultera 900		Screened interval: 101.42 to 86.18m; 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m; 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m; 1.22 to 17.37m BGS Material: Silica Sand				
19							
20							
21							
22							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
1	- becoming very dense at 1.68m BGS	93.28				
2	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth		Filter Sand Well Screen	RC1	93	63
3	END OF BOREHOLE @ 2.84m BGS	92.22				

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-QT003.GPJ CRA_CORP.GDT 3/28/12

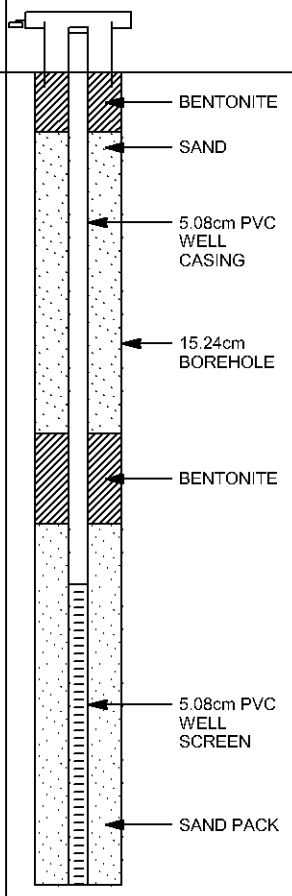
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING 97.54 TOP OF RISER 97.45 GROUND SURFACE 96.58	
0	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist	
1.0	- coarse sand, wood pieces, roots at 1.12m BGS	
1.5		
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS	
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29
3.0		
3.5	- REFUSAL at 3.50m BGS	93.07
	BEDROCK	
4.0	END OF BOREHOLE @ 4.11m BGS	92.46
4.5		
5.0		
5.5		
6.0		
6.5		

MONITORING WELL



WELL DETAILS
Screened interval:
93.99 to 92.46m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack:
94.29 to 92.46m
2.29 to 4.11m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		33		0.
2SS		33	11	10.0
3SS		54	86	0.1
4SS		67	55	0.2
5SS		8		0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug	SS1		54	13
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS2		83	74
2			Filter Sand Well Screen	SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4							
5							
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
93.12 to 91.59m
1.24 to 2.77m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.06 to 93.42m
0.30 to 0.94m BGS
Material: Bentonite
Sand Pack:
93.42 to 91.59m
0.94 to 2.77m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	94.57 94.50 93.36						
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay		BENTONITE SAND 5.08cm PVC WELL CASING 15.24cm BOREHOLE	1SS		54	14	0.0
0.5								
1.0				2SS		54	12	0.1
1.5	- red silty sand (or covered brick) at 1.68m BGS							
2.0	- spoon wet at 1.83m BGS			3SS		29	13	0.0
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92	BENTONITE	4SS		71	25	0.1
3.0								
3.5	- increasing clay, becoming wet at 3.51m BGS		5.08cm PVC WELL SCREEN	5SS		25	8	0.0
4.0	- cobble, rootmat, black at 4.24m BGS		SAND PACK	6SS		29	6	0.0
4.5	END OF BOREHOLE @ 4.42m BGS	88.94						
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

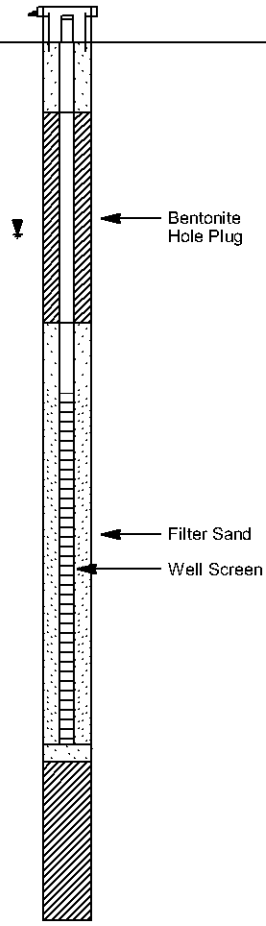
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF RISER	94.98
	GROUND SURFACE	93.83
0	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist	
	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07
4.6	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	89.26
6.1	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.89
7.62	END OF BOREHOLE @ 7.62m BGS	86.21

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
SS1		83	43	13.1
SS2		86		17.1
SS3		75	29	21.3
SS4		33	16	23.9
SS5		17	7	2.3
SS6		100	20	0.0
SS7		83	26	0.0
SS8		57		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.82 93.81						
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist							
1				SS1		50	38	0.0
			Bentonite Hole Plug	SS2		35		4.6
2								
				SS3		50	13	0.0
3				SS4		25	15	4.3
	- becoming wet at 3.65m BGS							
4				SS5		100		
			Filter Sand					
			Well Screen					
5				SS6		42	54	0.0
	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32						
6				SS7		50	15	0.0
				SS8		100		1.5
7	END OF BOREHOLE @ 6.98m BGS	86.83		SS9		100		0.0
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.76 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
5	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	83.96 82.94						
0	TOPSOIL	82.79						
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft		Bentonite Hole Plug	SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand Well Screen	SS2		100	3	0.0
3				SS3		100		0.0
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	84.00 83.10						
0	TOPSOIL	82.95						
	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS		Bentonite Hole Plug	SS1		83	15	0.0
1								
	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS	81.42	Filter Sand Well Screen	SS2		50	25	0.0
2								
	END OF BOREHOLE @ 2.90m BGS	80.20		SS3		100	27	0.0
3								
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS3)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 96.23 TOP OF RISER 96.15 GROUND SURFACE 95.67							
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE					
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND	1SS		58	7	0.1
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0				3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.54 to 92.01m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.15 to 93.84m
1.52 to 1.83m BGS
Material: BENTONITE
Sand Pack:
93.84 to 92.01m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 93.90 TOP OF RISER 93.79 GROUND SURFACE 92.99							
0.5	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick)		BENTONITE SAND	1SS		25		0.0
1.0	- increasing sand at 0.66m BGS		5.08cm PVC WELL CASING	2SS		75	24	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0	- 0.43m coarse beige sand at 1.98m BGS			3SS		67	19	0.1
2.5	- wet at 2.29m BGS			4SS		83	24	0.1
3.0	- ~2.54cm root mat at 2.74m BGS		5.08cm PVC WELL SCREEN					
3.5	CL/ML-SILTY CLAY, soft, grey, wet	90.09	SAND PACK	5SS		63	4	0.2
4.0	END OF BOREHOLE @ 3.66m BGS	89.33						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.46m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.16 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.42 93.33 92.38						
0.5	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist		BENTONITE 5.08cm PVC WELL CASING SAND	1SS		29	6	0.1
1.0			BENTONITE	2SS		38	16	0.1
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29						
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01	15.24cm BOREHOLE					
2.0				3SS		83	26	0.0
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS		5.08cm PVC WELL SCREEN	4SS		50		0.2
3.0	- REFUSAL at 3.05m BGS	89.33	SAND PACK					
	END OF BOREHOLE @ 3.05m BGS			5SS		4		0.1

WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

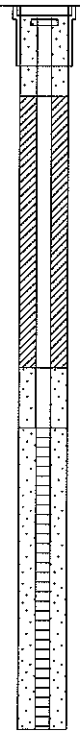
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.63					
	TOP OF RISER	94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0							
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							



WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0			WELL DETAILS Screened interval: 92.92 to 91.40m m AMSL 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.23 to 94.60m m AMSL 1.83 to 0.46m BGS Material: Bentonite Sand Pack: 93.23 to 91.40m m AMSL 1.83 to 3.66m BGS Material: No. 3 Silica Sand				
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

Appendix E

Water Well Logs

OCT 07 '93 08:09 BEAVER ROAD BUILDERS

#1

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
Ottawa Carleton	Gloucester	6	26

OWNER'S NAME	ADDRESS	DATE COMPLETED
Beaver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DAY 19 MO 4 YR 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
Grey	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	
☐ FRESH ☐ SALTY	☐ SULPHUR ☐ MINERAL ☐ GAS
☐ FRESH ☐ SALTY	☐ SULPHUR ☐ MINERAL ☐ GAS
☐ FRESH ☐ SALTY	☐ SULPHUR ☐ MINERAL ☐ GAS
☐ FRESH ☐ SALTY	☐ SULPHUR ☐ MINERAL ☐ GAS
☐ FRESH ☐ SALTY	☐ SULPHUR ☐ MINERAL ☐ GAS

20 NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH - FEET FROM	TO
6 1/4	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC	.188	0	31
6 1/8	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		31	75
6	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		75	135

SCREEN

SLOT NO. (PLUG NO.)	DIAMETER (INCHES)	LENGTH (FEET)
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN (FEET)	

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)
31	0	Grouted - Cement (18)

WELL TEST

TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	15-20 gpm	1 hours minutes

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☒ RECOVERY			
		10 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
31 feet	130 feet	40 feet	32	31 feet	31

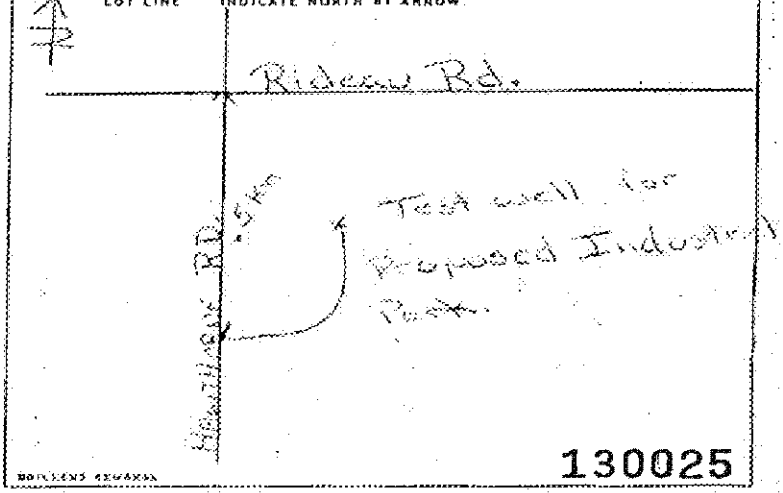
IF FLOWING GIVE RATE	WHERE WATER SEE AT	WATER AT END OF TEST
gpm	feet	☐ CLEAR ☐ CLOUDY

DURING PUMP TEST	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	125 feet	5 gpm

FINAL STATUS OF WELL	☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED ☐ DEWATERING
WATER USE	☒ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED
METHOD OF CONSTRUCTION	☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☒ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



BOREHOLE SKETCH

130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1558
P.O. Box 490 Stittsville, Ontario K2S 1A5	
NAME OF WELL TECHNICIAN S. Miller	WELL TECHNICIAN'S LICENCE NUMBER TC087
SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE DAY 20 MO 7 YR 93

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/86) FORM 9

000513

Ministry of the Environment

Ontario

WATER WELL RECORD

The Ontario Water Resources Act

TEST WELL TW-2

County or District: Ottawa Carleton

Municipality: Gloucester

Lot: 6 Concession: 26

Name of Owner: Beaver Road Builders

Address: P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2

Date Completed: 16 / 8 / 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (See Instructions)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

Water found at: NOT TESTED

CASING & OPEN HOLE RECORD

Inside Diameter	Material	Weight	Depth From	Depth To
6 1/4	Steel	.188	0	39
5 15/16	Open Hole		39	100

SCREEN

PLUGGING & SEALING RECORD

Depth Set at From	To	Material and Type	Volume
37.5	0	Cement - Grouted	

TEST OF WELL YIELD

Pumping Test Method: Pump

Date: 20 / 1

Static Level	Water Level End of Pumping	Pumping Rate	Duration of Pumping	Recommended Pumping Rate	Water Level End of Pumping
7'6"	14'6"	13'11"	14	14'4"	14'6"

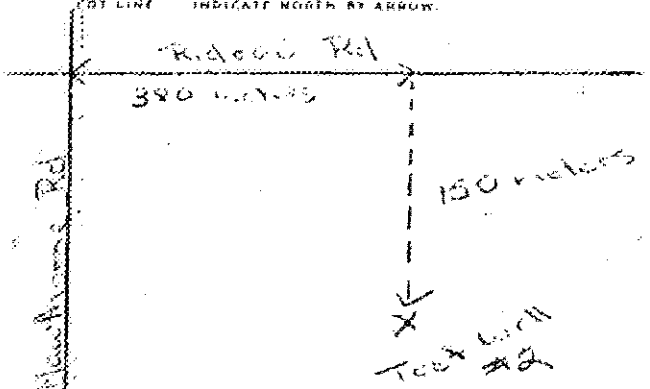
Recommended Pump Depth: 50 ft

Pumping Rate: 5 gpm

Water Clear and Sand Free at End of Pumping

LOCATION OF WELL

Diagram Below Show Distances of Well from Road and Lot Line. Indicate North by Arrow.



Well Tag No.: 135946

Final Status of Well: Water Supply

Water Use: Domestic

Method of Construction: Air Percussion

Name of Well Contractor: Capital Water Supply Ltd.

Well Contractor's Licence Number: 1558

Well Contractor's Address: 490 Bristeville, Ontario K2S 1A6

Name of Well Technician: Miller/T. Harrison

Well Technician's Licence Number: T0097/T2251

Date: 12 / 8 / 93

OFFICE USE ONLY

WATER'S COPY

FORM NO. 0506 (11/87) FORM 9

000514

of the Environment

Ontario

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton — Gloucester — 6 — 26

OWNER (SURNAME FIRST): Beaver Road Builders

ADDRESS: P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2

DATE COMPLETED: Oct 16 / 8 / 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Grey & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	Steel	.188	0	22
6 1/16	Open hole		22	100

SCREEN

PLUGGING & SEALING RECORD

DIAM.	FROM	TO	MATERIAL AND TYPE
20'8"	0		Grouted cement (3)

PUMP ☒ BAILER ☐

STATIC LEVEL	WATER LEVEL END OF PUMPING	PUMPING RATE	DURATION OF PUMPING
23'6"	24'4"	15-20	1 hours

WATER LEVELS DURING PUMPING		RECOVERY	
1st reading	2nd reading	1st reading	2nd reading
23'6"	24	24'4"	24'4"

PUMP INTAKE SET AT: 40 ft

ACCESSORY PUMP SETTING: 50 ft

DISPOSAL OF FIELD WATER: ☒ DRAINAGE

CHLORINATION: 5 ppm

☐ SHALLOW ☒ DEEP

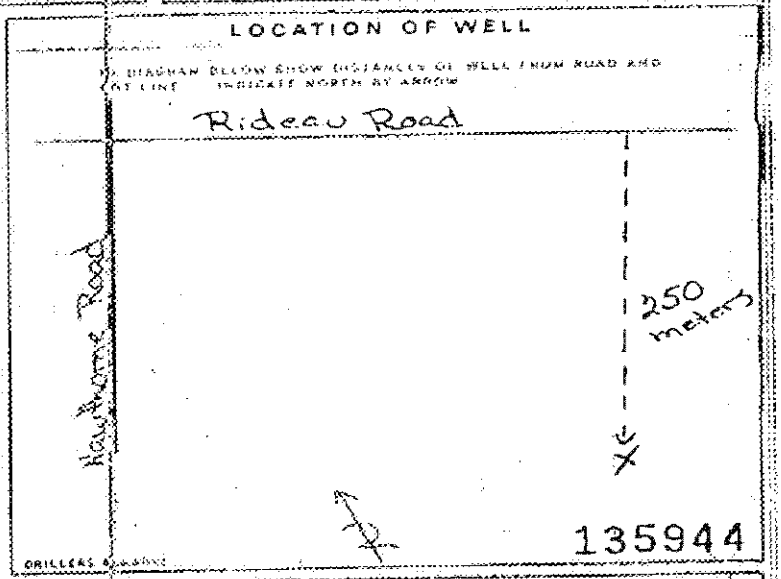
FINAL STATUS OF WELL
- ☒ WATER SUPPLY
- ☐ OBSERVATION WELL
- ☐ TEST HOLE
- ☐ RECHARGE WELL
- ☐ ABANDONED, INSUFFICIENT SUPPLY
- ☐ ABANDONED, POOR QUALITY
- ☐ UNFINISHED
- ☐ DEWATERING

WATER USE
- ☒ DOMESTIC
- ☐ STOCK
- ☐ IRRIGATION
- ☐ INDUSTRIAL
- ☐ OTHER
- ☐ COMMERCIAL
- ☐ MUNICIPAL
- ☐ PUBLIC SUPPLY
- ☐ COOLING OR AIR CONDITIONING
- ☐ NOT USED

METHOD OF CONSTRUCTION
- ☐ CABLE TOOL
- ☐ ROTARY (CONVENTIONAL)
- ☐ ROTARY (REVERSE)
- ☐ ROTARY (AIR)
- ☒ AIR PERCUSSION
- ☐ BORING
- ☐ DIAMOND
- ☐ JETTING
- ☐ DRIVING
- ☐ DIGGING
- ☐ OTHER

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



DRILLER'S REMARKS

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd.

WELL CONTRACTOR'S LICENCE NUMBER: 1558

ADDRESS: Box 490 Stittsville, Ontario K2S 1A6

NAME OF WELL TECHNICIAN: S. Miller/T. Harrison

WELL TECHNICIAN'S LICENCE NUMBER: T0057/T2251

SIGNATURE OF TECHNICIAN/CONTRACTOR

DATE OF COMPLETION: Oct 18 / 8 / 93

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO. 0506 (1) - 86

000515

Ontario Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068332

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/0 651 Colby Drive	Waterloo	Ontario	N2V1C2	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[ ] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	13.10

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth	Kind of Water	
26.51 (m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	
Water found at Depth (m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	
Water found at Depth (m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

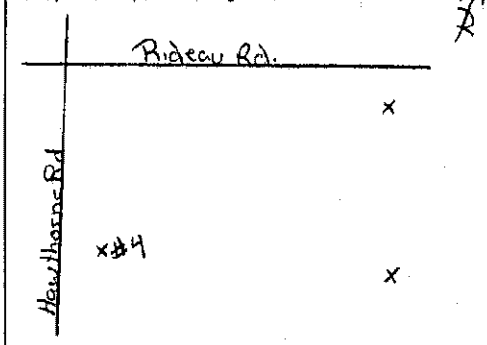
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15			
1	15.97	1	16.76	
2	16.98	2	15.74	
3	17.30	3	15.20	
4	17.43	4	15.	
5	17.50	5	14.91	
10	17.88	10	14.71	
15		15		
20	18.16	20	14.54	
25	18.23	25	14.51	
30	18.26	30	14.47	
40	18.34	40	14.41	
50	18.39	50	14.38	
60	18.41	60	14.35	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2009/11/18

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only

Audit No: Z84411

Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

000516

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068335 **A 068336**

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457043	5016848		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
27.12	[ ] Fresh [X] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	12.80	15.7
12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

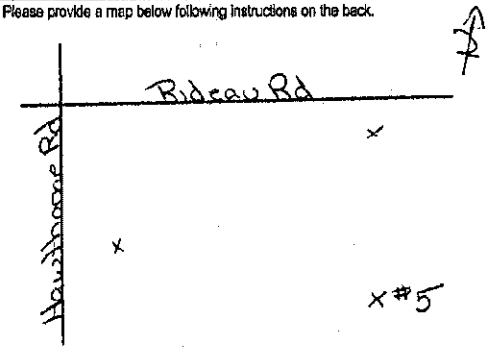
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

Drew Down Time (min)	Drew Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	6.85		
1	8.03	1	8.97
2	8.35	2	8.69
3	8.60	3	8.55
4	8.76	4	8.46
5	8.88	5	8.40
10	9.20	10	8.23
15		15	
20	9.49	20	8.04
25	9.62	25	7.99
30	9.68	30	7.93
40	9.82	40	7.84
50	9.91	50	7.77
60	9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361766	Miller, Stephon

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008 10 02

Well owner's Information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [X] No	2008 10 02	Audit No. Z 844[illegible]
	Date Work Completed: 2008 09 26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

Ontario | Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 0600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457102	5017600		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☒ Rotary (Reverse) Air ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Industrial ☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From (m/ft)	Depth To (m/ft)	Diameter (cm/in)
☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			
☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	0	17.67	15.86
☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

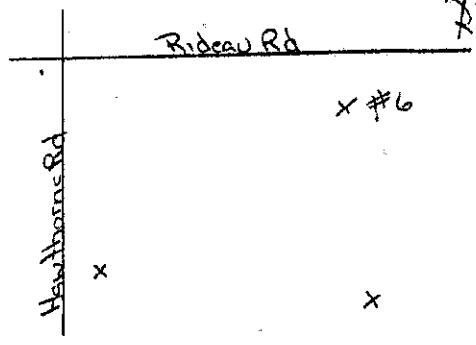
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	3.18		
1	3.24	1	
2	4.23	2	
3	5.19	3	
4		4	
5	6.53	5	
10	8.06	10	
15	9.99	15	22.80
20	11.53	20	19.40
25	12.92	25	17.12
30	14.08	30	15.13
40		40	11.82
50		50	9.47
60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361765	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008/09/10

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	2008/09/16	A068344 Received

Date Work Completed: 2008/09/26

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
0	FILL, sand and gravel, packed, brown		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
	SANDSTONE, very hard, grey and white	90.94					
30	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
0	LIMESTONE, grey, broken rock						
2	SANDSTONE, very hard, grey and white	92.94	18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
30	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix F

QA/QC Assessment Memorandum
&
Laboratory Analytical Reports

CONESTOGA-ROVERS & ASSOCIATES

17□ □□□nnad□ □□ad, □u□□ □□00
□□a□a, □n□ar□, □anada □2□ 7J□
□□□□□□n□□ □□1□□727□0510 □a□□ □□1□□727□070□
□□□□□□□□□rd□□□□

MEMORANDUM

TO:	Ron Cherkewski, Joseph Drader, Monica Radulescu	REF. NO.:	045804-58
FROM:	Airesse MacPhee/bar/5	DATE:	January 27, 2014

RE: Analytical Data Verification
5123 Hawthorne Road – Water Analysis
Orgaworld Canada Ltd
Ottawa, Ontario
February - November 2013

1.0 Introduction

The following document details an analytical data verification of results for groundwater and surface water samples collected from the 5123 Hawthorne Road site in Ottawa, Ontario from February to November 2013. The samples were submitted to ALS Canada Ltd. (ALS) located in Waterloo, Ontario. A sample collection and analysis summary is presented in Table 1. A summary of the analytical methodology is presented in Table 2.

Standard Conestoga-Rovers & Associates (CRA) report deliverables were submitted by the laboratory. The final results and supporting quality assurance/quality control (QA/QC) data were assessed. Evaluation of the data was based on information obtained from the chain of custody forms, finished report forms, method blank data, duplicate data, recovery data from surrogate spikes, laboratory control samples (LCS), matrix spikes (MS), and field QC samples.

The QA/QC criteria by which these data have been assessed are outlined in the analytical methods referenced in Table 2 and applicable guidance from the documents entitled:

i) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", United States Environmental Protection Agency (USEPA) 540/R-99-008, October 1999

ii) "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", USEPA 540/R-94-013, February 1994

iii) "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act", Laboratory Services Branch, Ministry of the Environment. March 9, 2004, amended as of July 1, 2011.

Items i) and ii) will subsequently be referred to as the "Guidelines" in this Memorandum. Item iii) will subsequently be referred to as the "O. Reg. 153 Analytical Protocols".

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

2.0 Sample Holding Time and Preservation

The sample holding time criteria for the analyses are summarized in Table 2. Sample chain of custody documents and analytical reports were used to determine sample holding times. The samples summarized in Table 3 were qualified due to sample holding time period exceedances. The remaining samples were prepared and/or analyzed within the specified holding time periods.

Most samples were properly preserved, delivered on ice, and stored by the laboratory at the required temperature (<10°C). Samples associated with lab report # L1275259 and L1391837 arrived at the laboratory on the day of sampling and had not had time to achieve a temperature of <10°C. This is acceptable since the cooling process had been initiated.

3.0 Laboratory Method Blank Analyses

Method blanks are prepared from a purified matrix and analyzed with investigative samples to determine the existence and magnitude of sample contamination introduced during the analytical procedures.

For this study, laboratory method blanks were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

All method blank results were non-detect, indicating that laboratory contamination was not a factor for this investigation.

4.0 Surrogate Spike Recoveries

In accordance with the methods employed, all samples, blanks, and QC samples analyzed for organics are spiked with surrogate compounds prior to sample extraction and/or analysis. Surrogate recoveries provide a means to evaluate the effects of laboratory performance on individual sample matrices.

All samples submitted for semi-volatile compound (SVOC) and petroleum hydrocarbon (PHC) determinations were spiked with the appropriate number of surrogate compounds prior to sample analysis.

Surrogate recoveries were assessed against laboratory control limits. All surrogate recoveries met the above criteria.

5.0 Laboratory Control Sample (LCS) Analyses

LCS are prepared and analyzed as samples to assess the analytical efficiencies of the methods employed, independent of sample matrix effects.

For this study, LCS were analyzed at a minimum frequency of 1 per 20 investigative samples and/or 1 per analytical batch.

Organic Analyses

The LCS contained all compounds of interest. All LCS recoveries were within the laboratory control limits, demonstrating acceptable analytical accuracy.

Inorganic Analyses

The LCS contained all analytes of interest. LCS recoveries were assessed per the "Guidelines". All LCS recoveries were within the control limits, demonstrating acceptable analytical accuracy.

6.0 Matrix Spike (MS) Analyses

To evaluate the effects of sample matrices on the extraction or digestion process, measurement procedures, and accuracy of a particular analysis, samples are spiked with a known concentration of the analyte of concern and analyzed as MS samples. If the original sample concentration is significantly greater than the spike concentration, the recovery is not assessed.

Organic Analyses

The MS samples were spiked with all compounds of interest. All percent recoveries were within the laboratory control limits, demonstrating acceptable analytical accuracy.

Inorganic Analyses

The MS samples were spiked with the analytes of interest, and the results were evaluated using the "Guidelines". All percent recoveries were within the control limits, demonstrating acceptable analytical accuracy.

7.0 Duplicate Sample Analyses

Analytical precision is evaluated based on the analysis of laboratory duplicate samples. For this study, duplicate samples were prepared and analyzed by the laboratory. The laboratory performed additional site-specific duplicate analyses internally. The duplicate results were evaluated per the "Guidelines".

Most duplicate analyses performed were acceptable, demonstrating acceptable analytical precision. The fecal coliform results for sample GW-45804-03052013-TS-008 and its duplicate exhibited variability and associated sample results have been qualified as estimated (see Table 4).

8.0 Ion Abundance Ratio

Naphthalene and benzo(a)pyrene results were flagged by the laboratory because the ion abundance ratios did not meet acceptance criteria. The associated sample results have been qualified as estimated (see Table 5).

9.0 Field QA/QC Samples

The field QA/QC consisted of four field blank samples and six field duplicate sample sets.

Field Blank Sample Analysis

To evaluate contamination sample collection, transportation, storage, and analytical activities, four field blanks were collected and submitted to the laboratory for analyses.

Most sample concentrations were non-detect for the compounds of interest. Low level concentrations of total Kjeldahl nitrogen (TKN), dissolved organic carbon (DOC), PHCs, color, turbidity and phenols were detected in groundwater field blanks and the results with concentrations similar to that reported in the associated field blanks were qualified as not detected at the associated reporting limit (see Table 6). Associated sample concentrations that were greater than five times the blank values were not qualified.

Field Duplicate Sample Analysis

To assess the analytical and sampling protocol precision, six field duplicate sample sets were collected and submitted "blind" to the laboratory, as specified in Table 1. The RPDs associated with these duplicate samples must be less than 50 percent for water samples. If the reported concentration in either the investigative sample or its duplicate is less than five times the reporting limit (RL), the evaluation criteria is one times the RL value for water samples.

Most duplicate analyses performed were acceptable, demonstrating acceptable analytical precision. Results which exhibited variability have been qualified as estimated (See Table 7).

10.0 Conclusion

Based on the assessment detailed in the foregoing, the data are acceptable with the specific qualifications noted herein.

TABLE 1

SAMPLE COLLECTION AND ANALYSIS SUMMARY
5122 HAWTHORNE ROAD – WATER ANALYSIS
ORGANOR LOCANDA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	Sample Identification	Location	Matrix	Collection Date (mm/dd/yyyy)	Analysis/Parameters																														Comments
					Petroleum Hydrocarbons (F1-F4)	Semi-Volatile Organic Compounds	pH	Color	Turbidity	Chemical Oxygen Demand	Metals	Mercury	Alkalinity	Ammonia-Nitrogen	Un-ionized Ammonia	Total Kjeldahl Nitrogen	Total Phosphorus	Chloride	Sulphate	Nitrate	Nitrite	Biological Oxygen Demand	Dissolved Organic Carbon	Phenol	Dissolved Phosphorus	Total Suspended Solids	Total Dissolved Solids	Escherichia coli	Fecal Coliform	Total Coliform	Conductivity		
L1273187	GW-452804-022713-TS-001	MW103-09	Groundwater	02/27/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1273187	GW-452804-022713-TS-002	MW5-09	Groundwater	02/27/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1273187	GW-452804-022713-TS-003	MW103-09	Groundwater	02/27/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1273187	GW-452804-022713-TS-004	MW5-09	Groundwater	02/27/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of GW-452804-022713-TS-002
L1273187	GW-452804-022713-TS-005	-	Water	02/27/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Blank
L1275259	GW-452804-030520015-TS-006	MW101-12	Groundwater	03/05/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1275259	GW-452804-030520015-TS-007	MW104-12	Groundwater	03/05/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1275259	GW-452804-030520015-TS-008	MW105-12	Groundwater	03/05/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-004	MW1-08	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-005	TW-7	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-006	MW103-09	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-007	MW4-08	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-008	MW3-08	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-009	MW4-09	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-013	MW5-09	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305512	GW-452804-052213-TS-014	MW103-09	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of GW-452804-052213-TS-013
L1305512	GW-452804-052213-TS-015	MW102-09	Groundwater	05/22/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305877	W-452804-052312-TS-105	ROCKFACE	Water	05/23/2013	-	-	X	-	-	-	-	-	-	X	X	X	X	-	X	-	-	-	-	-	-	X	-	-	-	-	X		
L1305880	SW-452804-052315-TS-001	SW5-09	Surface Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305880	SW-452804-052315-TS-002	SW2-09	Surface Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305880	SW-452804-052315-TS-003	SW2-09	Surface Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of SW-452804-052313-TS-002
L1305880	SW-452804-052315-TS-004	SW1-09	Surface Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305880	SW-452804-052315-TS-005	SW4-09	Surface Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-001	MW2-08	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-002	MW104-12	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-003	-	Water	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Blank
L1305889	GW-452804-052313-TS-010	MW105-12	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-011	TW-8	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-012	TW-6	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1305889	GW-452804-052313-TS-016	MW101-12	Groundwater	05/23/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343807	GW-452804-080713-TS-001	-	Water	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Blank
L1343807	GW-452804-080713-TS-002	MW104-12	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343825	GW-452804-080713-TS-003	MW105-12	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343825	GW-452804-080713-TS-004	MW5-09	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343825	GW-452804-080713-TS-005	MW102-09	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343825	GW-452804-080713-TS-006	MW102-09	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of GW-452804-080713-TS-005
L1343825	GW-452804-080713-TS-007	MW101-12	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1343825	GW-452804-080713-TS-008	MW103-09	Groundwater	08/07/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361311	SW-452804-111313-TS-001	SW4-09	Surface Water	11/13/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361311	SW-452804-111313-TS-002	SW5-09	Surface Water	11/13/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361311	SW-452804-111313-TS-003	SW2-09	Surface Water	11/13/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361311	SW-452804-111313-TS-004	SW1-09	Surface Water	11/13/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361311	SW-452804-111313-TS-005	SW4-09	Surface Water	11/13/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of SW-452804-111313-TS-001
L1361837	GW-452804-111413-TS-001	MW104-12	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-002	MW105-12	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-003	MW105-12	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Duplicate of GW-452804-111413-TS-002
L1361837	GW-452804-111413-TS-004	MW101-12	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-005	TW-8	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-006	MW2-08	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-007	TW-7	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-008	MW103-09	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-009	MW1-08	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-010	MW102-09	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-011	MW5-09	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-012	MW4-08	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-013	MW4-09	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-014	MW3-08	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-015	TW-6	Groundwater	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	
L1361837	GW-452804-111413-TS-016	-	Water	11/14/2013	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	Field Blank

Notes:

"-" - Not Applicable

TABLE 2

SUMMARY OF ANALYTICAL METHODS
AND HOLDING TIME CRITERIA
5123 HAWTHORNE ROAD – WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Parameters	***Methodology*** [1]	***Holding Time Criteria*** [2] Water
Alkalinity	SM 2320 B	14 days
Phenol	SM 5530 D	28 days
Chloride	SM 4110 B	28 days
Sulphate	SM 4110 B	30 days
Nitrite, Nitrate	SM 4110 B	7 days
Total Kjeldahl Nitrogen	SM 4500 N	28 days
Metals	SW-846 6020	60 days
Mercury	SW-846 7470	28 days
Dissolved Organic Carbon	SM 5310 C	28 days
Hardness	SM 2340 B	60 days
Ammonia-Nitrogen	SM 4500-NH3 G	28 days
Un-ionized Ammonia	Calculation	NA
Biological Oxygen Demand	SM 5210 B	4 days [3]
Total Phosphorous	SM 4500 C	28 days
Dissolved Phosphorous	SM 4500 C	28 days
Total Suspended Solids	SM 2540 B	7 days
Total Dissolved Solids	SM 2540 C	7 days
pH	SM 4500 H	28 days
Turbidity	SM 2130B	2 days
Color	SM 2120B	2 days
Chemical Oxygen Demand	SM 5220 B	28 days
Petroleum Hydrocarbons (F1)	CCME CWS Tier 1	14 days
Petroleum Hydrocarbons (F2-F4)	CCME CWS Tier 1	40 days
Semi-Volatile Organic Compounds	SW-846 8270	14 days
Escherichia *coli*	MOE E3407	2 days
Fecal Coliforms	SM 9222D	2 days
Total Coliform	SM 9222D	2 days
Conductivity	EPA 9050A	28 days

Notes:

(1) Methods referenced from the following:
SW-846 - "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", EPA SW-846,
SM - Standard Methods for the Examination of Water and Wastewater", 21st Ed., APHA,
EPA - "Methods for Chemical Analysis of Water and Wastes", EPA 600/4 79 020, Revised March 1983
MOE - Ministry of the Environment
CCME - Canadian Council of Ministers of the Environment

(2) Holding times differing from those defined in the indicated methodology were obtained from the O.Reg 153 Analytical Protocols

(3) Analysis needs to begin within 4 days

NA - Not Applicable

TABLE 3

QUALIFIED SAMPLE RESULTS DUE TO HOLDING TIME EXCEEDANCE
5123 HAWTHORNE ROAD – WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	*Parameter*	*Sample ID*	*Holding Time (days)*	*Holding Time Criteria (days)*	*Analyte*	*Qualified Sample Results*	*Units*
L1305888	GenChem	SW-45804-052313-TS-001	3	2	Color	53.8 J	TCU
L1305888	GenChem	SW-45804-052313-TS-002	3	2	Color	58.5 J	TCU
L1305888	GenChem	SW-45804-052313-TS-003	3	2	Color	59.4 J	TCU
L1305888	GenChem	SW-45804-052313-TS-004	3	2	Color	9.4 J	TCU
L1305888	GenChem	SW-45804-052313-TS-005	3	2	Color	28.2 J	TCU
L1305895	GenChem	GW-45804-052313-TS-001	3	2	Color	24.3 J	TCU
L1305895	GenChem	GW-45804-052313-TS-002	3	2	Color	173 J	TCU
L1305895	GenChem	GW-45804-052313-TS-003	3	2	Color	2.9 J	TCU
L1305895	GenChem	GW-45804-052313-TS-010	3	2	Color	58.9 J	TCU
L1305895	GenChem	GW-45804-052313-TS-011	3	2	Color	30.1 J	TCU
L1305895	GenChem	GW-45804-052313-TS-012	3	2	Color	35.0 J	TCU
L1305895	GenChem	GW-45804-052313-TS-016	3	2	Color	29.8 J	TCU

Notes:

J - Estimated concentration
TCU - Total Color Units
GenChem - General Chemistry

QUALIFIED SAMPLE DATA DUE TO OUTLYING LABORATORY DUPLICATE RESULTS
5123 HAWTHORNE ROAD – WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	*Parameter*	*Sample ID*	*Analyte*	*RPD/Diff*	*Associated Sample IDs*	*Qualified Result*	*Units*
L1275259	Micro	GW-45804-03052013-TS-008	Fecal coliform bacteria	67%	GW-45804-03052013-TS-006	2 UJ	CFU
					GW-45804-03052013-TS-007	0 UJ	CFU
					GW-45804-03052013-TS-008	50 J	CFU

Notes:

RPD - Relative percent difference
Diff - Difference
RL - Reporting Limit
J - Estimated concentration
UJ - Non-detect, Estimated Reporting Limit
0 - No colonies detected
Micro - Microbiological
CFU - Colony Forming Units

TABLE 5
QUALIFIED SAMPLE RESULTS DUE TO OUTLYING ION ABUNDANCE RATIOS
5123 HAWTHORNE ROAD – WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	*Parameter*	*Associated Sample ID*	*Mass Ion*	*Ratio Criteria (%)*	*Actual Ratio (%)*	*Tune Date (mm/dd/yyyy)*	*Tune Time*	*Tune Filename*	*Analyte*	*Qualified Result*	*Units*
L1305116	SVOCs	GW-45804-052213-TS-013	128	4.73-10.65	28.97	05/27/2013	7:21 AM	C:/MSDCHEM/1/5975/atune.u	Naphthalene	0.020 J	µg/L
L1305116	SVOCs	GW-45804-052213-TS-014	128	4.73-10.65	21.51	05/27/2013	7:21 AM	C:/MSDCHEM/1/5975/atune.u	Naphthalene	0.020 J	µg/L
L1305116	SVOCs	GW-45804-052213-TS-015	128	4.73-10.65	19.98	05/27/2013	7:21 AM	C:/MSDCHEM/1/5975/atune.u	Naphthalene	0.020 J	µg/L
L1391311	SVOCs	SW-45804-111313-TS-001	252	5.7-17.1	32.62	11/15/2013	10:14 AM	C:/MSDCHEM/1/5975/atune.u	Benzo(a)pyrene	0.0050 J	µg/L
L1391311	SVOCs	SW-45804-111313-TS-005	252	5.7-17.1	39.82	11/15/2013	10:14 AM	C:/MSDCHEM/1/5975/atune.u	Benzo(a)pyrene	0.0075 J	µg/L
L1391837	SVOCs	GW-45804-111413-TS-009	252	5.7-17.1	24.75	11/20/2013	3:08 PM	C:/MSDCHEM/1/5975/atune.u	Benzo(a)pyrene	0.0050 J	µg/L

Notes:

J - Estimated concentration
SVOCs - Semi-Volatile Organic Compounds

TABLE 6

QUALIFIED SAMPLE DATA DUE TO ANALYTE CONCENTRATIONS IN THE FIELD BLANKS
5123 HAWTHORNE ROAD – WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	*Parameter*	*Analyte*	*Blank Result*	*Associated Sample ID*	*Qualified Result*	*Units*
L1273187	PHCs	Petroleum hydrocarbons F4 (C34-C50)	680	GW-45804-022713-TS-001	630 U	µg/L
L1273187	PHCs	Petroleum hydrocarbons F4 (C34-C50)		GW-45804-022713-TS-002	420 U	µg/L
L1273187	PHCs	Total Petroleum Hydrocarbons (C6-C50)	960	GW-45804-022713-TS-001	630 U	µg/L
L1273187	PHCs	Total Petroleum Hydrocarbons (C6-C50)		GW-45804-022713-TS-002	420 U	µg/L
L1305895	GenChem	Dissolved organic carbon (DOC) (dissolved)	1.6	GW-45804-052313-TS-001	3.8 U	mg/L
L1305895	GenChem	Dissolved organic carbon (DOC) (dissolved)		GW-45804-052313-TS-010	5.2 U	mg/L
L1305895	GenChem	Dissolved organic carbon (DOC) (dissolved)		GW-45804-052313-TS-011	5.2 U	mg/L
L1305895	GenChem	Dissolved organic carbon (DOC) (dissolved)		GW-45804-052313-TS-012	5.2 U	mg/L
L1305895	GenChem	Dissolved organic carbon (DOC) (dissolved)		GW-45804-052313-TS-016	7.8 U	mg/L
L1305895	GenChem	Phenol	0.0030	GW-45804-052313-TS-010	0.0020 U	mg/L
L1305895	GenChem	Phenol		GW-45804-052313-TS-011	0.0030 U	mg/L
L1305895	GenChem	Phenol		GW-45804-052313-TS-012	0.0010 U	mg/L
L1305895	GenChem	Phenol		GW-45804-052313-TS-016	0.0030 U	mg/L
L1343807	GenChem	Phenol	0.0020	GW-45804-080713-TS-002	0.0090 U	mg/L

Notes:

U - Not present at or above the associated value
GenChem - General Chemistry
PHCs - Petroleum Hydrocarbons

TABLE 7

QUALIFIED SAMPLE DATA DUE TO VARIABILITY IN FIELD DUPLICATE RESULTS
5123 HAWTHORNE ROAD -- WATER ANALYSIS
ORGAWORLD CANADA LTD
OTTAWA, ONTARIO
FEBRUARY - NOVEMBER 2013

Lab Report #	Parameter	Analyte	RPD/Diff	Sample ID	Qualified Result	Field Duplicate Sample ID	Qualified Result	Units
L1273187	GenChem	Total suspended solids (TSS)	67%	GW-45804-022713-TS-002	700 J	GW-45804-022713-TS-004	1400 J	mg/L
L1273187	GenChem	Turbidity	61%	GW-45804-022713-TS-002	39.0 J	GW-45804-022713-TS-004	20.7 J	NTU
L1273187	SVOCs	Benzo(a)pyrene	>1x RL	GW-45804-022713-TS-002	0.11 J	GW-45804-022713-TS-004	0.31 J	µg/L
L1305116	GenChem	Turbidity	64%	GW-45804-052213-TS-014	20.5 J	GW-45804-052213-TS-015	40.0 J	NTU
L1305116	SVOCs	Fluoranthene	>1x RL	GW-45804-052213-TS-014	0.104 J	GW-45804-052213-TS-015	0.080 J	µg/L
L1305888	GenChem	Escherichia coli	>1x RL	SW-45804-052313-TS-002	40 J	SW-45804-052313-TS-003	20 J	CFU
L1305888	GenChem	Fecal coliform bacteria	61%	SW-45804-052313-TS-002	80 J	SW-45804-052313-TS-003	150 J	CFU
L1305888	GenChem	Phenol	>1x RL	SW-45804-052313-TS-002	0.0080 J	SW-45804-052313-TS-003	0.0050 J	mg/L
L1305888	Metals	Chromium	>1x RL	SW-45804-052313-TS-002	0.0022 J	SW-45804-052313-TS-003	0.0010 UJ	mg/L
L1305888	Metals	Copper	>1x RL	SW-45804-052313-TS-002	0.0027 J	SW-45804-052313-TS-003	0.0016 J	mg/L
L1305888	Metals	Iron	93%	SW-45804-052313-TS-002	1.41 J	SW-45804-052313-TS-003	0.518 J	mg/L
L1343825	GenChem	Chemical oxygen demand (COD)	>1x RL	GW-45804-080713-TS-005	36 J	GW-45804-080713-TS-006	148 J	mg/L
L1391311	GenChem	Total suspended solids (TSS)	>1x RL	SW-45804-111313-TS-001	8.8 J	SW-45804-111313-TS-005	14.0 J	mg/L
L1391311	Metals	Copper	>1x RL	SW-45804-111313-TS-001	0.0016 J	SW-45804-111313-TS-005	0.0028 J	mg/L
L1391311	Metals	Nickel	>1x RL	SW-45804-111313-TS-001	0.0022 J	SW-45804-111313-TS-005	0.0043 J	mg/L
L1391311	Metals	Zinc	>1x RL	SW-45804-111313-TS-001	0.0072 J	SW-45804-111313-TS-005	0.0133 J	mg/L
L1391837	GenChem	Nitrate (as N)	>1x RL	GW-45804-111413-TS-002	0.10 UJ	GW-45804-111413-TS-003	0.33 J	mg/L

Notes:

Diff - Difference (i.e., >1X reporting limit for water)
RPD - Relative percent difference
RL - Reporting Limit
J - Estimated concentration
UJ - Non-detect, Estimated Reporting Limit
GenChem - General Chemistry
SVOCs - Semi-Volatile Organic Compounds
CFU - Colony Forming Units
NTU - Nephelometric Turbidity Unit
N - Nitrogen

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 21-APR-14
Report Date: 28-APR-14 13:11 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1445355

Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers: 36931
Legal Site Desc:

Nancy Smith
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-1 GW-45804-042114-TS-001 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.40		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	10.5		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	120		1.0	C.U.		23-APR-14	R2825733
pH	7.55		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	32.0		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	1170		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	54.0		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	207		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.0281		0.00029	mg/L		28-APR-14	
Ammonia, Total (as N)	4.80		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	185		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	0.35		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	0.22		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	5.67		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	0.066		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	452		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.3		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	1		0	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	0.0017		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	0.00164		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	0.0022		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	4.62		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	5.35	DLM	0.010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	0.0232		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	0.0028		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	0.0201		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-1 GW-45804-042114-TS-001 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Aggregate Organics							
COD	54		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0025		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	88.4		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	110.9		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	0.0212		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	0.029		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	0.023		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	0.041		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	0.035		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	86.0		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	103.0		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-2 GW-45804-042114-TS-002 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Physical Tests							
Color, Apparent	1.6		1.0	C.U.		23-APR-14	R2825733

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-2 GW-45804-042114-TS-002 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Physical Tests							
pH	8.43		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	<2.0		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	<20		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	0.10		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		23-APR-14	R2826244
Ammonia, Total (as N)	<0.050		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	<2.0		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	0.46		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	<0.030		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	<2.0		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	12		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0015		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-2 GW-45804-042114-TS-002 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	82.2		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	123.2		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	89.5		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	98.5		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-3 GW-45804-042114-TS-003 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.00		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	8.3		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	16.8		1.0	C.U.		23-APR-14	R2825733
pH	7.23		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	6.8		2.0	mg/L	23-APR-14	24-APR-14	R2826838

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-3 GW-45804-042114-TS-003 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Physical Tests							
Total Dissolved Solids	2040		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	13.6		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	476		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.0436		0.000099	mg/L		28-APR-14	
Ammonia, Total (as N)	22.1		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	194		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	0.64		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	23.0		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	<0.030		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	887		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.4		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	60	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	90	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	4200	DLM	100	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Boron (B)-Dissolved	0.151		0.050	mg/L	22-APR-14	23-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	23-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	23-APR-14	R2825465
Copper (Cu)-Dissolved	0.0022		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	22-APR-14	23-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Manganese (Mn)-Dissolved	0.0299		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	0.0160		0.0010	mg/L	22-APR-14	23-APR-14	R2825465
Nickel (Ni)-Dissolved	0.0022		0.0020	mg/L	22-APR-14	23-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	23-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	41		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0032		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-3 GW-45804-042114-TS-003 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	96.4		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	98.4		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	81.6		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	91.2		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-4 GW-45804-042114-TS-004 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.03		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	9.3		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	46.9		1.0	C.U.		23-APR-14	R2825733
pH	7.25		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	20.0		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	1610		20	mg/L	22-APR-14	23-APR-14	R2826372

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-4 GW-45804-042114-TS-004 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Physical Tests							
Turbidity	51.0		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	911		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.174		0.00011	mg/L		28-APR-14	
Ammonia, Total (as N)	76.0		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	246		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	74.3		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	0.067		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	429		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.3		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	390	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	450	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	4400	DLM	100	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	0.0092		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	0.062		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	0.216		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	0.443		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	0.0024		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	9.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	54		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0083		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-4 GW-45804-042114-TS-004 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	91.5		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	104.9		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	87.5		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	100.6		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-5 GW-45804-042114-TS-005 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.03		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	9.3		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	53.9		1.0	C.U.		23-APR-14	R2825733
pH	7.26		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	4.4		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	1600		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	59.0		0.10	NTU	22-APR-14	22-APR-14	R2825390

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-5 GW-45804-042114-TS-005 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Physical Tests							
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	980		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.173		0.00011	mg/L		28-APR-14	
Ammonia, Total (as N)	75.5		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	245		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	75.0		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	0.067		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	427		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.4		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	380	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	430	DLM	10	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	4800	DLM	100	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	0.0078		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	0.061		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	0.212		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	0.413		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	0.0024		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	10.1		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	65		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0103		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-5 GW-45804-042114-TS-005 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	87.3		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	97.0		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	82.2		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	96.7		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-6 GW-45804-042114-TS-006 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.06		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	9.3		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	59.4		1.0	C.U.		23-APR-14	R2825733
pH	7.26		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	53.5		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	828		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	47.0		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-6 GW-45804-042114-TS-006 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	341		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.00164		0.00012	mg/L		28-APR-14	
Ammonia, Total (as N)	0.667		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	71.1		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	1.57		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	<0.030		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	272		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.7		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	7		0	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	0.0031		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	0.00096		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	0.0020		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	2.69		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	1.78		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	0.0060		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	0.0038		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	0.0146		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	34		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0024		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-6 GW-45804-042114-TS-006 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	88.4		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	83.9		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	0.037		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	92.8		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	100.8		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-7 GW-45804-042114-TS-007 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.34		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	7.2		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	191		1.0	C.U.		23-APR-14	R2825733
pH	7.30		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	24.5		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	1450		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	117		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	474		10	mg/L		23-APR-14	R2826244

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-7 GW-45804-042114-TS-007 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Anions and Nutrients							
Unionized ammonia	0.0215		0.00020	mg/L		28-APR-14	
Ammonia, Total (as N)	5.47		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	176		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	6.21		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	0.046		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	477		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.6		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	0.0012		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	9.19		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	4.90	DLM	0.010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	0.0049		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	58		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0033		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-7 GW-45804-042114-TS-007 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612
Surrogate: 2-Bromobenzotrifluoride	84.6		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	93.0		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	85.6		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	103.5		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
L1445355-8 GW-45804-042114-TS-008 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.15		0.10	pH	28-APR-14	28-APR-14	R2828456
Temperature, Client	9.9		0.1	Deg. C	28-APR-14	28-APR-14	R2828456
Physical Tests							
Color, Apparent	163		1.0	C.U.		23-APR-14	R2825733
pH	7.31		0.10	pH units	22-APR-14	22-APR-14	R2826521
Total Suspended Solids	21.5		2.0	mg/L	23-APR-14	24-APR-14	R2826838
Total Dissolved Solids	1480		20	mg/L	22-APR-14	23-APR-14	R2826372
Turbidity	87.0		0.10	NTU	22-APR-14	22-APR-14	R2825390
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	860		10	mg/L		23-APR-14	R2826244
Unionized ammonia	0.0831		0.00016	mg/L		28-APR-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-8 GW-45804-042114-TS-008 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	26.4		0.050	mg/L		23-APR-14	R2825731
Chloride (Cl)	209		2.0	mg/L		23-APR-14	R2827079
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		23-APR-14	R2827079
Total Kjeldahl Nitrogen	26.9		0.15	mg/L	22-APR-14	23-APR-14	R2826248
Phosphorus, Total	0.183		0.030	mg/L	22-APR-14	23-APR-14	R2826290
Sulphate (SO4)	297		2.0	mg/L		23-APR-14	R2827079
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.5		1.0	mg/L	25-APR-14	25-APR-14	R2828288
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826408
Fecal Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826401
Total Coliforms	0		0	CFU/100mL	22-APR-14	23-APR-14	R2826396
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					23-APR-14	R2826210
Dissolved Metals Filtration Location	FIELD					22-APR-14	R2825100
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Boron (B)-Dissolved	<0.050		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	22-APR-14	22-APR-14	R2825465
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	22-APR-14	22-APR-14	R2825465
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Iron (Fe)-Dissolved	6.73		0.050	mg/L	22-APR-14	22-APR-14	R2825465
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Manganese (Mn)-Dissolved	3.08	DLM	0.010	mg/L	22-APR-14	22-APR-14	R2825465
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	24-APR-14	24-APR-14	R2827016
Molybdenum (Mo)-Dissolved	0.0061		0.0010	mg/L	22-APR-14	22-APR-14	R2825465
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	22-APR-14	22-APR-14	R2825465
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	22-APR-14	22-APR-14	R2825465
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-APR-14	27-APR-14	R2828401
COD	43		10	mg/L	25-APR-14	25-APR-14	R2827834
Phenols (4AAP)	0.0076		0.0010	mg/L	25-APR-14	25-APR-14	R2828344
Hydrocarbons							
F1 (C6-C10)	120		100	ug/L		23-APR-14	R2826122
F2 (C10-C16)	<100		100	ug/L	25-APR-14	28-APR-14	R2828612
F2-Naphth	<100		100	ug/L		28-APR-14	
F3 (C16-C34)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
F3-PAH	<250		250	ug/L		28-APR-14	
F4 (C34-C50)	<250		250	ug/L	25-APR-14	28-APR-14	R2828612
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-APR-14	
Chrom. to baseline at nC50	YES				25-APR-14	28-APR-14	R2828612

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1445355-8 GW-45804-042114-TS-008 Sampled By: T.SAUNDERS on 21-APR-14 Matrix: WATER							
Hydrocarbons							
Surrogate: 2-Bromobenzotrifluoride	92.8		60-140	%	25-APR-14	28-APR-14	R2828612
Surrogate: 3,4-Dichlorotoluene	108.0		60-140	%		23-APR-14	R2826122
Polycyclic Aromatic Hydrocarbons							
Acenaphthene	0.184		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acenaphthylene	0.187	RRR	0.020	ug/L	25-APR-14	28-APR-14	R2828536
Acridine	<4.0		4.0	ug/L	25-APR-14	28-APR-14	R2828536
Anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(a)pyrene	<0.0050		0.0050	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(b)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(g,h,i)perylene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Benzo(k)fluoranthene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Chrysene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Dibenzo(ah)anthracene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluoranthene	0.121		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Fluorene	0.043		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Indeno(1,2,3-cd)pyrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
1-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
2-Methylnaphthalene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Naphthalene	<0.050		0.050	ug/L	25-APR-14	28-APR-14	R2828536
Phenanthrene	<0.020		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Pyrene	0.079		0.020	ug/L	25-APR-14	28-APR-14	R2828536
Quinoline	<0.040		0.040	ug/L	25-APR-14	28-APR-14	R2828536
Surrogate: 2-Fluorobiphenyl	91.2		30-130	%	25-APR-14	28-APR-14	R2828536
Surrogate: d14-Terphenyl	106.1		50-150	%	25-APR-14	28-APR-14	R2828536
B(a)P Total Potency Equivalent	<0.060		0.060	ug/L	25-APR-14	28-APR-14	R2828536
Report Remarks : RRR: Suspected contamination, comparable levels present in method blank.							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Manganese (Mn)-Dissolved	DLM	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Total Suspended Solids	DLM	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Chloride (Cl)	DLM	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Duplicate	Sulphate (SO4)	DLM	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Acenaphthylene	MB-LOR	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Method Blank	Naphthalene	MB-LOR	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Ammonia, Total (as N)	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulphate (SO4)	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1445355-1, -2, -3, -4, -5, -6, -7, -8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

Reference Information

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT Water Dissolved Metals in Water by ICPMS EPA 200.8
The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT Water Phosphorus, Total APHA 4500-P B E
Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of

Reference Information

four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

36931

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2826244								
WG1862233-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			106.3		%		80-120	23-APR-14
WG1862233-2 CVS								
Alkalinity, Total (as CaCO3)			104.5		%		85-115	23-APR-14
WG1862233-4 DUP		**L1445355-1**						
Alkalinity, Total (as CaCO3)		207	212		mg/L	2.5	20	23-APR-14
WG1862233-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	23-APR-14
BOD-C-WT	Water							
Batch R2828401								
WG1861699-2 DUP		**L1445059-1**						
BOD Carbonaceous		491	474		mg/L	3.5	20	27-APR-14
WG1861699-4 DUP		**L1445060-1**						
BOD Carbonaceous		192	176		mg/L	8.7	20	27-APR-14
WG1861699-3 LCS								
BOD Carbonaceous			95.5		%		85-115	27-APR-14
WG1861699-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	27-APR-14
C-DIS-ORG-WT	Water							
Batch R2828288								
WG1863839-3 DUP		**L1445355-8**						
Dissolved Organic Carbon		7.5	7.5		mg/L	0.1	20	25-APR-14
WG1863839-2 LCS								
Dissolved Organic Carbon			98.9		%		80-120	25-APR-14
WG1863839-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-APR-14
WG1863839-4 MS		**L1445355-8**						
Dissolved Organic Carbon			102.7		%		70-130	25-APR-14
CL-WT	Water							
Batch R2827079								
WG1862306-10 DUP		**L1445617-1**						
Chloride (Cl)		2460	2470		mg/L	0.0	20	23-APR-14
WG1862306-6 DUP		**L1444733-8**						
Chloride (Cl)		254	254		mg/L	0.2	20	23-APR-14
WG1862306-8 DUP		**L1445068-6**						
Chloride (Cl)		4.9	4.9		mg/L	0.2	20	23-APR-14
WG1862306-2 LCS								

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R2827079								
WG1862306-2 LCS								
Chloride (Cl)			99.4		%		85-115	23-APR-14
WG1862306-3 LCSD		**WG1862306-2**						
Chloride (Cl)		99.4	99.8		%	0.4	25	23-APR-14
WG1862306-1 MB								
Chloride (Cl)			<2.0		mg/L		2	23-APR-14
WG1862306-11 MS		**L1445617-1**						
Chloride (Cl)			N/A	MS-B	%		-	23-APR-14
WG1862306-7 MS		**L1444733-8**						
Chloride (Cl)			N/A	MS-B	%		-	23-APR-14
WG1862306-9 MS		**L1445068-6**						
Chloride (Cl)			99.5		%		75-125	23-APR-14
COD-WT	Water							
Batch R2827834								
WG1863692-3 DUP		**L1445355-8**						
COD		43	47		mg/L	8.9	20	25-APR-14
WG1863692-2 LCS								
COD			100.0		%		80-120	25-APR-14
WG1863692-1 MB								
COD			<10		mg/L		10	25-APR-14
WG1863692-4 MS		**L1445355-8**						
COD			101.0		%		85-115	25-APR-14
COLOUR-WT	Water							
Batch R2825733								
WG1862116-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			100.1		%		80-120	23-APR-14
WG1862116-2 CVS								
Color, Apparent			103.4		%		85-115	23-APR-14
WG1862116-4 DUP		**L1445355-2**						
Color, Apparent		1.6	1.6		C.U.	5.4	20	23-APR-14
WG1862116-1 MB								
Color, Apparent			<1.0		C.U.		1	23-APR-14
EC-MF-WT	Water							
Batch R2826408								
WG1861478-3 DUP		**L1445367-4**						
E. Coli		0	0		CFU/100mL	0.0	50	23-APR-14
WG1861478-1 MB								

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R2826408								
WG1861478-1 MB								
E. Coli			0		CFU/100mL		1	23-APR-14
WG1861478-2 MB								
E. Coli			0		CFU/100mL		1	23-APR-14
F1-HS-WT	Water							
Batch R2826122								
WG1859908-1 CVS								
F1 (C6-C10)			115.7		%		80-120	23-APR-14
WG1859908-4 DUP		**WG1859908-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	23-APR-14
WG1859908-2 MB								
F1 (C6-C10)			<100		ug/L		100	23-APR-14
Surrogate: 3,4-Dichlorotoluene			101.4		%		60-140	23-APR-14
F2-F4-WT	Water							
Batch R2828612								
WG1863846-1 CVS								
F2 (C10-C16)			97.8		%		80-120	28-APR-14
F3 (C16-C34)			100.8		%		80-120	28-APR-14
F4 (C34-C50)			102.4		%		80-120	28-APR-14
WG1862926-2 LCS								
F2 (C10-C16)			103.5		%		65-135	28-APR-14
F3 (C16-C34)			106.0		%		65-135	28-APR-14
F4 (C34-C50)			102.0		%		65-135	28-APR-14
WG1862926-1 MB								
F2 (C10-C16)			<100		ug/L		100	28-APR-14
F3 (C16-C34)			<250		ug/L		250	28-APR-14
F4 (C34-C50)			<250		ug/L		250	28-APR-14
Surrogate: 2-Bromobenzotrifluoride			82.7		%		60-140	28-APR-14
FC-MF-WT	Water							
Batch R2826401								
WG1861630-3 DUP		**L1445355-2**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	23-APR-14
WG1861630-1 MB								
Fecal Coliforms			0		CFU/100mL		1	23-APR-14
WG1861630-2 MB								
Fecal Coliforms			0		CFU/100mL		1	23-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	Water							
Batch R2827016								
WG1862437-3 DUP		**L1445355-2**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	24-APR-14
WG1862437-2 LCS								
Mercury (Hg)-Dissolved			100.5		%		80-120	24-APR-14
WG1862437-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	24-APR-14
WG1862437-4 MS		**L1445355-1**						
Mercury (Hg)-Dissolved			99.5		%		70-130	24-APR-14
MET-D-MS-WT	Water							
Batch R2825465								
WG1861641-1 CVS								
Arsenic (As)-Dissolved			100.2		%		80-120	22-APR-14
Boron (B)-Dissolved			103.0		%		80-120	22-APR-14
Cadmium (Cd)-Dissolved			100.8		%		80-120	22-APR-14
Chromium (Cr)-Dissolved			100.8		%		80-120	22-APR-14
Cobalt (Co)-Dissolved			100.3		%		80-120	22-APR-14
Copper (Cu)-Dissolved			102.3		%		80-120	22-APR-14
Iron (Fe)-Dissolved			101.8		%		80-120	22-APR-14
Lead (Pb)-Dissolved			98.8		%		80-120	22-APR-14
Manganese (Mn)-Dissolved			103.2		%		80-120	22-APR-14
Molybdenum (Mo)-Dissolved			98.8		%		80-120	22-APR-14
Nickel (Ni)-Dissolved			103.7		%		80-120	22-APR-14
Zinc (Zn)-Dissolved			97.9		%		80-120	22-APR-14
WG1861641-3 CVS								
Arsenic (As)-Dissolved			97.7		%		80-120	23-APR-14
Boron (B)-Dissolved			105.4		%		80-120	23-APR-14
Cadmium (Cd)-Dissolved			99.0		%		80-120	23-APR-14
Chromium (Cr)-Dissolved			99.7		%		80-120	23-APR-14
Cobalt (Co)-Dissolved			100.9		%		80-120	23-APR-14
Copper (Cu)-Dissolved			100.2		%		80-120	23-APR-14
Iron (Fe)-Dissolved			100.6		%		80-120	23-APR-14
Lead (Pb)-Dissolved			98.2		%		80-120	23-APR-14
Manganese (Mn)-Dissolved			102.1		%		80-120	23-APR-14
Molybdenum (Mo)-Dissolved			99.3		%		80-120	23-APR-14
Nickel (Ni)-Dissolved			101.1		%		80-120	23-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2825465								
WG1861641-3 CVS								
Zinc (Zn)-Dissolved			95.6		%		80-120	23-APR-14
WG1861560-4 DUP		**WG1861560-3**						
Arsenic (As)-Dissolved		0.0018	0.0018		mg/L	0.9	20	22-APR-14
Boron (B)-Dissolved		0.028	0.028		mg/L	2.5	20	22-APR-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	22-APR-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-APR-14
Cobalt (Co)-Dissolved		0.00164	0.00165		mg/L	0.5	20	22-APR-14
Copper (Cu)-Dissolved		0.0022	0.0022		mg/L	0.2	20	22-APR-14
Iron (Fe)-Dissolved		4.63	4.66		mg/L	0.7	20	22-APR-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	22-APR-14
Manganese (Mn)-Dissolved		5.16	5.24		mg/L	1.7	20	22-APR-14
Molybdenum (Mo)-Dissolved		0.0245	0.0256		mg/L	4.2	20	22-APR-14
Nickel (Ni)-Dissolved		0.0028	0.0028		mg/L	1.1	20	22-APR-14
Zinc (Zn)-Dissolved		0.0198	0.0193		mg/L	2.3	20	22-APR-14
WG1861560-2 LCS								
Arsenic (As)-Dissolved			96.8		%		80-120	22-APR-14
Boron (B)-Dissolved			86.4		%		80-120	22-APR-14
Cadmium (Cd)-Dissolved			90.4		%		80-120	22-APR-14
Chromium (Cr)-Dissolved			96.3		%		80-120	22-APR-14
Cobalt (Co)-Dissolved			96.7		%		80-120	22-APR-14
Copper (Cu)-Dissolved			98.8		%		80-120	22-APR-14
Iron (Fe)-Dissolved			99.2		%		80-120	22-APR-14
Lead (Pb)-Dissolved			91.6		%		80-120	22-APR-14
Manganese (Mn)-Dissolved			97.3		%		80-120	22-APR-14
Molybdenum (Mo)-Dissolved			96.5		%		80-120	22-APR-14
Nickel (Ni)-Dissolved			97.8		%		80-120	22-APR-14
Zinc (Zn)-Dissolved			100.4		%		80-120	22-APR-14
WG1861560-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	22-APR-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	22-APR-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	22-APR-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	22-APR-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	22-APR-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	22-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2825465								
WG1861560-1 MB								
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	22-APR-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	22-APR-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	22-APR-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	22-APR-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	22-APR-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	22-APR-14
WG1861560-5 MS		**WG1861560-3**						
Arsenic (As)-Dissolved			97.0		%		70-130	22-APR-14
Boron (B)-Dissolved			76.8		%		70-130	22-APR-14
Cadmium (Cd)-Dissolved			88.1		%		70-130	22-APR-14
Chromium (Cr)-Dissolved			92.6		%		70-130	22-APR-14
Cobalt (Co)-Dissolved			88.4		%		70-130	22-APR-14
Copper (Cu)-Dissolved			87.4		%		70-130	22-APR-14
Iron (Fe)-Dissolved			N/A	MS-B	%		-	22-APR-14
Lead (Pb)-Dissolved			86.0		%		70-130	22-APR-14
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	22-APR-14
Molybdenum (Mo)-Dissolved			87.3		%		70-130	22-APR-14
Nickel (Ni)-Dissolved			88.9		%		70-130	22-APR-14
Zinc (Zn)-Dissolved			82.1		%		70-130	22-APR-14
NH3-WT	Water							
Batch R2825731								
WG1862109-2 CVS								
Ammonia, Total (as N)			101.5		%		85-115	23-APR-14
WG1862109-3 DUP		**L1445708-1**						
Ammonia, Total (as N)		0.184	0.177		mg/L	3.6	20	23-APR-14
WG1862109-5 DUP		**L1445355-1**						
Ammonia, Total (as N)		4.80	4.81		mg/L	0.2	20	23-APR-14
WG1862109-7 DUP		**L1445452-1**						
Ammonia, Total (as N)		0.098	0.112		mg/L	13	20	23-APR-14
WG1862109-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	23-APR-14
WG1862109-4 MS		**L1445708-1**						
Ammonia, Total (as N)			97.3		%		75-125	23-APR-14
WG1862109-6 MS		**L1445355-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	23-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2825731								
WG1862109-8 MS		**L1445452-1**						
Ammonia, Total (as N)			91.6		%		75-125	23-APR-14
NO2-WT	Water							
Batch R2827079								
WG1862306-2 LCS								
Nitrite-N (NO2-N)			98.5		%		70-130	23-APR-14
WG1862306-3 LCSD		**WG1862306-2**						
Nitrite-N (NO2-N)		98.5	98.9		%	0.4	25	23-APR-14
WG1862306-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	23-APR-14
NO3-WT	Water							
Batch R2827079								
WG1862306-2 LCS								
Nitrate-N (NO3-N)			98.4		%		70-130	23-APR-14
WG1862306-3 LCSD		**WG1862306-2**						
Nitrate-N (NO3-N)		98.4	98.9		%	0.5	25	23-APR-14
WG1862306-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	23-APR-14
P-TOTAL-WT	Water							
Batch R2826290								
WG1862230-1 CVS								
Phosphorus, Total			91.4		%		80-120	23-APR-14
WG1862112-3 DUP		**L1445355-1**						
Phosphorus, Total		0.066	0.065		mg/L	1.5	25	23-APR-14
WG1862112-2 LCS								
Phosphorus, Total			89.2		%		80-120	23-APR-14
WG1862112-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	23-APR-14
PAH-CCME-WT	Water							
Batch R2828536								
WG1864447-1 CVS								
1-Methylnaphthalene			97.1		%		70-130	28-APR-14
2-Methylnaphthalene			98.3		%		70-130	28-APR-14
Acenaphthene			99.4		%		70-130	28-APR-14
Acenaphthylene			102.2		%		60-130	28-APR-14
Acridine			98.2		%		60-130	28-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2828536								
WG1864447-1 CVS								
Anthracene			102.1		%		60-130	28-APR-14
Benzo(a)anthracene			100.5		%		70-130	28-APR-14
Benzo(a)pyrene			100.4		%		70-130	28-APR-14
Benzo(b)fluoranthene			102.3		%		60-130	28-APR-14
Benzo(g,h,i)perylene			103.3		%		70-130	28-APR-14
Benzo(k)fluoranthene			94.1		%		60-140	28-APR-14
Chrysene			102.2		%		60-130	28-APR-14
Dibenzo(ah)anthracene			103.5		%		50-140	28-APR-14
Fluoranthene			98.9		%		60-130	28-APR-14
Fluorene			100.7		%		70-130	28-APR-14
Indeno(1,2,3-cd)pyrene			82.7		%		60-140	28-APR-14
Naphthalene			104.7		%		70-130	28-APR-14
Phenanthrene			99.0		%		70-130	28-APR-14
Pyrene			107.4		%		60-130	28-APR-14
Quinoline			99.1		%		60-130	28-APR-14
WG1863879-2 LCS								
1-Methylnaphthalene			83.2		%		50-140	28-APR-14
2-Methylnaphthalene			82.5		%		50-140	28-APR-14
Acenaphthene			91.9		%		50-140	28-APR-14
Acenaphthylene			98.0		%		50-140	28-APR-14
Acridine			91.8		%		60-130	28-APR-14
Anthracene			104.0		%		50-140	28-APR-14
Benzo(a)anthracene			96.6		%		50-140	28-APR-14
Benzo(a)pyrene			90.0		%		60-130	28-APR-14
Benzo(b)fluoranthene			97.9		%		50-140	28-APR-14
Benzo(g,h,i)perylene			96.0		%		50-140	28-APR-14
Benzo(k)fluoranthene			89.6		%		50-140	28-APR-14
Chrysene			105.2		%		50-140	28-APR-14
Dibenzo(ah)anthracene			95.0		%		50-140	28-APR-14
Fluoranthene			98.3		%		50-140	28-APR-14
Fluorene			95.0		%		50-140	28-APR-14
Indeno(1,2,3-cd)pyrene			81.2		%		50-140	28-APR-14
Naphthalene			89.6		%		50-140	28-APR-14
Phenanthrene			96.1		%		50-140	28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2828536								
WG1863879-2 LCS								
Pyrene			105.0		%		50-140	28-APR-14
Quinoline			93.3		%		50-150	28-APR-14
WG1863879-3 LCSD		**WG1863879-2**						
1-Methylnaphthalene		83.2	77.0		%	7.7	50	28-APR-14
2-Methylnaphthalene		82.5	76.3		%	7.8	50	28-APR-14
Acenaphthene		91.9	84.4		%	8.6	50	28-APR-14
Acenaphthylene		98.0	90.7		%	7.7	50	28-APR-14
Acridine		91.8	77.8		%	17	50	28-APR-14
Anthracene		104.0	95.5		%	8.5	50	28-APR-14
Benzo(a)anthracene		96.6	85.3		%	12	50	28-APR-14
Benzo(a)pyrene		90.0	81.6		%	9.8	50	28-APR-14
Benzo(b)fluoranthene		97.9	88.9		%	9.6	50	28-APR-14
Benzo(g,h,i)perylene		96.0	81.7		%	16	50	28-APR-14
Benzo(k)fluoranthene		89.6	73.8		%	19	50	28-APR-14
Chrysene		105.2	89.8		%	16	50	28-APR-14
Dibenzo(ah)anthracene		95.0	78.9		%	19	50	28-APR-14
Fluoranthene		98.3	87.9		%	11	50	28-APR-14
Fluorene		95.0	86.6		%	9.2	50	28-APR-14
Indeno(1,2,3-cd)pyrene		81.2	66.2		%	20	50	28-APR-14
Naphthalene		89.6	82.8		%	7.9	50	28-APR-14
Phenanthrene		96.1	86.7		%	10	50	28-APR-14
Pyrene		105.0	93.4		%	12	50	28-APR-14
Quinoline		93.3	83.4		%	11	50	28-APR-14
WG1863879-1 MB								
1-Methylnaphthalene			<0.020		ug/L		0.02	28-APR-14
2-Methylnaphthalene			<0.020		ug/L		0.02	28-APR-14
Acenaphthene			<0.020		ug/L		0.02	28-APR-14
Acenaphthylene			0.158	MB-LOR	ug/L		0.02	28-APR-14
Acridine			<4.0		ug/L		4	28-APR-14
Anthracene			<0.020		ug/L		0.02	28-APR-14
Benzo(a)anthracene			<0.020		ug/L		0.02	28-APR-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	28-APR-14
Benzo(b)fluoranthene			<0.020		ug/L		0.02	28-APR-14

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2828536								
WG1863879-1 MB								
Benzo(g,h,i)perylene			<0.020		ug/L		0.02	28-APR-14
Benzo(k)fluoranthene			<0.020		ug/L		0.02	28-APR-14
Chrysene			<0.020		ug/L		0.02	28-APR-14
Dibenzo(ah)anthracene			<0.020		ug/L		0.02	28-APR-14
Fluoranthene			<0.020		ug/L		0.02	28-APR-14
Fluorene			<0.020		ug/L		0.02	28-APR-14
Indeno(1,2,3-cd)pyrene			<0.020		ug/L		0.02	28-APR-14
Naphthalene			0.370	MB-LOR	ug/L		0.05	28-APR-14
Phenanthrene			<0.020		ug/L		0.02	28-APR-14
Pyrene			<0.020		ug/L		0.02	28-APR-14
Quinoline			<0.040		ug/L		0.04	28-APR-14
Surrogate: 2-Fluorobiphenyl			81.6		%		30-130	28-APR-14
Surrogate: d14-Terphenyl			92.1		%		50-150	28-APR-14
PH-WT	Water							
Batch R2826521								
WG1861811-2 DUP		**L1445355-1**						
pH		7.55	7.55	J	pH units	0.00	0.2	22-APR-14
WG1861811-1 LCS								
pH			7.01		pH units		6.9-7.1	22-APR-14
PHENOLS-4AAP-WT	Water							
Batch R2828344								
WG1863728-4 CVS								
Phenols (4AAP)			95.6		%		85-115	25-APR-14
WG1863728-3 DUP		**L1444727-1**						
Phenols (4AAP)		0.0017	0.0018		mg/L	11	20	25-APR-14
WG1863728-2 LCS								
Phenols (4AAP)			102.1		%		85-115	25-APR-14
WG1863728-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	25-APR-14
WG1863728-6 MS		**L1444727-1**						
Phenols (4AAP)			98.2		%		80-120	25-APR-14
SO4-WT	Water							

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-WT	Water							
Batch R2827079								
WG1862306-10 DUP		**L1445617-1**						
Sulphate (SO4)		107	107		mg/L	0.4	25	23-APR-14
WG1862306-6 DUP		**L1444733-8**						
Sulphate (SO4)		30	30		mg/L	0.1	25	23-APR-14
WG1862306-2 LCS								
Sulphate (SO4)			99.2		%		70-130	23-APR-14
WG1862306-3 LCSD		**WG1862306-2**						
Sulphate (SO4)		99.2	99.6		%	0.4	25	23-APR-14
WG1862306-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	23-APR-14
WG1862306-11 MS		**L1445617-1**						
Sulphate (SO4)			N/A	MS-B	%		-	23-APR-14
WG1862306-7 MS		**L1444733-8**						
Sulphate (SO4)			110.1		%		70-130	23-APR-14
SOLIDS-TDS-WT	Water							
Batch R2826372								
WG1861546-3 DUP		**L1444905-1**						
Total Dissolved Solids		195	192		mg/L	1.2	20	23-APR-14
WG1861546-2 LCS								
Total Dissolved Solids			92.8		%		85-115	23-APR-14
WG1861546-1 MB								
Total Dissolved Solids			<20		mg/L		20	23-APR-14
SOLIDS-TSS-WT	Water							
Batch R2826838								
WG1862158-3 DUP		**L1445059-1**						
Total Suspended Solids		40.0	42.0		mg/L	4.9	20	24-APR-14
WG1862158-2 LCS								
Total Suspended Solids			100.4		%		85-115	24-APR-14
WG1862158-1 MB								
Total Suspended Solids			<2.0		mg/L		2	24-APR-14
TC-MF-WT	Water							
Batch R2826396								
WG1861479-3 DUP		**L1445367-3**						
Total Coliforms		0	0		CFU/100mL	0.0	50	23-APR-14
WG1861479-1 MB								
Total Coliforms			0		CFU/100mL		1	23-APR-14
WG1861479-2 MB								

Quality Control Report

Workorder: L1445355 Report Date: 28-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC-MF-WT	Water							
Batch R2826396								
WG1861479-2 MB								
Total Coliforms			0		CFU/100mL		1	23-APR-14
TKN-WT	Water							
Batch R2826248								
WG1862229-1 CVS								
Total Kjeldahl Nitrogen			100.7		%		75-125	23-APR-14
WG1862112-3 DUP		**L1445355-1**						
Total Kjeldahl Nitrogen		5.67	5.83		mg/L	2.8	20	23-APR-14
WG1862112-2 LCS								
Total Kjeldahl Nitrogen			96.9		%		75-125	23-APR-14
WG1862112-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	23-APR-14
TURBIDITY-WT	Water							
Batch R2825390								
WG1861629-4 CVS								
Turbidity			95.0		%		85-115	22-APR-14
WG1861629-2 DUP		**L1445355-2**						
Turbidity		0.10	<0.10	RPD-NA	NTU	N/A	20	22-APR-14
WG1861629-1 MB								
Turbidity			<0.10		NTU		0.1	22-APR-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

L1445355-COFC

L1445555
58
Apr 21, 2014
15329

CHAIN OF CUSTODY RECORD

COC NO.:

PAGE 1 OF 1

(See Reverse Side For Terms and Conditions)

Address:

Phone: Fax:

Project No/ Phase/Task Code: 45504-58	Laboratory Name: ALS	Lab Location:	SSOW ID:
Project Name: Ogilvie - Olthuis	Lab Contact:	Lab Quote No:	Cooler No:
Project Location:			Carrier:
Chemistry Contact: Aimee MacPhee			Airbill No:
Sampler(s): T. Saunders			Date Shipped:

Item	Sample Identification	Date	Time	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other	Total Containers/Sample	Analysis Requested (See Back of COC for Definitions): Chem Haza & Hardness	Mercury	BTEX	PAH's	PHC F1-F4	MS/MSD Request	Comments/ Special Instructions:
	L445 45504-58-22114 TS 001														X	X	X	X	X		
	002														X	X	X	X	X		
	003														X	X	X	X	X		
	004														X	X	X	X	X		
	005														X	X	X	X	X		
	006														X	X	X	X	X		
	007														X	X	X	X	X		
	008														X	X	X	X	X		

TAT Required in business days (use separate COCs for different TATs):

☐ 0 Day ☐ 1 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers:

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1 T. Saunders	CRA	4/21/14	1245	Allison Cameron	ALS	Apr 21/14	12:55pm
2							
3							

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

WHITE – Lab; Retained Copy (ORIG) YELLOW – Receiving Laboratory's Copy PINK – Shipper GOLDENROD – Sampling Team

996000

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 29-MAY-14
Report Date: 08-JUN-14 04:44 (MT)
Version: FINAL REV. 2

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1461888
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Comments:
8-JUN-2014 Revised PAH list

Wayne Smith, C.Chem., C.E.T.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461888-1 SW-45804-052814-MB-001 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:00 Matrix: SURFACE WATER							
Field Tests							
pH, Client Supplied	8.34		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	20.8		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	32.0		1.0	C.U.		30-MAY-14	R2848799
pH	8.20		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	4.4		2.0	mg/L	29-MAY-14	30-MAY-14	R2850038
Total Dissolved Solids	636		20	mg/L	31-MAY-14	03-JUN-14	R2850452
Turbidity	3.15		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	145		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0194		0.0051	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.190		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	84.2		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	1.25		0.15	mg/L	01-JUN-14	02-JUN-14	R2850372
Total Phosphorus	0.0556		0.0030	mg/L		04-JUN-14	R2852270
Sulphate (SO4)	240		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.1		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	1		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	3		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	300	DLM	100	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Boron (B)-Total	<0.050		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	29-MAY-14	30-MAY-14	R2849986
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	29-MAY-14	30-MAY-14	R2849986
Copper (Cu)-Total	0.0011		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Iron (Fe)-Total	0.226		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Lead (Pb)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Manganese (Mn)-Total	0.0571		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848867
Molybdenum (Mo)-Total	0.0124		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	29-MAY-14	30-MAY-14	R2849986
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	29-MAY-14	30-MAY-14	R2849986
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	39		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0014		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461888-1 SW-45804-052814-MB-001 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:00 Matrix: SURFACE WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	79.9		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	77.3		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	91.3		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	98.7		50-150	%	03-JUN-14	06-JUN-14	R2853867
L1461888-2 SW-45804-052814-MB-002 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:00 Matrix: SURFACE WATER							
Field Tests							
pH, Client Supplied	8.34		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	20.8		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	32.4		1.0	C.U.		30-MAY-14	R2848799
pH	8.19		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	4.0		2.0	mg/L	29-MAY-14	30-MAY-14	R2850038
Total Dissolved Solids	632		20	mg/L	31-MAY-14	03-JUN-14	R2850452
Turbidity	2.76		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	143		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0198		0.0051	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.193		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	84.5		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	1.01		0.15	mg/L	01-JUN-14	02-JUN-14	R2850372
Total Phosphorus	0.133		0.0030	mg/L		04-JUN-14	R2852270
Sulphate (SO4)	241		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.8		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	4		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848781

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461888-2 SW-45804-052814-MB-002 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:00 Matrix: SURFACE WATER							
Bacteriological Tests							
Fecal Coliforms	7		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	500	DLM	100	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Boron (B)-Total	<0.050		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	29-MAY-14	30-MAY-14	R2849986
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	29-MAY-14	30-MAY-14	R2849986
Copper (Cu)-Total	0.0012		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Iron (Fe)-Total	0.239		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Lead (Pb)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Manganese (Mn)-Total	0.0546		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848867
Molybdenum (Mo)-Total	0.0120		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	29-MAY-14	30-MAY-14	R2849986
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	29-MAY-14	30-MAY-14	R2849986
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	30		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0034		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	77.0		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	96.0		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	94.2		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	108.3		50-150	%	03-JUN-14	06-JUN-14	R2853867

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Total	DLM	L1461888-1, -2
Duplicate	Boron (B)-Total	DLM	L1461888-1, -2
Duplicate	Cadmium (Cd)-Total	DLM	L1461888-1, -2
Duplicate	Chromium (Cr)-Total	DLM	L1461888-1, -2
Duplicate	Cobalt (Co)-Total	DLM	L1461888-1, -2
Duplicate	Copper (Cu)-Total	DLM	L1461888-1, -2
Duplicate	Iron (Fe)-Total	DLM	L1461888-1, -2
Duplicate	Lead (Pb)-Total	DLM	L1461888-1, -2
Duplicate	Manganese (Mn)-Total	DLM	L1461888-1, -2
Duplicate	Molybdenum (Mo)-Total	DLM	L1461888-1, -2
Duplicate	Nickel (Ni)-Total	DLM	L1461888-1, -2
Duplicate	Zinc (Zn)-Total	DLM	L1461888-1, -2
Duplicate	Total Suspended Solids	DLM	L1461888-1, -2
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L1461888-1, -2
Matrix Spike	Chloride (Cl)	MS-B	L1461888-1, -2
Matrix Spike	Sulphate (SO4)	MS-B	L1461888-1, -2
Duplicate	Color, Apparent	PEHT	L1461888-1, -2

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-WW-MF-WT	Water	E. Coli	SM 9222D
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

Reference Information

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-WW-MF-WT Water Fecal Coliforms SM 9222D

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

MET-T-MS-WT Water Total Metals in Water by ICPMS EPA 200.8
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-LOW-WT Water Phosphorus, Total, Low Level APHA 4500-P B E
This analysis is carried by out an discrete colorimetric auto-analyzer using procedures adapted from APHA Method 4500-P "Phosphorus".

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-WW-MF-WT Water Total Coliforms SM 9222B

Reference Information

Water sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2852238								
WG1884758-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.6		%		80-120	03-JUN-14
WG1884758-2 CVS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	03-JUN-14
WG1884758-4 DUP		**L1461791-4**						
Alkalinity, Total (as CaCO3)		344	334		mg/L	2.9	20	03-JUN-14
WG1884758-5 DUP		**L1461921-1**						
Alkalinity, Total (as CaCO3)		466	468		mg/L	0.3	20	03-JUN-14
WG1884758-6 DUP		**L1462714-1**						
Alkalinity, Total (as CaCO3)		243	239		mg/L	1.7	20	03-JUN-14
WG1884758-7 DUP		**L1463704-1**						
Alkalinity, Total (as CaCO3)		228	232		mg/L	1.7	20	03-JUN-14
WG1884758-8 DUP		**L1464009-4**						
Alkalinity, Total (as CaCO3)		26	25		mg/L	3.6	20	03-JUN-14
WG1884758-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	03-JUN-14
BOD-C-WT	Water							
Batch R2851464								
WG1881433-2 DUP		**L1461992-1**						
BOD Carbonaceous		705	690		mg/L	2.2	20	03-JUN-14
WG1881433-4 DUP		**L1461995-1**						
BOD Carbonaceous		565	564		mg/L	0.2	20	03-JUN-14
WG1881433-3 LCS								
BOD Carbonaceous			101.5		%		85-115	03-JUN-14
WG1881433-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	03-JUN-14
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-5 DUP		**L1461122-5**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-8 DUP		**L1461892-2**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-2 LCS								
Dissolved Organic Carbon			96.0		%		80-120	30-MAY-14
WG1882027-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	30-MAY-14
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4				70-130	

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4		%		70-130	30-MAY-14
CL-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Chloride (Cl)		84.2	84.2		mg/L	0.1	20	02-JUN-14
WG1883427-2 LCS								
Chloride (Cl)			100.3		%		85-115	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Chloride (Cl)		100.3	100.3		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Chloride (Cl)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Chloride (Cl)			N/A	MS-B	%		-	02-JUN-14
COD-WT	Water							
Batch R2851550								
WG1884091-3 DUP		**L1461791-5**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884091-5 DUP		**L1461921-3**						
COD		34	36		mg/L	5.7	20	03-JUN-14
WG1884091-2 LCS								
COD			102.0		%		80-120	03-JUN-14
WG1884091-1 MB								
COD			<10		mg/L		10	03-JUN-14
WG1884091-4 MS		**L1461791-5**						
COD			109.0		%		85-115	03-JUN-14
COLOUR-WT	Water							
Batch R2848799								
WG1882208-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			96.9		%		80-120	30-MAY-14
WG1882208-2 CVS								
Color, Apparent			98.9		%		85-115	30-MAY-14
WG1882208-4 DUP		**L1461872-1**						
Color, Apparent		7.9	8.4		C.U.	5.7	20	30-MAY-14
WG1882208-5 DUP		**L1462593-1**						
Color, Apparent		2.7	2.2		C.U.	18	20	30-MAY-14
WG1882208-1 MB								

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COLOUR-WT	Water							
Batch R2848799								
WG1882208-1 MB								
Color, Apparent			<1.0		C.U.		1	30-MAY-14
EC-WW-MF-WT	Water							
Batch R2848781								
WG1881407-1 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-2 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-5 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
F1-HS-WT	Water							
Batch R2848483								
WG1881756-1 CVS								
F1 (C6-C10)			87.1		%		80-120	29-MAY-14
WG1881756-4 DUP		**WG1881756-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	30-MAY-14
WG1881756-2 MB								
F1 (C6-C10)			<100		ug/L		100	29-MAY-14
Surrogate: 3,4-Dichlorotoluene			130.2		%		60-140	29-MAY-14
F2-F4-WT	Water							
Batch R2852405								
WG1885189-1 CVS								
F2 (C10-C16)			100.2		%		80-120	04-JUN-14
F3 (C16-C34)			98.1		%		80-120	04-JUN-14
F4 (C34-C50)			97.8		%		80-120	04-JUN-14
WG1885189-2 CVS								
F2 (C10-C16)			101.1		%		80-120	04-JUN-14
F3 (C16-C34)			99.5		%		80-120	04-JUN-14
F4 (C34-C50)			98.3		%		80-120	04-JUN-14
WG1884458-2 LCS								
F2 (C10-C16)			109.2		%		65-135	04-JUN-14
F3 (C16-C34)			107.5		%		65-135	04-JUN-14
F4 (C34-C50)			104.0		%		65-135	04-JUN-14
WG1884458-3 LCSD		**WG1884458-2**						
F2 (C10-C16)		109.2	105.7		%	3.3	50	04-JUN-14
F3 (C16-C34)		107.5	106.1		%			04-JUN-14

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2852405								
WG1884458-3 LCSD		**WG1884458-2**						
F3 (C16-C34)		107.5	106.1		%	1.2	50	04-JUN-14
F4 (C34-C50)		104.0	101.1		%	2.8	50	04-JUN-14
WG1884458-1 MB								
F2 (C10-C16)			<100		ug/L		100	04-JUN-14
F3 (C16-C34)			<250		ug/L		250	04-JUN-14
F4 (C34-C50)			<250		ug/L		250	04-JUN-14
Surrogate: 2-Bromobenzotrifluoride			86.9		%		60-140	04-JUN-14
FC-WW-MF-WT	Water							
Batch R2848784								
WG1881404-1 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881404-2 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
HG-T-CVAA-WT	Water							
Batch R2848867								
WG1881718-3 DUP		**L1461462-1**						
Mercury (Hg)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1881718-2 LCS								
Mercury (Hg)-Total			97.5		%		80-120	30-MAY-14
WG1881718-1 MB								
Mercury (Hg)-Total			<0.00010		mg/L		0.0001	30-MAY-14
WG1881718-4 MS		**L1461462-2**						
Mercury (Hg)-Total			103.0		%		70-130	30-MAY-14
MET-T-MS-WT	Water							
Batch R2849986								
WG1882325-1 CVS								
Arsenic (As)-Total			97.6		%		80-120	30-MAY-14
Boron (B)-Total			98.3		%		80-120	30-MAY-14
Cadmium (Cd)-Total			99.3		%		80-120	30-MAY-14
Chromium (Cr)-Total			100.0		%		80-120	30-MAY-14
Cobalt (Co)-Total			101.1		%		80-120	30-MAY-14
Copper (Cu)-Total			98.5		%		80-120	30-MAY-14
Iron (Fe)-Total			99.3		%		80-120	30-MAY-14
Lead (Pb)-Total			102.0		%		80-120	30-MAY-14
Manganese (Mn)-Total			99.3		%		80-120	30-MAY-14

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2849986								
WG1882325-1 CVS								
Molybdenum (Mo)-Total			95.9		%		80-120	30-MAY-14
Nickel (Ni)-Total			100.1		%		80-120	30-MAY-14
Zinc (Zn)-Total			90.2		%		80-120	30-MAY-14
WG1882325-3 CVS								
Arsenic (As)-Total			98.3		%		80-120	02-JUN-14
Boron (B)-Total			96.8		%		80-120	02-JUN-14
Cadmium (Cd)-Total			95.3		%		80-120	02-JUN-14
Chromium (Cr)-Total			98.8		%		80-120	02-JUN-14
Cobalt (Co)-Total			103.4		%		80-120	02-JUN-14
Copper (Cu)-Total			100.3		%		80-120	02-JUN-14
Iron (Fe)-Total			100.5		%		80-120	02-JUN-14
Lead (Pb)-Total			107.9		%		80-120	02-JUN-14
Manganese (Mn)-Total			99.8		%		80-120	02-JUN-14
Molybdenum (Mo)-Total			96.6		%		80-120	02-JUN-14
Nickel (Ni)-Total			99.98		%		80-120	02-JUN-14
Zinc (Zn)-Total			90.4		%		80-120	02-JUN-14
WG1881549-4 DUP		**WG1881549-3**						
Arsenic (As)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	30-MAY-14
Cadmium (Cd)-Total		<0.00090	<0.00090	RPD-NA	mg/L	N/A	20	30-MAY-14
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Cobalt (Co)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Iron (Fe)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-MAY-14
Lead (Pb)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Manganese (Mn)-Total		0.027	0.028		mg/L	3.7	20	30-MAY-14
Molybdenum (Mo)-Total		0.552	0.556		mg/L	0.7	20	30-MAY-14
Nickel (Ni)-Total		0.016	0.016		mg/L	2.6	20	30-MAY-14
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1881549-2 LCS								
Arsenic (As)-Total			90.6		%		80-120	30-MAY-14
Boron (B)-Total			89.5		%		80-120	30-MAY-14
Cadmium (Cd)-Total			92.5		%		80-120	30-MAY-14
Chromium (Cr)-Total			91.6		%		80-120	30-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2849986								
WG1881549-2 LCS								
Cobalt (Co)-Total			93.8		%		80-120	30-MAY-14
Copper (Cu)-Total			90.6		%		80-120	30-MAY-14
Iron (Fe)-Total			94.2		%		80-120	30-MAY-14
Lead (Pb)-Total			99.6		%		80-120	30-MAY-14
Manganese (Mn)-Total			90.7		%		80-120	30-MAY-14
Molybdenum (Mo)-Total			92.3		%		80-120	30-MAY-14
Nickel (Ni)-Total			92.7		%		80-120	30-MAY-14
Zinc (Zn)-Total			90.7		%		80-120	30-MAY-14
WG1881549-1 MB								
Arsenic (As)-Total			<0.0010		mg/L		0.001	30-MAY-14
Boron (B)-Total			<0.010		mg/L		0.01	30-MAY-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	30-MAY-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	30-MAY-14
Iron (Fe)-Total			<0.050		mg/L		0.05	30-MAY-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	30-MAY-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	30-MAY-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-MAY-14
WG1881549-5 MS		**WG1881549-3**						
Arsenic (As)-Total			105.0		%		70-130	30-MAY-14
Cadmium (Cd)-Total			93.0		%		70-130	30-MAY-14
Chromium (Cr)-Total			95.8		%		70-130	30-MAY-14
Cobalt (Co)-Total			101.9		%		70-130	30-MAY-14
Copper (Cu)-Total			92.9		%		70-130	30-MAY-14
Iron (Fe)-Total			111.9		%		70-130	30-MAY-14
Lead (Pb)-Total			95.4		%		70-130	30-MAY-14
Molybdenum (Mo)-Total			N/A	MS-B	%		-	30-MAY-14
Zinc (Zn)-Total			100.9		%		70-130	30-MAY-14
NH3-WT	Water							

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2851623								
WG1884161-2 CVS								
Ammonia, Total (as N)			100.9		%		85-115	03-JUN-14
WG1884161-3 DUP		**L1462363-1**						
Ammonia, Total (as N)		0.128	0.132		mg/L	3.1	20	03-JUN-14
WG1884161-5 DUP		**L1461791-8**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884161-7 DUP		**L1461841-3**						
Ammonia, Total (as N)		0.053	0.060		mg/L	13	20	03-JUN-14
WG1884161-9 DUP		**L1461908-3**						
Ammonia, Total (as N)		0.077	0.098	J	mg/L	0.021	0.1	03-JUN-14
WG1884161-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	03-JUN-14
WG1884161-10 MS		**L1461908-3**						
Ammonia, Total (as N)			112.7		%		75-125	03-JUN-14
WG1884161-4 MS		**L1462363-1**						
Ammonia, Total (as N)			101.1		%		75-125	03-JUN-14
WG1884161-6 MS		**L1461791-8**						
Ammonia, Total (as N)			102.2		%		75-125	03-JUN-14
WG1884161-8 MS		**L1461841-3**						
Ammonia, Total (as N)			101.4		%		75-125	03-JUN-14
NO2-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrite-N (NO2-N)		4.45	4.46		mg/L	0.3	25	02-JUN-14
WG1883427-2 LCS								
Nitrite-N (NO2-N)			98.6		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrite-N (NO2-N)		98.6	98.5		%	0.1	25	02-JUN-14
WG1883427-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrite-N (NO2-N)			93.2		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrite-N (NO2-N)			103.5		%		70-130	02-JUN-14

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrate-N (NO3-N)		15.0	15.0		mg/L	0.1	25	02-JUN-14
WG1883427-2 LCS								
Nitrate-N (NO3-N)			98.8		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrate-N (NO3-N)		98.8	98.7		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrate-N (NO3-N)			89.5		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrate-N (NO3-N)			97.4		%		70-130	02-JUN-14
P-TOTAL-LOW-WT	Water							
Batch R2852270								
WG1884450-3 DUP		**L1461838-1**						
Total Phosphorus		0.0302	0.0306		mg/L	1.5	20	04-JUN-14
WG1884450-5 DUP		**L1461841-6**						
Total Phosphorus		0.0305	0.0285		mg/L	6.9	20	04-JUN-14
WG1884450-7 DUP		**L1461908-3**						
Total Phosphorus		0.0259	0.0277		mg/L	6.6	20	04-JUN-14
WG1884450-2 LCS								
Total Phosphorus			101.5		%		80-120	04-JUN-14
WG1884450-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	04-JUN-14
WG1884450-4 MS		**L1461838-1**						
Total Phosphorus			94.5		%		70-130	04-JUN-14
WG1884450-6 MS		**L1461841-6**						
Total Phosphorus			87.1		%		70-130	04-JUN-14
WG1884450-8 MS		**L1461908-3**						
Total Phosphorus			93.7		%		70-130	04-JUN-14
PAH-CCME-WT	Water							

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2853867								
WG1886485-1 CVS								
Anthracene			114.1		%		60-130	06-JUN-14
Benzo(a)pyrene			108.9		%		70-130	06-JUN-14
WG1884169-2 LCS								
Anthracene			114.4		%		50-140	06-JUN-14
Benzo(a)pyrene			109.1		%		60-130	06-JUN-14
WG1884169-3 LCSD		**WG1884169-2**						
Anthracene		114.4	113.3		%	0.9	50	06-JUN-14
Benzo(a)pyrene		109.1	106.9		%	2.1	50	06-JUN-14
WG1884169-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			85.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			102.6		%		50-150	06-JUN-14
PH-WT	Water							
Batch R2848786								
WG1881798-3 DUP		**WG1881798-2**						
pH		7.92	7.95	J	pH units	0.03	0.2	29-MAY-14
WG1881798-4 DUP		**L1461875-1**						
pH		8.06	8.05	J	pH units	0.01	0.2	29-MAY-14
WG1881798-6 DUP		**L1462157-1**						
pH		7.62	7.63	J	pH units	0.00	0.2	29-MAY-14
WG1881798-7 DUP		**L1462363-1**						
pH		8.39	8.40	J	pH units	0.01	0.2	29-MAY-14
WG1881798-1 LCS								
pH			6.95		pH units		6.9-7.1	29-MAY-14
PHENOLS-4AAP-WT	Water							
Batch R2850923								
WG1883460-3 CVS								
Phenols (4AAP)			93.9		%		85-115	02-JUN-14
WG1883460-4 DUP		**L1461184-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883460-6 DUP		**L1461161-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883460-8 DUP		**L1461791-1**						
Phenols (4AAP)		0.0079	0.0084		mg/L	6.3	20	02-JUN-14
WG1883460-2 LCS								

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R2850923								
WG1883460-2 LCS								
Phenols (4AAP)			106.1		%		85-115	02-JUN-14
WG1883460-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-JUN-14
WG1883460-5 MS		**L1461184-2**						
Phenols (4AAP)			105.6		%		75-125	02-JUN-14
WG1883460-7 MS		**L1461161-1**						
Phenols (4AAP)			105.9		%		75-125	02-JUN-14
WG1883460-9 MS		**L1461791-1**						
Phenols (4AAP)			95.1		%		75-125	02-JUN-14
SO4-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Sulphate (SO4)		240	240		mg/L	0.2	25	02-JUN-14
WG1883427-2 LCS								
Sulphate (SO4)			100.4		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Sulphate (SO4)		100.4	100.4		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Sulphate (SO4)			N/A	MS-B	%		-	02-JUN-14
SOLIDS-TDS-WT	Water							
Batch R2850452								
WG1882930-3 DUP		**L1461892-1**						
Total Dissolved Solids		452	460		mg/L	1.8	20	03-JUN-14
WG1882930-2 LCS								
Total Dissolved Solids			99.9		%		85-115	03-JUN-14
WG1882930-1 MB								
Total Dissolved Solids			<20		mg/L		20	03-JUN-14
SOLIDS-TSS-WT	Water							
Batch R2850038								
WG1881310-3 DUP		**L1461885-1**						
Total Suspended Solids		395	480		mg/L	19	20	30-MAY-14
WG1881310-2 LCS								
Total Suspended Solids			92.0		%		85-115	30-MAY-14
WG1881310-1 MB								

Quality Control Report

Workorder: L1461888 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R2850038								
WG1881310-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-MAY-14
TC-WW-MF-WT	Water							
Batch R2848775								
WG1881411-1 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881411-2 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
TKN-WT	Water							
Batch R2850372								
WG1883411-1 CVS								
Total Kjeldahl Nitrogen			93.7		%		75-125	02-JUN-14
WG1883220-3 DUP		**L1461883-1**						
Total Kjeldahl Nitrogen		34.4	34.0		mg/L	1.1	20	02-JUN-14
WG1883220-4 DUP		**L1461868-1**						
Total Kjeldahl Nitrogen		380	391		mg/L	2.9	20	02-JUN-14
WG1883220-2 LCS								
Total Kjeldahl Nitrogen			100.6		%		75-125	02-JUN-14
WG1883220-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-JUN-14
TURBIDITY-WT	Water							
Batch R2848168								
WG1881265-4 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-7 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-2 DUP		**L1460642-1**						
Turbidity		0.15	0.11	J	NTU	0.040	0.2	29-MAY-14
WG1881265-8 DUP		**L1461921-3**						
Turbidity		145	149		NTU	2.7	20	29-MAY-14
WG1881265-1 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14
WG1881265-5 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CHAIN OF CUSTODY RECORD

COC NO.: 36914

CONESTOGA-ROVERS & ASSOCIATES

Address: 197 COLONNADE ROAD, SUITE 402, OTTAWA L1461888

Phone: 613 727-0510 Fax: _____ PAGE 1 OF 1

B916

(See Reverse Side for Instructions)

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS	**Lab Location:** WATERLOO	**SSOW ID:**
Project Name: ORLEANS WOODS	**Lab Contact:**	**Lab Quote No:** 45804-58	**Cooler No:** 2 of 3
Project Location: OTTAWA			**Carrier:** FedEx
Chemistry Contact: AIRESSE MACPHEE			**Airbill No:** 8652 5577 8475
Sampler(s): M. BOUCHARD			**Date Shipped:** 5/28/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Lt Gen Chem	Dissolved Metals	Bacteria	Radis	F1-F4				MS/MSD Request	Comments/ Special Instructions:
1	SW-45804-052814-MB-001	5/28/14	16:00	WS	G									14	X	X	X	X	X			-1		SURFACE WATER
2	↓ ↓ ↓ ↓ -002	↓	16:10	WS	G									14	X	X	X	X	X			-2		(UNFILTERED)
3																								
4																								PLEASE SEE LAB PO FOR SPECIFIC PARAMETERS
5																								
6																								
7																								
8																								
9																								
10																								
11																								CBODS, COD, DOC, Included
12	MB																							
13																								
14																								
15																								

TOTAL METALS 1



TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 28

All Samples in Cooler must be on COC

Notes/ Special Requirements: SEE LAB P.O.

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	5/28/2014	5h15	1. MK		29 MAY 14	9:00
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

6.30

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

0005986

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 29-MAY-14
Report Date: 08-JUN-14 04:58 (MT)
Version: FINAL REV. 2

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1461908
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Comments:
8-JUN-2014 Revised PAH list

Wayne Smith, C.Chem., C.E.T.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461908-1 SW-45804-052814-MB-003 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:20 Matrix: SURFACE WATER							
Field Tests							
pH, Client Supplied	8.14		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	20.4		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	16.3		1.0	C.U.		30-MAY-14	R2848799
pH	8.12		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	7.2		2.0	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	1040		20	mg/L	31-MAY-14	03-JUN-14	R2850452
Turbidity	4.83		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	136		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0068		0.0032	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.105		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	100		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	0.33		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	0.49		0.15	mg/L	01-JUN-14	02-JUN-14	R2850372
Total Phosphorus	0.0183		0.0030	mg/L		04-JUN-14	R2852270
Sulphate (SO4)	489		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.2		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	10	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	20	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	2200	DLM	100	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Total Metals							
Arsenic (As)-Total	<0.010	DLM	0.010	mg/L	29-MAY-14	30-MAY-14	R2849986
Boron (B)-Total	<0.10	DLM	0.10	mg/L	29-MAY-14	30-MAY-14	R2849986
Cadmium (Cd)-Total	<0.00090	DLM	0.00090	mg/L	29-MAY-14	30-MAY-14	R2849986
Chromium (Cr)-Total	<0.0050	DLM	0.0050	mg/L	29-MAY-14	30-MAY-14	R2849986
Cobalt (Co)-Total	<0.0050	DLM	0.0050	mg/L	29-MAY-14	30-MAY-14	R2849986
Copper (Cu)-Total	<0.010	DLM	0.010	mg/L	29-MAY-14	30-MAY-14	R2849986
Iron (Fe)-Total	<0.50	DLM	0.50	mg/L	29-MAY-14	30-MAY-14	R2849986
Lead (Pb)-Total	<0.0050	DLM	0.0050	mg/L	29-MAY-14	30-MAY-14	R2849986
Manganese (Mn)-Total	0.028	DLM	0.010	mg/L	29-MAY-14	30-MAY-14	R2849986
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848867
Molybdenum (Mo)-Total	0.585	DLM	0.0050	mg/L	29-MAY-14	02-JUN-14	R2849986
Nickel (Ni)-Total	0.016	DLM	0.010	mg/L	29-MAY-14	30-MAY-14	R2849986
Zinc (Zn)-Total	<0.030	DLM	0.030	mg/L	29-MAY-14	30-MAY-14	R2849986
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	10		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0036		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461908-1 SW-45804-052814-MB-003 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:20 Matrix: SURFACE WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	84.9		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	87.4		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	98.7		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	112.3		50-150	%	03-JUN-14	06-JUN-14	R2853867
L1461908-2 SW-45804-052814-MB-004 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:25 Matrix: SURFACE WATER							
Field Tests							
pH, Client Supplied	8.22		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	17.6		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	30.9		1.0	C.U.		30-MAY-14	R2848799
pH	8.23		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	6.8		2.0	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	875		20	mg/L	31-MAY-14	03-JUN-14	R2850452
Turbidity	3.24		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	216		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0045		0.0032	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.071		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	120		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	0.25		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	01-JUN-14	02-JUN-14	R2850372
Total Phosphorus	0.0210		0.0030	mg/L		04-JUN-14	R2852270
Sulphate (SO4)	305		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.3		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	40	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848781

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461908-2 SW-45804-052814-MB-004 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:25 Matrix: SURFACE WATER							
Bacteriological Tests							
Fecal Coliforms	50	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	2700	DLM	100	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Boron (B)-Total	<0.050		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	29-MAY-14	30-MAY-14	R2849986
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Cobalt (Co)-Total	0.00051		0.00050	mg/L	29-MAY-14	30-MAY-14	R2849986
Copper (Cu)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Iron (Fe)-Total	0.229		0.050	mg/L	29-MAY-14	30-MAY-14	R2849986
Lead (Pb)-Total	<0.0010		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Manganese (Mn)-Total	0.110		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848867
Molybdenum (Mo)-Total	0.157		0.0010	mg/L	29-MAY-14	30-MAY-14	R2849986
Nickel (Ni)-Total	0.0056		0.0020	mg/L	29-MAY-14	30-MAY-14	R2849986
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	29-MAY-14	30-MAY-14	R2849986
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	21		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0044		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	86.1		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	84.3		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	93.9		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	107.9		50-150	%	03-JUN-14	06-JUN-14	R2853867
L1461908-3 SW-45804-052814-MB-005 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:30 Matrix: SURFACE WATER							
Field Tests							
pH, Client Supplied	8.21		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	18.0		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461908-3 SW-45804-052814-MB-005 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:30 Matrix: SURFACE WATER							
Field Tests							
Physical Tests							
Color, Apparent	37.4		1.0	C.U.		30-MAY-14	R2848799
pH	8.25		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	5.2		2.0	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	730		20	mg/L	31-MAY-14	03-JUN-14	R2851466
Turbidity	3.52		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	234		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0049		0.0032	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.077		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	119		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	0.18		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	0.65		0.15	mg/L	01-JUN-14	02-JUN-14	R2850372
Total Phosphorus	0.0259		0.0030	mg/L		04-JUN-14	R2852270
Sulphate (SO4)	188		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.8		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	70	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	100	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	2900	DLM	100	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2851468
Boron (B)-Total	<0.050		0.050	mg/L	30-MAY-14	03-JUN-14	R2851468
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	30-MAY-14	03-JUN-14	R2851468
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2851468
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	30-MAY-14	03-JUN-14	R2851468
Copper (Cu)-Total	0.0011		0.0010	mg/L	30-MAY-14	03-JUN-14	R2851468
Iron (Fe)-Total	0.385		0.050	mg/L	30-MAY-14	03-JUN-14	R2851468
Lead (Pb)-Total	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2851468
Manganese (Mn)-Total	0.133		0.0010	mg/L	30-MAY-14	03-JUN-14	R2851468
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848867
Molybdenum (Mo)-Total	0.0080		0.0010	mg/L	30-MAY-14	04-JUN-14	R2851468
Nickel (Ni)-Total	0.0024		0.0020	mg/L	30-MAY-14	03-JUN-14	R2851468
Zinc (Zn)-Total	0.0046		0.0030	mg/L	30-MAY-14	03-JUN-14	R2851468
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	25		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0020		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461908-3 SW-45804-052814-MB-005 Sampled By: M. BOUCHARD on 28-MAY-14 @ 16:30 Matrix: SURFACE WATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	90.6		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	77.3		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	64.5		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	72.4		50-150	%	03-JUN-14	06-JUN-14	R2853867

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Total	DLM	L1461908-1, -2
Duplicate	Boron (B)-Total	DLM	L1461908-1, -2
Duplicate	Cadmium (Cd)-Total	DLM	L1461908-1, -2
Duplicate	Chromium (Cr)-Total	DLM	L1461908-1, -2
Duplicate	Cobalt (Co)-Total	DLM	L1461908-1, -2
Duplicate	Copper (Cu)-Total	DLM	L1461908-1, -2
Duplicate	Iron (Fe)-Total	DLM	L1461908-1, -2
Duplicate	Lead (Pb)-Total	DLM	L1461908-1, -2
Duplicate	Manganese (Mn)-Total	DLM	L1461908-1, -2
Duplicate	Molybdenum (Mo)-Total	DLM	L1461908-1, -2
Duplicate	Nickel (Ni)-Total	DLM	L1461908-1, -2
Duplicate	Zinc (Zn)-Total	DLM	L1461908-1, -2
Duplicate	Total Suspended Solids	DLM	L1461908-1, -2, -3
Matrix Spike	Molybdenum (Mo)-Total	MS-B	L1461908-1, -2
Matrix Spike	Chloride (Cl)	MS-B	L1461908-1, -2, -3
Matrix Spike	Sulphate (SO4)	MS-B	L1461908-1, -2, -3
Duplicate	Color, Apparent	PEHT	L1461908-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-WW-MF-WT	Water	E. Coli	SM 9222D
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:

Reference Information

1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-WW-MF-WT Water Fecal Coliforms SM 9222D

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

MET-T-MS-WT Water Total Metals in Water by ICPMS EPA 200.8
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-LOW-WT Water Phosphorus, Total, Low Level APHA 4500-P B E
This analysis is carried by out an discrete colorimetric auto-analyzer using procedures adapted from APHA Method 4500-P "Phosphorus".

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-WW-MF-WT Water Total Coliforms SM 9222B

Reference Information

Water sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2852238								
WG1884758-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.6		%		80-120	03-JUN-14
WG1884758-2 CVS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	03-JUN-14
WG1884758-4 DUP		**L1461791-4**						
Alkalinity, Total (as CaCO3)		344	334		mg/L	2.9	20	03-JUN-14
WG1884758-5 DUP		**L1461921-1**						
Alkalinity, Total (as CaCO3)		466	468		mg/L	0.3	20	03-JUN-14
WG1884758-6 DUP		**L1462714-1**						
Alkalinity, Total (as CaCO3)		243	239		mg/L	1.7	20	03-JUN-14
WG1884758-7 DUP		**L1463704-1**						
Alkalinity, Total (as CaCO3)		228	232		mg/L	1.7	20	03-JUN-14
WG1884758-8 DUP		**L1464009-4**						
Alkalinity, Total (as CaCO3)		26	25		mg/L	3.6	20	03-JUN-14
WG1884758-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	03-JUN-14
BOD-C-WT	Water							
Batch R2851464								
WG1881433-2 DUP		**L1461992-1**						
BOD Carbonaceous		705	690		mg/L	2.2	20	03-JUN-14
WG1881433-4 DUP		**L1461995-1**						
BOD Carbonaceous		565	564		mg/L	0.2	20	03-JUN-14
WG1881433-3 LCS								
BOD Carbonaceous			101.5		%		85-115	03-JUN-14
WG1881433-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	03-JUN-14
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-5 DUP		**L1461122-5**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-8 DUP		**L1461892-2**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-2 LCS								
Dissolved Organic Carbon			96.0		%		80-120	30-MAY-14
WG1882027-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	30-MAY-14
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4				70-130	

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4		%		70-130	30-MAY-14
CL-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Chloride (Cl)		84.2	84.2		mg/L	0.1	20	02-JUN-14
WG1883427-2 LCS								
Chloride (Cl)			100.3		%		85-115	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Chloride (Cl)		100.3	100.3		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Chloride (Cl)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Chloride (Cl)			N/A	MS-B	%		-	02-JUN-14
COD-WT	Water							
Batch R2851550								
WG1884091-3 DUP		**L1461791-5**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884091-5 DUP		**L1461921-3**						
COD		34	36		mg/L	5.7	20	03-JUN-14
WG1884091-2 LCS								
COD			102.0		%		80-120	03-JUN-14
WG1884091-1 MB								
COD			<10		mg/L		10	03-JUN-14
WG1884091-4 MS		**L1461791-5**						
COD			109.0		%		85-115	03-JUN-14
COLOUR-WT	Water							
Batch R2848799								
WG1882208-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			96.9		%		80-120	30-MAY-14
WG1882208-2 CVS								
Color, Apparent			98.9		%		85-115	30-MAY-14
WG1882208-4 DUP		**L1461872-1**						
Color, Apparent		7.9	8.4		C.U.	5.7	20	30-MAY-14
WG1882208-5 DUP		**L1462593-1**						
Color, Apparent		2.7	2.2		C.U.	18	20	30-MAY-14
WG1882208-1 MB								

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COLOUR-WT	Water							
Batch R2848799								
WG1882208-1 MB								
Color, Apparent			<1.0		C.U.		1	30-MAY-14
EC-WW-MF-WT	Water							
Batch R2848781								
WG1881407-1 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-2 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-5 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
F1-HS-WT	Water							
Batch R2848483								
WG1881756-1 CVS								
F1 (C6-C10)			87.1		%		80-120	29-MAY-14
WG1881756-4 DUP		**WG1881756-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	30-MAY-14
WG1881756-2 MB								
F1 (C6-C10)			<100		ug/L		100	29-MAY-14
Surrogate: 3,4-Dichlorotoluene			130.2		%		60-140	29-MAY-14
F2-F4-WT	Water							
Batch R2852405								
WG1885189-1 CVS								
F2 (C10-C16)			100.2		%		80-120	04-JUN-14
F3 (C16-C34)			98.1		%		80-120	04-JUN-14
F4 (C34-C50)			97.8		%		80-120	04-JUN-14
WG1885189-2 CVS								
F2 (C10-C16)			101.1		%		80-120	04-JUN-14
F3 (C16-C34)			99.5		%		80-120	04-JUN-14
F4 (C34-C50)			98.3		%		80-120	04-JUN-14
WG1884458-2 LCS								
F2 (C10-C16)			109.2		%		65-135	04-JUN-14
F3 (C16-C34)			107.5		%		65-135	04-JUN-14
F4 (C34-C50)			104.0		%		65-135	04-JUN-14
WG1884458-3 LCSD		**WG1884458-2**						
F2 (C10-C16)		109.2	105.7		%	3.3	50	04-JUN-14
F3 (C16-C34)		107.5	106.1		%			04-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2852405								
WG1884458-3 LCSD		**WG1884458-2**						
F3 (C16-C34)		107.5	106.1		%	1.2	50	04-JUN-14
F4 (C34-C50)		104.0	101.1		%	2.8	50	04-JUN-14
WG1884458-1 MB								
F2 (C10-C16)			<100		ug/L		100	04-JUN-14
F3 (C16-C34)			<250		ug/L		250	04-JUN-14
F4 (C34-C50)			<250		ug/L		250	04-JUN-14
Surrogate: 2-Bromobenzotrifluoride			86.9		%		60-140	04-JUN-14
FC-WW-MF-WT	Water							
Batch R2848784								
WG1881404-1 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881404-2 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
HG-T-CVAA-WT	Water							
Batch R2848867								
WG1881718-3 DUP		**L1461462-1**						
Mercury (Hg)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1881718-2 LCS								
Mercury (Hg)-Total			97.5		%		80-120	30-MAY-14
WG1881718-1 MB								
Mercury (Hg)-Total			<0.00010		mg/L		0.0001	30-MAY-14
WG1881718-4 MS		**L1461462-2**						
Mercury (Hg)-Total			103.0		%		70-130	30-MAY-14
MET-T-MS-WT	Water							
Batch R2849986								
WG1882325-1 CVS								
Arsenic (As)-Total			97.6		%		80-120	30-MAY-14
Boron (B)-Total			98.3		%		80-120	30-MAY-14
Cadmium (Cd)-Total			99.3		%		80-120	30-MAY-14
Chromium (Cr)-Total			100.0		%		80-120	30-MAY-14
Cobalt (Co)-Total			101.1		%		80-120	30-MAY-14
Copper (Cu)-Total			98.5		%		80-120	30-MAY-14
Iron (Fe)-Total			99.3		%		80-120	30-MAY-14
Lead (Pb)-Total			102.0		%		80-120	30-MAY-14
Manganese (Mn)-Total			99.3		%		80-120	30-MAY-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2849986								
WG1882325-1 CVS								
Molybdenum (Mo)-Total			95.9		%		80-120	30-MAY-14
Nickel (Ni)-Total			100.1		%		80-120	30-MAY-14
Zinc (Zn)-Total			90.2		%		80-120	30-MAY-14
WG1882325-3 CVS								
Arsenic (As)-Total			98.3		%		80-120	02-JUN-14
Boron (B)-Total			96.8		%		80-120	02-JUN-14
Cadmium (Cd)-Total			95.3		%		80-120	02-JUN-14
Chromium (Cr)-Total			98.8		%		80-120	02-JUN-14
Cobalt (Co)-Total			103.4		%		80-120	02-JUN-14
Copper (Cu)-Total			100.3		%		80-120	02-JUN-14
Iron (Fe)-Total			100.5		%		80-120	02-JUN-14
Lead (Pb)-Total			107.9		%		80-120	02-JUN-14
Manganese (Mn)-Total			99.8		%		80-120	02-JUN-14
Molybdenum (Mo)-Total			96.6		%		80-120	02-JUN-14
Nickel (Ni)-Total			99.98		%		80-120	02-JUN-14
Zinc (Zn)-Total			90.4		%		80-120	02-JUN-14
WG1881549-4 DUP		**WG1881549-3**						
Arsenic (As)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	30-MAY-14
Cadmium (Cd)-Total		<0.00090	<0.00090	RPD-NA	mg/L	N/A	20	30-MAY-14
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Cobalt (Co)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Iron (Fe)-Total		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-MAY-14
Lead (Pb)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Manganese (Mn)-Total		0.027	0.028		mg/L	3.7	20	30-MAY-14
Molybdenum (Mo)-Total		0.552	0.556		mg/L	0.7	20	30-MAY-14
Nickel (Ni)-Total		0.016	0.016		mg/L	2.6	20	30-MAY-14
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1881549-2 LCS								
Arsenic (As)-Total			90.6		%		80-120	30-MAY-14
Boron (B)-Total			89.5		%		80-120	30-MAY-14
Cadmium (Cd)-Total			92.5		%		80-120	30-MAY-14
Chromium (Cr)-Total			91.6		%		80-120	30-MAY-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2849986								
WG1881549-2 LCS								
Cobalt (Co)-Total			93.8		%		80-120	30-MAY-14
Copper (Cu)-Total			90.6		%		80-120	30-MAY-14
Iron (Fe)-Total			94.2		%		80-120	30-MAY-14
Lead (Pb)-Total			99.6		%		80-120	30-MAY-14
Manganese (Mn)-Total			90.7		%		80-120	30-MAY-14
Molybdenum (Mo)-Total			92.3		%		80-120	30-MAY-14
Nickel (Ni)-Total			92.7		%		80-120	30-MAY-14
Zinc (Zn)-Total			90.7		%		80-120	30-MAY-14
WG1881549-1 MB								
Arsenic (As)-Total			<0.0010		mg/L		0.001	30-MAY-14
Boron (B)-Total			<0.010		mg/L		0.01	30-MAY-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	30-MAY-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	30-MAY-14
Iron (Fe)-Total			<0.050		mg/L		0.05	30-MAY-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	30-MAY-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	30-MAY-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	30-MAY-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	30-MAY-14
WG1881549-5 MS		**WG1881549-3**						
Arsenic (As)-Total			105.0		%		70-130	30-MAY-14
Cadmium (Cd)-Total			93.0		%		70-130	30-MAY-14
Chromium (Cr)-Total			95.8		%		70-130	30-MAY-14
Cobalt (Co)-Total			101.9		%		70-130	30-MAY-14
Copper (Cu)-Total			92.9		%		70-130	30-MAY-14
Iron (Fe)-Total			111.9		%		70-130	30-MAY-14
Lead (Pb)-Total			95.4		%		70-130	30-MAY-14
Molybdenum (Mo)-Total			N/A	MS-B	%		-	30-MAY-14
Zinc (Zn)-Total			100.9		%		70-130	30-MAY-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2851468								
WG1883652-1 CVS								
Arsenic (As)-Total			98.0		%		80-120	03-JUN-14
Boron (B)-Total			96.9		%		80-120	03-JUN-14
Cadmium (Cd)-Total			97.6		%		80-120	03-JUN-14
Chromium (Cr)-Total			99.3		%		80-120	03-JUN-14
Cobalt (Co)-Total			98.9		%		80-120	03-JUN-14
Copper (Cu)-Total			99.6		%		80-120	03-JUN-14
Iron (Fe)-Total			100.8		%		80-120	03-JUN-14
Lead (Pb)-Total			98.9		%		80-120	03-JUN-14
Manganese (Mn)-Total			99.8		%		80-120	03-JUN-14
Molybdenum (Mo)-Total			95.2		%		80-120	03-JUN-14
Nickel (Ni)-Total			99.8		%		80-120	03-JUN-14
Zinc (Zn)-Total			93.0		%		80-120	03-JUN-14
WG1883652-3 CVS								
Arsenic (As)-Total			96.2		%		80-120	04-JUN-14
Boron (B)-Total			92.7		%		80-120	04-JUN-14
Cadmium (Cd)-Total			97.1		%		80-120	04-JUN-14
Chromium (Cr)-Total			97.3		%		80-120	04-JUN-14
Cobalt (Co)-Total			96.6		%		80-120	04-JUN-14
Copper (Cu)-Total			96.5		%		80-120	04-JUN-14
Iron (Fe)-Total			100.2		%		80-120	04-JUN-14
Lead (Pb)-Total			97.8		%		80-120	04-JUN-14
Manganese (Mn)-Total			101.1		%		80-120	04-JUN-14
Molybdenum (Mo)-Total			94.5		%		80-120	04-JUN-14
Nickel (Ni)-Total			96.4		%		80-120	04-JUN-14
Zinc (Zn)-Total			88.1		%		80-120	04-JUN-14
WG1882005-4 DUP		**WG1882005-3**						
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUN-14
Boron (B)-Total		0.023	0.024		mg/L	5.4	20	04-JUN-14
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	04-JUN-14
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUN-14
Cobalt (Co)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUN-14
Copper (Cu)-Total		0.0026	0.0028		mg/L	4.2	20	04-JUN-14
Iron (Fe)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUN-14
Lead (Pb)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	04-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2851468								
WG1882005-4 DUP		**WG1882005-3**						
Manganese (Mn)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUN-14
Molybdenum (Mo)-Total		0.00120	0.00126		mg/L	4.7	20	04-JUN-14
Nickel (Ni)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	04-JUN-14
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1882005-2 LCS								
Arsenic (As)-Total			95.5		%		80-120	03-JUN-14
Boron (B)-Total			87.9		%		80-120	03-JUN-14
Cadmium (Cd)-Total			96.1		%		80-120	03-JUN-14
Chromium (Cr)-Total			94.9		%		80-120	03-JUN-14
Cobalt (Co)-Total			95.0		%		80-120	03-JUN-14
Copper (Cu)-Total			95.1		%		80-120	03-JUN-14
Iron (Fe)-Total			96.6		%		80-120	03-JUN-14
Lead (Pb)-Total			95.3		%		80-120	03-JUN-14
Manganese (Mn)-Total			96.6		%		80-120	03-JUN-14
Molybdenum (Mo)-Total			94.8		%		80-120	03-JUN-14
Nickel (Ni)-Total			95.8		%		80-120	03-JUN-14
Zinc (Zn)-Total			94.8		%		80-120	03-JUN-14
WG1882005-1 MB								
Arsenic (As)-Total			<0.0010		mg/L		0.001	03-JUN-14
Boron (B)-Total			<0.010		mg/L		0.01	03-JUN-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	03-JUN-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	03-JUN-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	03-JUN-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	03-JUN-14
Iron (Fe)-Total			<0.050		mg/L		0.05	03-JUN-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	03-JUN-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	03-JUN-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	03-JUN-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	03-JUN-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	03-JUN-14
WG1882005-5 MS		**WG1882005-3**						
Arsenic (As)-Total			98.2		%		70-130	04-JUN-14
Boron (B)-Total			86.9		%		70-130	04-JUN-14
Cadmium (Cd)-Total			96.3		%		70-130	04-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R2851468								
WG1882005-5 MS		**WG1882005-3**						
Chromium (Cr)-Total			95.5		%		70-130	04-JUN-14
Cobalt (Co)-Total			93.8		%		70-130	04-JUN-14
Copper (Cu)-Total			92.6		%		70-130	04-JUN-14
Iron (Fe)-Total			96.5		%		70-130	04-JUN-14
Lead (Pb)-Total			92.5		%		70-130	04-JUN-14
Manganese (Mn)-Total			97.7		%		70-130	04-JUN-14
Molybdenum (Mo)-Total			96.6		%		70-130	04-JUN-14
Nickel (Ni)-Total			93.9		%		70-130	04-JUN-14
Zinc (Zn)-Total			93.2		%		70-130	04-JUN-14
NH3-WT	Water							
Batch R2851623								
WG1884161-2 CVS								
Ammonia, Total (as N)			100.9		%		85-115	03-JUN-14
WG1884161-3 DUP		**L1462363-1**						
Ammonia, Total (as N)		0.128	0.132		mg/L	3.1	20	03-JUN-14
WG1884161-5 DUP		**L1461791-8**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884161-7 DUP		**L1461841-3**						
Ammonia, Total (as N)		0.053	0.060		mg/L	13	20	03-JUN-14
WG1884161-9 DUP		**L1461908-3**						
Ammonia, Total (as N)		0.077	0.098	J	mg/L	0.021	0.1	03-JUN-14
WG1884161-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	03-JUN-14
WG1884161-10 MS		**L1461908-3**						
Ammonia, Total (as N)			112.7		%		75-125	03-JUN-14
WG1884161-4 MS		**L1462363-1**						
Ammonia, Total (as N)			101.1		%		75-125	03-JUN-14
WG1884161-6 MS		**L1461791-8**						
Ammonia, Total (as N)			102.2		%		75-125	03-JUN-14
WG1884161-8 MS		**L1461841-3**						
Ammonia, Total (as N)			101.4		%		75-125	03-JUN-14
NO2-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrite-N (NO2-N)		4.45	4.46		mg/L	0.3	25	02-JUN-14
WG1883427-2 LCS								
Nitrite-N (NO2-N)			98.6		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrite-N (NO2-N)		98.6	98.5		%	0.1	25	02-JUN-14
WG1883427-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrite-N (NO2-N)			93.2		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrite-N (NO2-N)			103.5		%		70-130	02-JUN-14
NO3-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrate-N (NO3-N)		15.0	15.0		mg/L	0.1	25	02-JUN-14
WG1883427-2 LCS								
Nitrate-N (NO3-N)			98.8		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrate-N (NO3-N)		98.8	98.7		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrate-N (NO3-N)			89.5		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrate-N (NO3-N)			97.4		%		70-130	02-JUN-14
P-TOTAL-LOW-WT	Water							
Batch R2852270								
WG1884450-3 DUP		**L1461838-1**						
Total Phosphorus		0.0302	0.0306		mg/L	1.5	20	04-JUN-14
WG1884450-5 DUP		**L1461841-6**						
Total Phosphorus		0.0305	0.0285		mg/L			04-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-LOW-WT	Water							
Batch R2852270								
WG1884450-5 DUP		**L1461841-6**						
Total Phosphorus		0.0305	0.0285		mg/L	6.9	20	04-JUN-14
WG1884450-7 DUP		**L1461908-3**						
Total Phosphorus		0.0259	0.0277		mg/L	6.6	20	04-JUN-14
WG1884450-2 LCS								
Total Phosphorus			101.5		%		80-120	04-JUN-14
WG1884450-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	04-JUN-14
WG1884450-4 MS		**L1461838-1**						
Total Phosphorus			94.5		%		70-130	04-JUN-14
WG1884450-6 MS		**L1461841-6**						
Total Phosphorus			87.1		%		70-130	04-JUN-14
WG1884450-8 MS		**L1461908-3**						
Total Phosphorus			93.7		%		70-130	04-JUN-14
PAH-CCME-WT	Water							
Batch R2853867								
WG1886485-1 CVS								
Anthracene			114.1		%		60-130	06-JUN-14
Benzo(a)pyrene			108.9		%		70-130	06-JUN-14
WG1884169-2 LCS								
Anthracene			114.4		%		50-140	06-JUN-14
Benzo(a)pyrene			109.1		%		60-130	06-JUN-14
WG1884169-3 LCSD		**WG1884169-2**						
Anthracene		114.4	113.3		%	0.9	50	06-JUN-14
Benzo(a)pyrene		109.1	106.9		%	2.1	50	06-JUN-14
WG1884169-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			85.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			102.6		%		50-150	06-JUN-14
PH-WT	Water							
Batch R2848786								
WG1881798-3 DUP		**WG1881798-2**						
pH		7.92	7.95	J	pH units	0.03	0.2	29-MAY-14
WG1881798-4 DUP		**L1461875-1**						
pH		8.06	8.05	J	pH units	0.01	0.2	29-MAY-14
WG1881798-6 DUP		**L1462157-1**						

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R2848786								
WG1881798-6 DUP		**L1462157-1**						
pH		7.62	7.63	J	pH units	0.00	0.2	29-MAY-14
WG1881798-7 DUP		**L1462363-1**						
pH		8.39	8.40	J	pH units	0.01	0.2	29-MAY-14
WG1881798-1 LCS								
pH			6.95		pH units		6.9-7.1	29-MAY-14
PHENOLS-4AAP-WT	Water							
Batch R2850923								
WG1883460-3 CVS								
Phenols (4AAP)			93.9		%		85-115	02-JUN-14
WG1883460-4 DUP		**L1461184-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883460-6 DUP		**L1461161-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883460-8 DUP		**L1461791-1**						
Phenols (4AAP)		0.0079	0.0084		mg/L	6.3	20	02-JUN-14
WG1883460-2 LCS								
Phenols (4AAP)			106.1		%		85-115	02-JUN-14
WG1883460-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-JUN-14
WG1883460-5 MS		**L1461184-2**						
Phenols (4AAP)			105.6		%		75-125	02-JUN-14
WG1883460-7 MS		**L1461161-1**						
Phenols (4AAP)			105.9		%		75-125	02-JUN-14
WG1883460-9 MS		**L1461791-1**						
Phenols (4AAP)			95.1		%		75-125	02-JUN-14
SO4-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Sulphate (SO4)		240	240		mg/L	0.2	25	02-JUN-14
WG1883427-2 LCS								
Sulphate (SO4)			100.4		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Sulphate (SO4)		100.4	100.4		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Sulphate (SO4)			N/A	MS-B	%		-	02-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R2850452								
WG1882930-3 DUP		**L1461892-1**						
Total Dissolved Solids		452	460		mg/L	1.8	20	03-JUN-14
WG1882930-2 LCS								
Total Dissolved Solids			99.9		%		85-115	03-JUN-14
WG1882930-1 MB								
Total Dissolved Solids			<20		mg/L		20	03-JUN-14
Batch R2851466								
WG1882964-3 DUP		**L1463204-1**						
Total Dissolved Solids		879	884		mg/L	0.6	20	03-JUN-14
WG1882964-2 LCS								
Total Dissolved Solids			102.1		%		85-115	03-JUN-14
WG1882964-1 MB								
Total Dissolved Solids			<20		mg/L		20	03-JUN-14
SOLIDS-TSS-WT	Water							
Batch R2850607								
WG1882169-3 DUP		**L1461129-1**						
Total Suspended Solids		470	450		mg/L	4.3	20	02-JUN-14
WG1883505-2 LCS								
Total Suspended Solids			102.8		%		85-115	02-JUN-14
WG1883505-1 MB								
Total Suspended Solids			<2.0		mg/L		2	02-JUN-14
TC-WW-MF-WT	Water							
Batch R2848775								
WG1881411-1 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881411-2 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
TKN-WT	Water							
Batch R2850372								
WG1883411-1 CVS								
Total Kjeldahl Nitrogen			93.7		%		75-125	02-JUN-14
WG1883220-3 DUP		**L1461883-1**						
Total Kjeldahl Nitrogen		34.4	34.0		mg/L	1.1	20	02-JUN-14
WG1883220-4 DUP		**L1461868-1**						
Total Kjeldahl Nitrogen		380	391		mg/L	2.9	20	02-JUN-14
WG1883220-2 LCS								
Total Kjeldahl Nitrogen			100.6		%		75-125	02-JUN-14

Quality Control Report

Workorder: L1461908 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R2850372								
WG1883220-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-JUN-14
TURBIDITY-WT	Water							
Batch R2848168								
WG1881265-4 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-7 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-2 DUP		**L1460642-1**						
Turbidity		0.15	0.11	J	NTU	0.040	0.2	29-MAY-14
WG1881265-8 DUP		**L1461921-3**						
Turbidity		145	149		NTU	2.7	20	29-MAY-14
WG1881265-1 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14
WG1881265-5 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CHAIN OF CUSTODY RECORD

L1461908 COC NO.: 36915

PAGE 1 OF 1

B916

(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES

Address: 1979 COLONNADE ROAD, SUITE 400, OTTAWA

Phone: 613 729-0510 Fax:

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS	**Lab Location:** WATERLOO	**SSOW ID:**
Project Name: ORGALWORLD	**Lab Contact:**	**Lab Quote No:** 45804-58	**Cooler No:** 3 of 3
Project Location: OTTAWA			**Carrier:** FEDEX
Chemistry Contact: AIRESSE MACPHEE			**Airbill No:** 8652 5877 8475
Sampler(s): M. BOUCHARD			**Date Shipped:** 5/28/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested: General Chem	Total Metals	Bacterial	PAHs	PHC F1-F4			MS/MSD Request	Comments/ Special Instructions:
1	SW-45804-052814-MB-003	5/28/14	1620	WS	G									14	X	X	X	X	X		-1		SURFACE WATER (UNFILTERED)
2	↓ ↓ ↓ ↓ -004		1625	WS	G									14	X	X	X	X	X		-2		
3	↓ ↓ ↓ ↓ -005	↓	1630	WS	G									14	X	X	X	X	X		-3		
4																							PLEASE SEE P.O. FOR SPECIFIC PARAMETERS.
5																							
6																							
7																							
8																							
9								MP															
10																							CBODS, COD, DOC, included.
11																							
12																							
13																			-005 1L Broke in transit				
14																							
15																							

L1461908-COFC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 42

All Samples in Cooler must be on COC

Notes/ Special Requirements: SEE LAB P.O.

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	5/28/14	5h15	1. Nancy Smith	29-May-14	9:00am	
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

000611

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

6.3

CRA Form: COC-10B (20110804)

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 29-MAY-14
Report Date: 08-JUN-14 05:07 (MT)
Version: FINAL REV. 2

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1461921
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Comments:
8-JUN-2014 Revised PAH list

Wayne Smith, C.Chem., C.E.T.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461921-1 GW-45804-052814-MB-001 Sampled By: M. BOUCHARD on 28-MAY-14 @ 11:00 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.22		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	10.4		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	34.8		1.0	C.U.		30-MAY-14	R2848799
pH	7.76		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	10.0		2.0	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	1030		20	mg/L	31-MAY-14	03-JUN-14	R2851466
Turbidity	23.5		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	466		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0104		0.00019	mg/L		04-JUN-14	
Ammonia, Total (as N)	2.69		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	103		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	0.15		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	2.65		0.15	mg/L	29-MAY-14	30-MAY-14	R2850061
Phosphorus, Total	<0.030		0.030	mg/L	01-JUN-14	02-JUN-14	R2850385
Sulphate (SO4)	279		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.2		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	0		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	10	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-MAY-14	R2848428
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848442
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Boron (B)-Dissolved	0.099		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848871
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	30-MAY-14	R2848871
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Iron (Fe)-Dissolved	3.06		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Manganese (Mn)-Dissolved	1.34		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848870
Molybdenum (Mo)-Dissolved	0.0133		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	30-MAY-14	R2848871
Zinc (Zn)-Dissolved	0.0075		0.0030	mg/L	30-MAY-14	30-MAY-14	R2848871
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461921-1 GW-45804-052814-MB-001 Sampled By: M. BOUCHARD on 28-MAY-14 @ 11:00 Matrix: GROUNDWATER							
Aggregate Organics							
COD	19		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0030		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	85.3		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	114.9		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	92.4		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	106.6		50-150	%	03-JUN-14	06-JUN-14	R2853867
L1461921-2 GW-45804-052814-MB-002 Sampled By: M. BOUCHARD on 28-MAY-14 @ 12:00 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.13		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	11.6		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	45.7		1.0	C.U.		30-MAY-14	R2848799
pH	7.48		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	6.4		2.0	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	1400		20	mg/L	31-MAY-14	03-JUN-14	R2851466
Turbidity	14.5		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	570		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0128		0.00017	mg/L		04-JUN-14	
Ammonia, Total (as N)	3.72		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	170		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	3.52		0.15	mg/L	29-MAY-14	30-MAY-14	R2850061
Phosphorus, Total	<0.030		0.030	mg/L	01-JUN-14	02-JUN-14	R2850385
Sulphate (SO4)	355		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.4		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461921-2 GW-45804-052814-MB-002 Sampled By: M. BOUCHARD on 28-MAY-14 @ 12:00 Matrix: GROUNDWATER							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	0		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	0		0	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-MAY-14	R2848428
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848442
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Boron (B)-Dissolved	0.079		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848871
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	30-MAY-14	R2848871
Copper (Cu)-Dissolved	0.0134		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Iron (Fe)-Dissolved	1.72		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Manganese (Mn)-Dissolved	1.30		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848870
Molybdenum (Mo)-Dissolved	0.0041		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Nickel (Ni)-Dissolved	0.0022		0.0020	mg/L	30-MAY-14	30-MAY-14	R2848871
Zinc (Zn)-Dissolved	0.0044		0.0030	mg/L	30-MAY-14	30-MAY-14	R2848871
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464
COD	23		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0023		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	84.9		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	84.1		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	92.1		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	110.4		50-150	%	03-JUN-14	06-JUN-14	R2853867
L1461921-3 GW-45804-052814-MB-003 Sampled By: M. BOUCHARD on 28-MAY-14 @ 15:00 Matrix: GROUNDWATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461921-3 GW-45804-052814-MB-003 Sampled By: M. BOUCHARD on 28-MAY-14 @ 15:00 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	6.98		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	13.8		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	25.3		1.0	C.U.		30-MAY-14	R2848799
pH	7.67		0.10	pH units		29-MAY-14	R2848786
Total Suspended Solids	292	DLM	10	mg/L	02-JUN-14	02-JUN-14	R2850607
Total Dissolved Solids	722		20	mg/L	31-MAY-14	03-JUN-14	R2851466
Turbidity	145		0.10	NTU	29-MAY-14	29-MAY-14	R2848168
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	309		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.00016		0.00014	mg/L		04-JUN-14	
Ammonia, Total (as N)	0.055		0.050	mg/L		03-JUN-14	R2851623
Chloride (Cl)	76.9		2.0	mg/L		02-JUN-14	R2851619
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		02-JUN-14	R2851619
Total Kjeldahl Nitrogen	0.60		0.15	mg/L	29-MAY-14	30-MAY-14	R2850061
Phosphorus, Total	<0.030		0.030	mg/L	01-JUN-14	02-JUN-14	R2850385
Sulphate (SO4)	191		2.0	mg/L		02-JUN-14	R2851619
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.0		1.0	mg/L	30-MAY-14	30-MAY-14	R2850504
Bacteriological Tests							
E. Coli	<2	DLM	2	CFU/100mL	29-MAY-14	30-MAY-14	R2848781
Fecal Coliforms	<2	DLM	2	CFU/100mL	29-MAY-14	30-MAY-14	R2848784
Total Coliforms	10	DLM	10	CFU/100mL	29-MAY-14	30-MAY-14	R2848775
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					30-MAY-14	R2848428
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848442
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Boron (B)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848871
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	30-MAY-14	R2848871
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Iron (Fe)-Dissolved	11.1		0.050	mg/L	30-MAY-14	30-MAY-14	R2848871
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Manganese (Mn)-Dissolved	1.02		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	30-MAY-14	R2848870
Molybdenum (Mo)-Dissolved	0.0027		0.0010	mg/L	30-MAY-14	30-MAY-14	R2848871
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	30-MAY-14	R2848871
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	30-MAY-14	R2848871
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	29-MAY-14	03-JUN-14	R2851464

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1461921-3 GW-45804-052814-MB-003 Sampled By: M. BOUCHARD on 28-MAY-14 @ 15:00 Matrix: GROUNDWATER							
Aggregate Organics							
COD	34		10	mg/L	03-JUN-14	03-JUN-14	R2851550
Phenols (4AAP)	0.0032		0.0010	mg/L	02-JUN-14	02-JUN-14	R2850923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		30-MAY-14	R2848483
F2 (C10-C16)	<100		100	ug/L	04-JUN-14	04-JUN-14	R2852405
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	04-JUN-14	04-JUN-14	R2852405
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				04-JUN-14	04-JUN-14	R2852405
Surrogate: 2-Bromobenzotrifluoride	77.3		60-140	%	04-JUN-14	04-JUN-14	R2852405
Surrogate: 3,4-Dichlorotoluene	77.0		60-140	%		30-MAY-14	R2848483
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	03-JUN-14	06-JUN-14	R2853867
Benzo(a)pyrene	<0.0050		0.0050	ug/L	03-JUN-14	06-JUN-14	R2853867
Surrogate: 2-Fluorobiphenyl	103.4		30-130	%	03-JUN-14	06-JUN-14	R2853867
Surrogate: d14-Terphenyl	113.6		50-150	%	03-JUN-14	06-JUN-14	R2853867

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLM	L1461921-1, -2, -3
Matrix Spike	Chloride (Cl)	MS-B	L1461921-1, -2, -3
Matrix Spike	Sulphate (SO4)	MS-B	L1461921-1, -2, -3
Duplicate	Color, Apparent	PEHT	L1461921-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-WT Water Chloride EPA 300.0 (IC)

COD-WT Water Chemical Oxygen Demand APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

COLOUR-WT Water Colour APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

EC-MF-WT Water E. coli SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100%

Reference Information

polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT Water Dissolved Metals in Water by ICPMS EPA 200.8
The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT Water Phosphorus, Total APHA 4500-P B E
Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h. Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

Reference Information

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2852238								
WG1884758-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.6		%		80-120	03-JUN-14
WG1884758-2 CVS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	03-JUN-14
WG1884758-4 DUP		**L1461791-4**						
Alkalinity, Total (as CaCO3)		344	334		mg/L	2.9	20	03-JUN-14
WG1884758-5 DUP		**L1461921-1**						
Alkalinity, Total (as CaCO3)		466	468		mg/L	0.3	20	03-JUN-14
WG1884758-6 DUP		**L1462714-1**						
Alkalinity, Total (as CaCO3)		243	239		mg/L	1.7	20	03-JUN-14
WG1884758-7 DUP		**L1463704-1**						
Alkalinity, Total (as CaCO3)		228	232		mg/L	1.7	20	03-JUN-14
WG1884758-8 DUP		**L1464009-4**						
Alkalinity, Total (as CaCO3)		26	25		mg/L	3.6	20	03-JUN-14
WG1884758-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	03-JUN-14
BOD-C-WT	Water							
Batch R2851464								
WG1881433-2 DUP		**L1461992-1**						
BOD Carbonaceous		705	690		mg/L	2.2	20	03-JUN-14
WG1881433-4 DUP		**L1461995-1**						
BOD Carbonaceous		565	564		mg/L	0.2	20	03-JUN-14
WG1881433-3 LCS								
BOD Carbonaceous			101.5		%		85-115	03-JUN-14
WG1881433-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	03-JUN-14
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-5 DUP		**L1461122-5**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-8 DUP		**L1461892-2**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882027-2 LCS								
Dissolved Organic Carbon			96.0		%		80-120	30-MAY-14
WG1882027-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	30-MAY-14
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4				70-130	

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2850504								
WG1882027-9 MS		**L1461892-2**						
Dissolved Organic Carbon			99.4		%		70-130	30-MAY-14
CL-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Chloride (Cl)		84.2	84.2		mg/L	0.1	20	02-JUN-14
WG1883427-2 LCS								
Chloride (Cl)			100.3		%		85-115	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Chloride (Cl)		100.3	100.3		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Chloride (Cl)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Chloride (Cl)			N/A	MS-B	%		-	02-JUN-14
COD-WT	Water							
Batch R2851550								
WG1884091-3 DUP		**L1461791-5**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884091-5 DUP		**L1461921-3**						
COD		34	36		mg/L	5.7	20	03-JUN-14
WG1884091-2 LCS								
COD			102.0		%		80-120	03-JUN-14
WG1884091-1 MB								
COD			<10		mg/L		10	03-JUN-14
WG1884091-4 MS		**L1461791-5**						
COD			109.0		%		85-115	03-JUN-14
COLOUR-WT	Water							
Batch R2848799								
WG1882208-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			96.9		%		80-120	30-MAY-14
WG1882208-2 CVS								
Color, Apparent			98.9		%		85-115	30-MAY-14
WG1882208-4 DUP		**L1461872-1**						
Color, Apparent		7.9	8.4		C.U.	5.7	20	30-MAY-14
WG1882208-5 DUP		**L1462593-1**						
Color, Apparent		2.7	2.2		C.U.	18	20	30-MAY-14
WG1882208-1 MB								

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COLOUR-WT	Water							
Batch R2848799								
WG1882208-1 MB								
Color, Apparent			<1.0		C.U.		1	30-MAY-14
EC-MF-WT	Water							
Batch R2848781								
WG1881407-3 DUP		**L1461864-1**						
E. Coli		0	0		CFU/100mL	0.0	50	30-MAY-14
WG1881407-4 DUP		**L1461668-7**						
E. Coli		0	0		CFU/100mL	0.0	50	30-MAY-14
WG1881407-1 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-2 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
WG1881407-5 MB								
E. Coli			0		CFU/100mL		1	30-MAY-14
F1-HS-WT	Water							
Batch R2848483								
WG1881756-1 CVS								
F1 (C6-C10)			87.1		%		80-120	29-MAY-14
WG1881756-4 DUP		**WG1881756-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	30-MAY-14
WG1881756-2 MB								
F1 (C6-C10)			<100		ug/L		100	29-MAY-14
Surrogate: 3,4-Dichlorotoluene			130.2		%		60-140	29-MAY-14
F2-F4-WT	Water							
Batch R2852405								
WG1885189-1 CVS								
F2 (C10-C16)			100.2		%		80-120	04-JUN-14
F3 (C16-C34)			98.1		%		80-120	04-JUN-14
F4 (C34-C50)			97.8		%		80-120	04-JUN-14
WG1885189-2 CVS								
F2 (C10-C16)			101.1		%		80-120	04-JUN-14
F3 (C16-C34)			99.5		%		80-120	04-JUN-14
F4 (C34-C50)			98.3		%		80-120	04-JUN-14
WG1884458-2 LCS								
F2 (C10-C16)			109.2		%		65-135	04-JUN-14
F3 (C16-C34)			107.5		%		65-135	04-JUN-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2852405								
WG1884458-2 LCS								
F4 (C34-C50)			104.0		%		65-135	04-JUN-14
WG1884458-3 LCSD		**WG1884458-2**						
F2 (C10-C16)		109.2	105.7		%	3.3	50	04-JUN-14
F3 (C16-C34)		107.5	106.1		%	1.2	50	04-JUN-14
F4 (C34-C50)		104.0	101.1		%	2.8	50	04-JUN-14
WG1884458-1 MB								
F2 (C10-C16)			<100		ug/L		100	04-JUN-14
F3 (C16-C34)			<250		ug/L		250	04-JUN-14
F4 (C34-C50)			<250		ug/L		250	04-JUN-14
Surrogate: 2-Bromobenzotrifluoride			86.9		%		60-140	04-JUN-14
FC-MF-WT	Water							
Batch R2848784								
WG1881404-3 DUP		**L1461921-2**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	30-MAY-14
WG1881404-1 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881404-2 MB								
Fecal Coliforms			0		CFU/100mL		1	30-MAY-14
HG-D-CVAA-WT	Water							
Batch R2848870								
WG1881983-3 DUP		**L1461921-1**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1881983-2 LCS								
Mercury (Hg)-Dissolved			97.5		%		80-120	30-MAY-14
WG1881983-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	30-MAY-14
WG1881983-4 MS		**L1461921-2**						
Mercury (Hg)-Dissolved			104.0		%		70-130	30-MAY-14
MET-D-MS-WT	Water							
Batch R2848871								
WG1882075-1 CVS								
Arsenic (As)-Dissolved			95.4		%		80-120	30-MAY-14
Boron (B)-Dissolved			90.8		%		80-120	30-MAY-14
Cadmium (Cd)-Dissolved			94.4		%		80-120	30-MAY-14
Chromium (Cr)-Dissolved			97.0		%		80-120	30-MAY-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2848871								
WG1882075-1 CVS								
Cobalt (Co)-Dissolved			97.4		%		80-120	30-MAY-14
Copper (Cu)-Dissolved			96.1		%		80-120	30-MAY-14
Iron (Fe)-Dissolved			102.4		%		80-120	30-MAY-14
Lead (Pb)-Dissolved			100.2		%		80-120	30-MAY-14
Manganese (Mn)-Dissolved			99.0		%		80-120	30-MAY-14
Molybdenum (Mo)-Dissolved			91.0		%		80-120	30-MAY-14
Nickel (Ni)-Dissolved			96.3		%		80-120	30-MAY-14
Zinc (Zn)-Dissolved			92.5		%		80-120	30-MAY-14
WG1882075-3 CVS								
Arsenic (As)-Dissolved			98.9		%		80-120	02-JUN-14
Boron (B)-Dissolved			104.7		%		80-120	02-JUN-14
Cadmium (Cd)-Dissolved			100.6		%		80-120	02-JUN-14
Chromium (Cr)-Dissolved			96.8		%		80-120	02-JUN-14
Cobalt (Co)-Dissolved			99.5		%		80-120	02-JUN-14
Copper (Cu)-Dissolved			99.2		%		80-120	02-JUN-14
Iron (Fe)-Dissolved			99.0		%		80-120	02-JUN-14
Lead (Pb)-Dissolved			103.1		%		80-120	02-JUN-14
Manganese (Mn)-Dissolved			101.8		%		80-120	02-JUN-14
Molybdenum (Mo)-Dissolved			97.3		%		80-120	02-JUN-14
Nickel (Ni)-Dissolved			99.2		%		80-120	02-JUN-14
Zinc (Zn)-Dissolved			92.2		%		80-120	02-JUN-14
WG1882010-4 DUP		**WG1882010-3**						
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-MAY-14
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	30-MAY-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-MAY-14
Cobalt (Co)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-MAY-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-MAY-14
Iron (Fe)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	30-MAY-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-MAY-14
Manganese (Mn)-Dissolved		0.0120	0.0118		mg/L	0.9	20	30-MAY-14
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-MAY-14
Nickel (Ni)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-MAY-14
Zinc (Zn)-Dissolved		0.0054	0.0052		mg/L			

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2848871								
WG1882010-4 DUP		**WG1882010-3**						
Zinc (Zn)-Dissolved		0.0054	0.0052		mg/L	3.1	20	30-MAY-14
WG1882010-2 LCS								
Arsenic (As)-Dissolved			92.7		%		80-120	30-MAY-14
Boron (B)-Dissolved			83.3		%		80-120	30-MAY-14
Cadmium (Cd)-Dissolved			90.0		%		80-120	30-MAY-14
Chromium (Cr)-Dissolved			90.8		%		80-120	30-MAY-14
Cobalt (Co)-Dissolved			91.5		%		80-120	30-MAY-14
Copper (Cu)-Dissolved			92.1		%		80-120	30-MAY-14
Iron (Fe)-Dissolved			96.1		%		80-120	30-MAY-14
Lead (Pb)-Dissolved			93.7		%		80-120	30-MAY-14
Manganese (Mn)-Dissolved			92.3		%		80-120	30-MAY-14
Molybdenum (Mo)-Dissolved			90.6		%		80-120	30-MAY-14
Nickel (Ni)-Dissolved			91.7		%		80-120	30-MAY-14
Zinc (Zn)-Dissolved			93.4		%		80-120	30-MAY-14
WG1882010-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	30-MAY-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	30-MAY-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	30-MAY-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	30-MAY-14
WG1882010-5 MS		**WG1882010-3**						
Arsenic (As)-Dissolved			86.9		%		70-130	30-MAY-14
Boron (B)-Dissolved			79.9		%		70-130	30-MAY-14
Cadmium (Cd)-Dissolved			77.2		%		70-130	30-MAY-14
Chromium (Cr)-Dissolved			78.9		%		70-130	30-MAY-14
Cobalt (Co)-Dissolved			77.9		%		70-130	30-MAY-14
Copper (Cu)-Dissolved			77.1		%		70-130	30-MAY-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2848871								
WG1882010-5 MS		**WG1882010-3**						
Iron (Fe)-Dissolved			83.8		%		70-130	30-MAY-14
Lead (Pb)-Dissolved			82.6		%		70-130	30-MAY-14
Manganese (Mn)-Dissolved			77.2		%		70-130	30-MAY-14
Molybdenum (Mo)-Dissolved			81.4		%		70-130	30-MAY-14
Nickel (Ni)-Dissolved			77.5		%		70-130	30-MAY-14
Zinc (Zn)-Dissolved			70.9		%		70-130	30-MAY-14
NH3-WT	Water							
Batch R2851623								
WG1884161-2 CVS								
Ammonia, Total (as N)			100.9		%		85-115	03-JUN-14
WG1884161-3 DUP		**L1462363-1**						
Ammonia, Total (as N)		0.128	0.132		mg/L	3.1	20	03-JUN-14
WG1884161-5 DUP		**L1461791-8**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884161-7 DUP		**L1461841-3**						
Ammonia, Total (as N)		0.053	0.060		mg/L	13	20	03-JUN-14
WG1884161-9 DUP		**L1461908-3**						
Ammonia, Total (as N)		0.077	0.098	J	mg/L	0.021	0.1	03-JUN-14
WG1884161-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	03-JUN-14
WG1884161-10 MS		**L1461908-3**						
Ammonia, Total (as N)			112.7		%		75-125	03-JUN-14
WG1884161-4 MS		**L1462363-1**						
Ammonia, Total (as N)			101.1		%		75-125	03-JUN-14
WG1884161-6 MS		**L1461791-8**						
Ammonia, Total (as N)			102.2		%		75-125	03-JUN-14
WG1884161-8 MS		**L1461841-3**						
Ammonia, Total (as N)			101.4		%		75-125	03-JUN-14
NO2-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrite-N (NO2-N)		4.45	4.46		mg/L	0.3	25	02-JUN-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-WT	Water							
Batch R2851619								
WG1883427-2 LCS								
Nitrite-N (NO2-N)			98.6		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrite-N (NO2-N)		98.6	98.5		%	0.1	25	02-JUN-14
WG1883427-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrite-N (NO2-N)			93.2		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrite-N (NO2-N)			103.5		%		70-130	02-JUN-14
NO3-WT	Water							
Batch R2851619								
WG1883427-10 DUP		**L1462349-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-6 DUP		**L1461888-1**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	02-JUN-14
WG1883427-8 DUP		**L1462303-1**						
Nitrate-N (NO3-N)		15.0	15.0		mg/L	0.1	25	02-JUN-14
WG1883427-2 LCS								
Nitrate-N (NO3-N)			98.8		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Nitrate-N (NO3-N)		98.8	98.7		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	02-JUN-14
WG1883427-11 MS		**L1462349-3**						
Nitrate-N (NO3-N)			89.5		%		70-130	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Nitrate-N (NO3-N)			97.4		%		70-130	02-JUN-14
P-TOTAL-WT	Water							
Batch R2850385								
WG1883416-1 CVS								
Phosphorus, Total			96.2		%		85-115	02-JUN-14
WG1883220-3 DUP		**L1461883-1**						
Phosphorus, Total		1.42	1.26		mg/L	12	20	02-JUN-14
WG1883220-4 DUP		**L1461868-1**						
Phosphorus, Total		2.82	2.77		mg/L	1.8	20	02-JUN-14
WG1883220-2 LCS								
Phosphorus, Total			102.0		%		80-120	02-JUN-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-WT	Water							
Batch R2850385								
WG1883220-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	02-JUN-14
PAH-CCME-WT	Water							
Batch R2853867								
WG1886485-1 CVS								
Anthracene			114.1		%		60-130	06-JUN-14
Benzo(a)pyrene			108.9		%		70-130	06-JUN-14
WG1884169-2 LCS								
Anthracene			114.4		%		50-140	06-JUN-14
Benzo(a)pyrene			109.1		%		60-130	06-JUN-14
WG1884169-3 LCSD		**WG1884169-2**						
Anthracene		114.4	113.3		%	0.9	50	06-JUN-14
Benzo(a)pyrene		109.1	106.9		%	2.1	50	06-JUN-14
WG1884169-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			85.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			102.6		%		50-150	06-JUN-14
PH-WT	Water							
Batch R2848786								
WG1881798-3 DUP		**WG1881798-2**						
pH		7.92	7.95	J	pH units	0.03	0.2	29-MAY-14
WG1881798-4 DUP		**L1461875-1**						
pH		8.06	8.05	J	pH units	0.01	0.2	29-MAY-14
WG1881798-6 DUP		**L1462157-1**						
pH		7.62	7.63	J	pH units	0.00	0.2	29-MAY-14
WG1881798-7 DUP		**L1462363-1**						
pH		8.39	8.40	J	pH units	0.01	0.2	29-MAY-14
WG1881798-1 LCS								
pH			6.95		pH units		6.9-7.1	29-MAY-14
PHENOLS-4AAP-WT	Water							
Batch R2850923								
WG1883460-3 CVS								
Phenols (4AAP)			93.9		%		85-115	02-JUN-14
WG1883460-4 DUP		**L1461184-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R2850923								
WG1883460-6 DUP		**L1461161-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883460-8 DUP		**L1461791-1**						
Phenols (4AAP)		0.0079	0.0084		mg/L	6.3	20	02-JUN-14
WG1883460-2 LCS								
Phenols (4AAP)			106.1		%		85-115	02-JUN-14
WG1883460-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-JUN-14
WG1883460-5 MS		**L1461184-2**						
Phenols (4AAP)			105.6		%		75-125	02-JUN-14
WG1883460-7 MS		**L1461161-1**						
Phenols (4AAP)			105.9		%		75-125	02-JUN-14
WG1883460-9 MS		**L1461791-1**						
Phenols (4AAP)			95.1		%		75-125	02-JUN-14
SO4-WT	Water							
Batch R2851619								
WG1883427-6 DUP		**L1461888-1**						
Sulphate (SO4)		240	240		mg/L	0.2	25	02-JUN-14
WG1883427-2 LCS								
Sulphate (SO4)			100.4		%		70-130	02-JUN-14
WG1883427-3 LCSD		**WG1883427-2**						
Sulphate (SO4)		100.4	100.4		%	0.0	25	02-JUN-14
WG1883427-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	02-JUN-14
WG1883427-7 MS		**L1461888-1**						
Sulphate (SO4)			N/A	MS-B	%		-	02-JUN-14
SOLIDS-TDS-WT	Water							
Batch R2851466								
WG1882964-3 DUP		**L1463204-1**						
Total Dissolved Solids		879	884		mg/L	0.6	20	03-JUN-14
WG1882964-2 LCS								
Total Dissolved Solids			102.1		%		85-115	03-JUN-14
WG1882964-1 MB								
Total Dissolved Solids			<20		mg/L		20	03-JUN-14
SOLIDS-TSS-WT	Water							

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R2850607								
WG1882169-3 DUP		**L1461129-1**						
Total Suspended Solids		470	450		mg/L	4.3	20	02-JUN-14
WG1883505-2 LCS								
Total Suspended Solids			102.8		%		85-115	02-JUN-14
WG1883505-1 MB								
Total Suspended Solids			<2.0		mg/L		2	02-JUN-14
TC-MF-WT	Water							
Batch R2848775								
WG1881411-3 DUP		**L1461668-3**						
Total Coliforms		0	0		CFU/100mL	0.0	50	30-MAY-14
WG1881411-1 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
WG1881411-2 MB								
Total Coliforms			0		CFU/100mL		1	30-MAY-14
TKN-WT	Water							
Batch R2850061								
WG1882408-1 CVS								
Total Kjeldahl Nitrogen			96.5		%		75-125	30-MAY-14
WG1881971-3 DUP		**L1461942-1**						
Total Kjeldahl Nitrogen		0.51	0.55		mg/L	6.3	20	30-MAY-14
WG1881971-4 DUP		**L1461921-1**						
Total Kjeldahl Nitrogen		2.65	2.54		mg/L	4.5	20	30-MAY-14
WG1881971-2 LCS								
Total Kjeldahl Nitrogen			109.1		%		75-125	30-MAY-14
WG1881971-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	30-MAY-14
TURBIDITY-WT	Water							
Batch R2848168								
WG1881265-4 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-7 CVS								
Turbidity			95.0		%		85-115	29-MAY-14
WG1881265-2 DUP		**L1460642-1**						
Turbidity		0.15	0.11	J	NTU	0.040	0.2	29-MAY-14
WG1881265-8 DUP		**L1461921-3**						
Turbidity		145	149		NTU	2.7	20	29-MAY-14
WG1881265-1 MB								

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	Water							
Batch R2848168								
WG1881265-1 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14
WG1881265-5 MB								
Turbidity			<0.10		NTU		0.1	29-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1461921 Report Date: 08-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Colour							
	1	28-MAY-14 11:00	30-MAY-14 11:52	48	49	hours	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1461921 were received on 29-MAY-14 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CHAIN OF CUSTODY RECORD

COC NO.: 36901 PAGE 1 OF 1

L1461921

BA105914

(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES

Address: 130 Colonnade Road, Suite 400, Ottawa

Phone: 613 727-0510 Fax:

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS	**Lab Location:** WATERLOO	**SSOW ID:**
Project Name: ORLEANWOOD	**Lab Contact:**	**Lab Quote No:** 45804-58	**Cooler No:** 1 of 3
Project Location: OTTAWA			**Carrier:** FED EX
Chemistry Contact: AIRESSE MACPHEE			**Airbill No:** 8652 5577 8495
Sampler(s): M. BOUCHARD			**Date Shipped:** 5/28/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested: General Chem	Dissolved Metals	Bacteria	PAHs	F1-F4	Filtered (Metals)		MS/MSD Request	Comments/ Special Instructions:
1	GW-45804-052814-MB-001	5/28/14	11:00	GW	G									14	X	X	X	X	X	X		-1	Please see Lab P.O. for specific parameters
2	-002		12:50	GW	G									14	X	X	X	X	X	X		-2	
3	-003		15:00	GW	G									14	X	X	X	X	X	X		-3	
4																							
5																							
6																							
7																							
8																							
9																							
10																							~~BOD~~, CBOD5 COD, DOC included.
11																							
12																							
13																							
14																							
15																							

L1461921-COFC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 42

All Samples in Cooler must be on COC

Notes/ Special Requirements: SEE LAB P.O.

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	5/28/14	5h15	1. Nancy Smith	29-May-14 6.3		9:00am
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

000635

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 31-MAY-14
Report Date: 12-JUN-14 13:01 (MT)
Version: FINAL REV. 2

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1462687
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Comments: ADDITIONAL 11-JUN-14 07:04

Wayne Smith, C.Chem., C.E.T.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-1 GW-45804-052914-MB-004 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.20		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	9.8		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	12.0		1.0	C.U.		31-MAY-14	R2852281
pH	7.48		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	110		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1380		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	22.0		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	309		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	<0.00018		0.00018	mg/L		05-JUN-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	73.5		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	0.24		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	01-JUN-14	02-JUN-14	R2850885
Phosphorus, Total	0.070		0.030	mg/L	01-JUN-14	02-JUN-14	R2850502
Sulphate (SO4)	646		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.0		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	5		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.059		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	0.00061		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	0.221		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.182		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0445		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	0.0022		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-1 GW-45804-052914-MB-004 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Aggregate Organics							
COD	<10		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0018		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2850244
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	94.3		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	100.6		60-140	%		02-JUN-14	R2850244
Polycyclic Aromatic Hydrocarbons							
Anthracene	0.038		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	0.0064		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	77.9		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	106.5		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-2 GW-45804-052914-MB-005 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.11		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	12.6		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	1.7		1.0	C.U.		31-MAY-14	R2852281
pH	7.40		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	7.2		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1370		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	0.22		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	360		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.00024		0.00018	mg/L		05-JUN-14	
Ammonia, Total (as N)	0.067		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	68.1		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	0.21		0.15	mg/L	01-JUN-14	02-JUN-14	R2850885
Phosphorus, Total	<0.030		0.030	mg/L	01-JUN-14	02-JUN-14	R2850502
Sulphate (SO4)	621		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-2 GW-45804-052914-MB-005 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.052		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.270		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0201		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	0.0061		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	<10		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	<0.0010		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2850244
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	94.3		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	90.5		60-140	%		02-JUN-14	R2850244
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	70.2		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	106.1		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-3 GW-45804-052914-MB-006 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-3 GW-45804-052914-MB-006 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.30		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	17.1		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	153		1.0	C.U.		31-MAY-14	R2852281
pH	7.58		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	202	DLM	4.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1580	DLM	20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	132		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	575		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.101		0.00038	mg/L		05-JUN-14	
Ammonia, Total (as N)	13.2		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	189		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	13.6		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.111		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	507		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.1		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.010	DLM	0.010	mg/L	30-MAY-14	30-MAY-14	R2850401
Boron (B)-Dissolved	<0.10	DLM	0.10	mg/L	30-MAY-14	30-MAY-14	R2850401
Cadmium (Cd)-Dissolved	<0.00090	DLM	0.00090	mg/L	30-MAY-14	30-MAY-14	R2850401
Chromium (Cr)-Dissolved	<0.0050	DLM	0.0050	mg/L	30-MAY-14	30-MAY-14	R2850401
Cobalt (Co)-Dissolved	<0.0050	DLM	0.0050	mg/L	30-MAY-14	30-MAY-14	R2850401
Copper (Cu)-Dissolved	<0.010	DLM	0.010	mg/L	30-MAY-14	30-MAY-14	R2850401
Iron (Fe)-Dissolved	18.2	DLM	0.50	mg/L	30-MAY-14	30-MAY-14	R2850401
Lead (Pb)-Dissolved	<0.0050	DLM	0.0050	mg/L	30-MAY-14	30-MAY-14	R2850401
Manganese (Mn)-Dissolved	13.3	DLM	0.010	mg/L	30-MAY-14	30-MAY-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0191	DLM	0.0050	mg/L	30-MAY-14	30-MAY-14	R2850401
Nickel (Ni)-Dissolved	<0.010	DLM	0.010	mg/L	30-MAY-14	30-MAY-14	R2850401
Zinc (Zn)-Dissolved	<0.030	DLM	0.030	mg/L	30-MAY-14	30-MAY-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-3 GW-45804-052914-MB-006 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Aggregate Organics							
COD	74		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0117		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2850244
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	93.1		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	92.4		60-140	%		02-JUN-14	R2850244
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	0.0435		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	81.3		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	101.7		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-4 GW-45804-052914-MB-007 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.19		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	18.9		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	55.5		1.0	C.U.		31-MAY-14	R2852281
pH	7.55		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	11.6		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1740		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	18.2		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	600		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.396		0.00034	mg/L		05-JUN-14	
Ammonia, Total (as N)	57.8		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	218		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	48.4		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.134		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	649		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.2		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-4 GW-45804-052914-MB-007 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	2		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	0.0040		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.065		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	0.080		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.443		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	8.1		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	34		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0074		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2850244
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	91.7		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	91.9		60-140	%		02-JUN-14	R2850244
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	84.5		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	105.7		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-5 GW-45804-052914-MB-008 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-5 GW-45804-052914-MB-008 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.19		0.10	pH	05-JUN-14	05-JUN-14	R2852574
Temperature, Client	18.9		0.1	Deg. C	05-JUN-14	05-JUN-14	R2852574
Physical Tests							
Color, Apparent	70.7		1.0	C.U.		31-MAY-14	R2852281
pH	7.59		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	4.0		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1730		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	28.0		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	608		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.396		0.00034	mg/L		05-JUN-14	
Ammonia, Total (as N)	57.8		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	217		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	51.2		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.107		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	649		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.2		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	1		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	0.0049		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.067		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	0.095		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.532		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	6.6		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-5 GW-45804-052914-MB-008 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Aggregate Organics							
COD	30		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0090		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	89.4		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	107.6		60-140	%		02-JUN-14	R2849990
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	91.4		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	111.7		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-6 GW-45804-052914-MB-009 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		31-MAY-14	R2852281
pH	7.09		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	<2.0		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	<20		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	<0.10		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		03-JUN-14	R2852238
Ammonia, Total (as N)	0.074		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	<2.0		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	0.42		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	<0.030		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	<2.0		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-6 GW-45804-052914-MB-009 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	0.0056		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	<10		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	<0.0010		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	86.3		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	100.6		60-140	%		02-JUN-14	R2849990
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	98.7		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	122.3		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-7 GW-45804-052914-MB-010 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.06		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	17.7		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-7 GW-45804-052914-MB-010 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Physical Tests							
Color, Apparent	15.9		1.0	C.U.		31-MAY-14	R2852281
pH	7.42		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	3.6		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	1840		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	0.85		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	460		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.162		0.00023	mg/L		05-JUN-14	
Ammonia, Total (as N)	34.9		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	140		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	0.64		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	31.8		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.032		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	834		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.6		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	50	DLM	10	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	0.0019		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.112		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	0.209		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.530		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0230		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	0.0030		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	3.2		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	14		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	<0.0010		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-7 GW-45804-052914-MB-010 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	85.7		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	74.0		60-140	%		02-JUN-14	R2849990
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	79.4		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	109.4		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-8 GW-45804-052914-MB-011 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.53		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	13.1		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	9.9		1.0	C.U.		31-MAY-14	R2852281
pH	7.71		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	17.2		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	402		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	2.22		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	282		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	<0.00048		0.00048	mg/L		05-JUN-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	<2.0		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	0.43		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.052		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	108		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.2		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-8 GW-45804-052914-MB-011 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Bacteriological Tests							
Total Coliforms	5		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Boron (B)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	03-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	03-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	03-JUN-14	R2850401
Copper (Cu)-Dissolved	0.0039		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	03-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.0019		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0123		0.0010	mg/L	30-MAY-14	03-JUN-14	R2850401
Nickel (Ni)-Dissolved	0.0048		0.0020	mg/L	30-MAY-14	03-JUN-14	R2850401
Zinc (Zn)-Dissolved	0.0105		0.0030	mg/L	30-MAY-14	03-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	10		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0016		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
Surrogate: 3,4-Dichlorotoluene	102.3		60-140	%		02-JUN-14	R2849990
L1462687-9 GW-45804-053014-MB-011 Sampled By: M. BOUCHARD on 30-MAY-14 Matrix: GROUNDWATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	89.6		60-140	%	05-JUN-14	05-JUN-14	R2853294
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	90.4		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	113.6		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-10 GW-45804-052914-MB-012 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-10 GW-45804-052914-MB-012 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.31		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	9.4		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Turbidity	51.0		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Unionized ammonia	0.133		0.00022	mg/L		05-JUN-14	
Ammonia, Total (as N)	30.4		0.050	mg/L		04-JUN-14	R2853099
Total Kjeldahl Nitrogen	28.0		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.198		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.1		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	0.063		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	6.53		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	3.28	DLM	0.010	mg/L	30-MAY-14	30-MAY-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0066		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
COD	41		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0011		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-10 GW-45804-052914-MB-012 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Hydrocarbons							
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	93.9		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	89.7		60-140	%		02-JUN-14	R2849990
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	04-JUN-14	06-JUN-14	R2854452
Benzo(a)pyrene	<0.0050		0.0050	ug/L	04-JUN-14	06-JUN-14	R2854452
Surrogate: 2-Fluorobiphenyl	93.7		30-130	%	04-JUN-14	06-JUN-14	R2854452
Surrogate: d14-Terphenyl	113.6		50-150	%	04-JUN-14	06-JUN-14	R2854452
L1462687-11 GW-45804-052914-MB-016 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Field Tests							
pH, Client Supplied	7.24		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	8.1		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	10.4		1.0	C.U.		31-MAY-14	R2852281
pH	7.62		0.10	pH units		30-MAY-14	R2850080
Total Suspended Solids	106		2.0	mg/L	02-JUN-14	03-JUN-14	R2851614
Total Dissolved Solids	613		20	mg/L	03-JUN-14	04-JUN-14	R2852276
Turbidity	4.84		0.10	NTU	30-MAY-14	30-MAY-14	R2849047
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	262		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	<0.00017		0.00017	mg/L		05-JUN-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	46.8		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	0.52		0.15	mg/L	02-JUN-14	03-JUN-14	R2851222
Phosphorus, Total	0.074		0.030	mg/L	02-JUN-14	03-JUN-14	R2851266
Sulphate (SO4)	222		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.7		1.0	mg/L	03-JUN-14	03-JUN-14	R2852240
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849884
Fecal Coliforms	0		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849885
Total Coliforms	5		0	CFU/100mL	30-MAY-14	31-MAY-14	R2849880
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					30-MAY-14	R2848912
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Boron (B)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	30-MAY-14	02-JUN-14	R2850401

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-11 GW-45804-052914-MB-016 Sampled By: M. BOUCHARD on 29-MAY-14 Matrix: GROUNDWATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	30-MAY-14	02-JUN-14	R2850401
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	30-MAY-14	02-JUN-14	R2850401
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Manganese (Mn)-Dissolved	0.0055		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0459		0.0010	mg/L	30-MAY-14	02-JUN-14	R2850401
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	30-MAY-14	02-JUN-14	R2850401
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	30-MAY-14	02-JUN-14	R2850401
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	30-MAY-14	04-JUN-14	R2852207
COD	12		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0045		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		02-JUN-14	R2849990
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	98.6		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	102.7		60-140	%		02-JUN-14	R2849990
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	05-JUN-14	06-JUN-14	R2854342
Benzo(a)pyrene	<0.0050		0.0050	ug/L	05-JUN-14	06-JUN-14	R2854342
Surrogate: 2-Fluorobiphenyl	77.6		30-130	%	05-JUN-14	06-JUN-14	R2854342
Surrogate: d14-Terphenyl	88.4		50-150	%	05-JUN-14	06-JUN-14	R2854342
L1462687-12 GW-45804-053014-MB-012 (L1462687-10) Sampled By: M.BOUCHARD on 30-MAY-14 Matrix: GROUNDWATER							
Physical Tests							
Color, Apparent	260		1.0	C.U.		31-MAY-14	R2852281
pH	7.52		0.10	pH units		02-JUN-14	R2851484
Total Suspended Solids	17.6		2.0	mg/L	06-JUN-14	07-JUN-14	R2851614
Total Dissolved Solids	1640		20	mg/L	03-JUN-14	04-JUN-14	R2852274
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	742		10	mg/L		03-JUN-14	R2852238
Chloride (Cl)	231		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1462687-12 GW-45804-053014-MB-012 (L1462687-10) Sampled By: M.BOUCHARD on 30-MAY-14 Matrix: GROUNDWATER							
Anions and Nutrients							
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Sulphate (SO4)	421		2.0	mg/L		03-JUN-14	R2852414
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	31-MAY-14	02-JUN-14	R2852901

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Boron (B)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Chromium (Cr)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Cobalt (Co)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Copper (Cu)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Iron (Fe)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Lead (Pb)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Manganese (Mn)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Molybdenum (Mo)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Nickel (Ni)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Zinc (Zn)-Dissolved	DLM	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Total Suspended Solids	DLM	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulphate (SO4)	MS-B	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulphate (SO4)	MS-B	L1462687-1, -11, -12, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Ammonia, Total (as N)	MS-B	L1462687-1, -10, -11, -2, -3, -4, -5, -6, -7, -8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH

Reference Information

represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT Water Dissolved Metals in Water by ICPMS EPA 200.8
The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT Water Phosphorus, Total APHA 4500-P B E
Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

Reference Information

SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2852238								
WG1884758-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.6		%		80-120	03-JUN-14
WG1884758-2 CVS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	03-JUN-14
WG1884758-4 DUP		**L1461791-4**						
Alkalinity, Total (as CaCO3)		344	334		mg/L	2.9	20	03-JUN-14
WG1884758-5 DUP		**L1461921-1**						
Alkalinity, Total (as CaCO3)		466	468		mg/L	0.3	20	03-JUN-14
WG1884758-6 DUP		**L1462714-1**						
Alkalinity, Total (as CaCO3)		243	239		mg/L	1.7	20	03-JUN-14
WG1884758-7 DUP		**L1463704-1**						
Alkalinity, Total (as CaCO3)		228	232		mg/L	1.7	20	03-JUN-14
WG1884758-8 DUP		**L1464009-4**						
Alkalinity, Total (as CaCO3)		26	25		mg/L	3.6	20	03-JUN-14
WG1884758-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	03-JUN-14
BOD-C-WT	Water							
Batch R2852207								
WG1882282-2 DUP		**L1462507-1**						
BOD Carbonaceous		1680	1650		mg/L	1.8	20	04-JUN-14
WG1882282-4 DUP		**L1462544-1**						
BOD Carbonaceous		342	330		mg/L	3.6	20	04-JUN-14
WG1882282-5 DUP		**L1462531-1**						
BOD Carbonaceous		151	147		mg/L	2.7	20	04-JUN-14
WG1882282-3 LCS								
BOD Carbonaceous			106.1		%		85-115	04-JUN-14
WG1882282-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	04-JUN-14
Batch R2852901								
WG1882898-2 DUP		**L1463093-5**						
BOD Carbonaceous		1650	1570		mg/L	5.4	20	05-JUN-14
WG1882898-3 LCS								
BOD Carbonaceous			107.1		%		85-115	05-JUN-14
WG1882898-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	05-JUN-14
C-DIS-ORG-WT	Water							

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R2852240								
WG1884144-3 DUP		**L1462548-1**						
Dissolved Organic Carbon		4.2	3.8		mg/L	7.8	20	03-JUN-14
WG1884144-5 DUP		**L1462687-2**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884144-2 LCS								
Dissolved Organic Carbon			94.5		%		80-120	03-JUN-14
WG1884144-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	03-JUN-14
WG1884144-4 MS		**L1462548-1**						
Dissolved Organic Carbon			95.3		%		70-130	03-JUN-14
WG1884144-6 MS		**L1462687-2**						
Dissolved Organic Carbon			98.4		%		70-130	03-JUN-14
CL-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Chloride (Cl)		217	217		mg/L	0.1	20	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Chloride (Cl)		179	179		mg/L	0.0	20	03-JUN-14
WG1884238-4 DUP		**L1462608-1**						
Chloride (Cl)		2.0	<2.0	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Chloride (Cl)		299	300		mg/L	0.3	20	03-JUN-14
WG1884238-2 LCS								
Chloride (Cl)			100.4		%		85-115	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Chloride (Cl)		100.4	100.2		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Chloride (Cl)			<2.0		mg/L		2	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
WG1884238-5 MS		**L1462608-1**						
Chloride (Cl)			97.4		%		75-125	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
COD-WT	Water							

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-WT	Water							
Batch R2853208								
WG1885752-3 DUP		**L1462542-10**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	05-JUN-14
WG1885752-5 DUP		**L1464420-6**						
COD		10	12		mg/L	18	20	05-JUN-14
WG1885752-7 DUP		**L1462687-11**						
COD		12	14		mg/L	15	20	05-JUN-14
WG1885752-2 LCS								
COD			100.0		%		80-120	05-JUN-14
WG1885752-1 MB								
COD			<10		mg/L		10	05-JUN-14
WG1885752-4 MS		**L1462542-10**						
COD			102.0		%		85-115	05-JUN-14
WG1885752-6 MS		**L1464420-6**						
COD			101.0		%		85-115	05-JUN-14
COLOUR-WT	Water							
Batch R2852281								
WG1882885-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			99.7		%		80-120	31-MAY-14
WG1882885-2 CVS								
Color, Apparent			99.7		%		85-115	31-MAY-14
WG1882885-4 DUP		**L1462687-1**						
Color, Apparent		12.0	12.5		C.U.	3.8	20	31-MAY-14
WG1882885-1 MB								
Color, Apparent			<1.0		C.U.		1	31-MAY-14
EC-MF-WT	Water							
Batch R2849884								
WG1882336-3 DUP		**L1462591-4**						
E. Coli		31	29		CFU/100mL	6.7	50	31-MAY-14
WG1882336-1 MB								
E. Coli			0		CFU/100mL		1	31-MAY-14
WG1882336-2 MB								
E. Coli			0		CFU/100mL		1	31-MAY-14
F1-HS-WT	Water							
Batch R2849990								
WG1882513-1 CVS								
F1 (C6-C10)			113.3		%		80-120	02-JUN-14
WG1882513-4 DUP		**WG1882513-3**						

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R2849990								
WG1882513-4 DUP		**WG1882513-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	02-JUN-14
WG1882513-2 MB								
F1 (C6-C10)			<100		ug/L		100	02-JUN-14
Surrogate: 3,4-Dichlorotoluene			110.5		%		60-140	02-JUN-14
WG1882513-5 MS		**WG1882513-3**						
F1 (C6-C10)			92.3		%		50-150	02-JUN-14
Batch R2850244								
WG1882511-1 CVS								
F1 (C6-C10)			109.7		%		80-120	02-JUN-14
WG1882511-4 DUP		**WG1882511-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	02-JUN-14
WG1882511-2 MB								
F1 (C6-C10)			<100		ug/L		100	02-JUN-14
Surrogate: 3,4-Dichlorotoluene			102.3		%		60-140	02-JUN-14
WG1882511-5 MS		**WG1882511-3**						
F1 (C6-C10)			91.2		%		50-150	02-JUN-14
F2-F4-WT	Water							
Batch R2853294								
WG1885994-1 CVS								
F2 (C10-C16)			105.4		%		80-120	05-JUN-14
F3 (C16-C34)			103.9		%		80-120	05-JUN-14
F4 (C34-C50)			103.2		%		80-120	05-JUN-14
WG1885994-2 CVS								
F2 (C10-C16)			89.6		%		80-120	05-JUN-14
F3 (C16-C34)			100.8		%		80-120	05-JUN-14
F4 (C34-C50)			103.0		%		80-120	05-JUN-14
WG1885449-2 LCS								
F2 (C10-C16)			104.2		%		65-135	05-JUN-14
F3 (C16-C34)			103.0		%		65-135	05-JUN-14
F4 (C34-C50)			98.6		%		65-135	05-JUN-14
WG1885449-3 LCSD		**WG1885449-2**						
F2 (C10-C16)		104.2	105.7		%	1.4	50	05-JUN-14
F3 (C16-C34)		103.0	104.8		%	1.7	50	05-JUN-14
F4 (C34-C50)		98.6	100.1		%	1.5	50	05-JUN-14
WG1885449-1 MB								
F2 (C10-C16)			<100		ug/L		100	05-JUN-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2853294								
WG1885449-1 MB								
F3 (C16-C34)			<250		ug/L		250	05-JUN-14
F4 (C34-C50)			<250		ug/L		250	05-JUN-14
Surrogate: 2-Bromobenzotrifluoride			97.1		%		60-140	05-JUN-14
FC-MF-WT	Water							
Batch R2849885								
WG1882343-3 DUP		**L1462687-6**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	31-MAY-14
WG1882343-1 MB								
Fecal Coliforms			0		CFU/100mL		1	31-MAY-14
WG1882343-2 MB								
Fecal Coliforms			0		CFU/100mL		1	31-MAY-14
HG-D-CVAA-WT	Water							
Batch R2850494								
WG1883434-3 DUP		**L1462687-1**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883434-2 LCS								
Mercury (Hg)-Dissolved			107.0		%		80-120	02-JUN-14
WG1883434-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	02-JUN-14
WG1883434-4 MS		**L1462687-2**						
Mercury (Hg)-Dissolved			111.0		%		70-130	02-JUN-14
MET-D-MS-WT	Water							
Batch R2850401								
WG1882459-1 CVS								
Arsenic (As)-Dissolved			98.4		%		80-120	30-MAY-14
Boron (B)-Dissolved			98.2		%		80-120	30-MAY-14
Cadmium (Cd)-Dissolved			106.6		%		80-120	30-MAY-14
Chromium (Cr)-Dissolved			99.8		%		80-120	30-MAY-14
Cobalt (Co)-Dissolved			99.4		%		80-120	30-MAY-14
Copper (Cu)-Dissolved			99.7		%		80-120	30-MAY-14
Iron (Fe)-Dissolved			99.4		%		80-120	30-MAY-14
Lead (Pb)-Dissolved			103.3		%		80-120	30-MAY-14
Manganese (Mn)-Dissolved			99.4		%		80-120	30-MAY-14
Molybdenum (Mo)-Dissolved			95.4		%		80-120	30-MAY-14
Nickel (Ni)-Dissolved			98.5		%		80-120	30-MAY-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2850401								
WG1882459-1 CVS								
Zinc (Zn)-Dissolved			92.8		%		80-120	30-MAY-14
WG1882459-3 CVS								
Arsenic (As)-Dissolved			98.9		%		80-120	02-JUN-14
Boron (B)-Dissolved			104.7		%		80-120	02-JUN-14
Cadmium (Cd)-Dissolved			100.6		%		80-120	02-JUN-14
Chromium (Cr)-Dissolved			96.8		%		80-120	02-JUN-14
Cobalt (Co)-Dissolved			99.5		%		80-120	02-JUN-14
Copper (Cu)-Dissolved			99.2		%		80-120	02-JUN-14
Iron (Fe)-Dissolved			99.0		%		80-120	02-JUN-14
Lead (Pb)-Dissolved			103.1		%		80-120	02-JUN-14
Manganese (Mn)-Dissolved			101.8		%		80-120	02-JUN-14
Molybdenum (Mo)-Dissolved			97.3		%		80-120	02-JUN-14
Nickel (Ni)-Dissolved			99.2		%		80-120	02-JUN-14
Zinc (Zn)-Dissolved			92.2		%		80-120	02-JUN-14
WG1882459-4 CVS								
Arsenic (As)-Dissolved			98.0		%		80-120	03-JUN-14
Boron (B)-Dissolved			96.9		%		80-120	03-JUN-14
Cadmium (Cd)-Dissolved			97.6		%		80-120	03-JUN-14
Chromium (Cr)-Dissolved			99.3		%		80-120	03-JUN-14
Cobalt (Co)-Dissolved			98.9		%		80-120	03-JUN-14
Copper (Cu)-Dissolved			99.6		%		80-120	03-JUN-14
Iron (Fe)-Dissolved			100.8		%		80-120	03-JUN-14
Lead (Pb)-Dissolved			98.9		%		80-120	03-JUN-14
Manganese (Mn)-Dissolved			99.8		%		80-120	03-JUN-14
Molybdenum (Mo)-Dissolved			95.2		%		80-120	03-JUN-14
Nickel (Ni)-Dissolved			99.8		%		80-120	03-JUN-14
Zinc (Zn)-Dissolved			93.0		%		80-120	03-JUN-14
WG1882428-4 DUP		**WG1882428-3**						
Arsenic (As)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Boron (B)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	30-MAY-14
Cadmium (Cd)-Dissolved		<0.00090	<0.00090	RPD-NA	mg/L	N/A	20	30-MAY-14
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Cobalt (Co)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Copper (Cu)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2850401								
WG1882428-4 DUP		**WG1882428-3**						
Iron (Fe)-Dissolved		<0.50	<0.50	RPD-NA	mg/L	N/A	20	30-MAY-14
Lead (Pb)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	30-MAY-14
Manganese (Mn)-Dissolved		0.182	0.188		mg/L	2.9	20	30-MAY-14
Molybdenum (Mo)-Dissolved		0.0469	0.0470		mg/L	0.3	20	30-MAY-14
Nickel (Ni)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-MAY-14
Zinc (Zn)-Dissolved		<0.030	<0.030	RPD-NA	mg/L	N/A	20	30-MAY-14
WG1882428-2 LCS								
Arsenic (As)-Dissolved			94.9		%		80-120	30-MAY-14
Boron (B)-Dissolved			80.3		%		80-120	30-MAY-14
Cadmium (Cd)-Dissolved			99.9		%		80-120	30-MAY-14
Chromium (Cr)-Dissolved			94.6		%		80-120	30-MAY-14
Cobalt (Co)-Dissolved			95.3		%		80-120	30-MAY-14
Copper (Cu)-Dissolved			96.6		%		80-120	30-MAY-14
Iron (Fe)-Dissolved			93.6		%		80-120	30-MAY-14
Lead (Pb)-Dissolved			99.0		%		80-120	30-MAY-14
Manganese (Mn)-Dissolved			93.6		%		80-120	30-MAY-14
Molybdenum (Mo)-Dissolved			93.5		%		80-120	30-MAY-14
Nickel (Ni)-Dissolved			94.9		%		80-120	30-MAY-14
Zinc (Zn)-Dissolved			93.5		%		80-120	30-MAY-14
WG1882428-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	30-MAY-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	30-MAY-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	30-MAY-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	30-MAY-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	30-MAY-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	30-MAY-14
WG1882428-5 MS		**WG1882428-3**						
Arsenic (As)-Dissolved			87.7		%		70-130	30-MAY-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2850401								
WG1882428-5 MS		**WG1882428-3**						
Boron (B)-Dissolved			78.0		%		70-130	30-MAY-14
Cadmium (Cd)-Dissolved			89.2		%		70-130	30-MAY-14
Chromium (Cr)-Dissolved			84.0		%		70-130	30-MAY-14
Cobalt (Co)-Dissolved			84.9		%		70-130	30-MAY-14
Copper (Cu)-Dissolved			85.2		%		70-130	30-MAY-14
Iron (Fe)-Dissolved			86.0		%		70-130	30-MAY-14
Lead (Pb)-Dissolved			89.1		%		70-130	30-MAY-14
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	30-MAY-14
Nickel (Ni)-Dissolved			84.9		%		70-130	30-MAY-14
Zinc (Zn)-Dissolved			83.1		%		70-130	30-MAY-14
NH3-WT	Water							
Batch R2853099								
WG1885039-2 CVS								
Ammonia, Total (as N)			93.4		%		85-115	04-JUN-14
WG1885039-11 DUP		**L1462922-1**						
Ammonia, Total (as N)		0.057	0.063		mg/L	8.5	20	04-JUN-14
WG1885039-3 DUP		**L1464420-4**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1885039-5 DUP		**L1462542-3**						
Ammonia, Total (as N)		29.7	28.1		mg/L	5.7	20	04-JUN-14
WG1885039-7 DUP		**L1462591-4**						
Ammonia, Total (as N)		0.175	0.148		mg/L	17	20	04-JUN-14
WG1885039-9 DUP		**L1462714-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1885039-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	04-JUN-14
WG1885039-10 MS		**L1462714-1**						
Ammonia, Total (as N)			81.8		%		75-125	04-JUN-14
WG1885039-12 MS		**L1462922-1**						
Ammonia, Total (as N)			89.5		%		75-125	04-JUN-14
WG1885039-4 MS		**L1464420-4**						
Ammonia, Total (as N)			100.2		%		75-125	04-JUN-14
WG1885039-6 MS		**L1462542-3**						
Ammonia, Total (as N)			N/A	MS-B	%		-	04-JUN-14
WG1885039-8 MS		**L1462591-4**						
Ammonia, Total (as N)			96.5		%		75-125	04-JUN-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-2 LCS								
Nitrite-N (NO2-N)			99.98		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Nitrite-N (NO2-N)		99.98	99.8		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Nitrite-N (NO2-N)			96.2		%		70-130	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Nitrite-N (NO2-N)			96.1		%		70-130	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Nitrite-N (NO2-N)			101.6		%		70-130	03-JUN-14
NO3-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Nitrate-N (NO3-N)		0.63	0.63		mg/L	0.0	25	03-JUN-14
WG1884238-2 LCS								
Nitrate-N (NO3-N)			99.2		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Nitrate-N (NO3-N)		99.2	99.0		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Nitrate-N (NO3-N)			89.9		%		70-130	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Nitrate-N (NO3-N)			88.8		%		70-130	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Nitrate-N (NO3-N)			94.9		%		70-130	03-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-WT	Water							
Batch R2850502								
WG1883692-1 CVS								
Phosphorus, Total			102.2		%		85-115	02-JUN-14
WG1883223-3 DUP		**L1462591-1**						
Phosphorus, Total		0.046	0.042		mg/L	9.1	20	02-JUN-14
WG1883223-4 DUP		**L1462342-2**						
Phosphorus, Total		28.3	30.1		mg/L	6.2	20	02-JUN-14
WG1883223-2 LCS								
Phosphorus, Total			99.3		%		80-120	02-JUN-14
WG1883223-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	02-JUN-14
Batch R2851266								
WG1884043-1 CVS								
Phosphorus, Total			95.0		%		85-115	03-JUN-14
WG1884007-3 DUP		**L1462885-1**						
Phosphorus, Total		0.042	0.045		mg/L	6.9	20	03-JUN-14
WG1884007-4 DUP		**L1462687-3**						
Phosphorus, Total		0.111	0.108		mg/L	2.7	20	03-JUN-14
WG1884007-2 LCS								
Phosphorus, Total			102.9		%		80-120	03-JUN-14
WG1884007-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	03-JUN-14
PAH-CCME-WT	Water							
Batch R2854342								
WG1886849-1 CVS								
Anthracene			116.2		%		60-130	06-JUN-14
Benzo(a)pyrene			108.4		%		70-130	06-JUN-14
WG1886849-2 CVS								
Anthracene			111.2		%		60-130	09-JUN-14
Benzo(a)pyrene			107.6		%		70-130	09-JUN-14
WG1886401-2 LCS								
Anthracene			104.8		%		50-140	06-JUN-14
Benzo(a)pyrene			95.7		%		60-130	06-JUN-14
WG1886401-3 LCSD		**WG1886401-2**						
Anthracene		104.8	109.1		%	4.0	50	09-JUN-14
Benzo(a)pyrene		95.7	95.8		%	0.1	50	09-JUN-14
WG1886401-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2854342								
WG1886401-1 MB								
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			66.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			86.4		%		50-150	06-JUN-14
Batch R2854452								
WG1886479-1 CVS								
Anthracene			116.2		%		60-130	06-JUN-14
Benzo(a)pyrene			108.4		%		70-130	06-JUN-14
WG1884966-2 LCS								
Anthracene			106.3		%		50-140	06-JUN-14
Benzo(a)pyrene			99.4		%		60-130	06-JUN-14
WG1884966-3 LCSD		**WG1884966-2**						
Anthracene		106.3	103.9		%	2.3	50	06-JUN-14
Benzo(a)pyrene		99.4	99.4		%	0.0	50	06-JUN-14
WG1884966-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			90.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			102.7		%		50-150	06-JUN-14
PH-WT	Water							
Batch R2850080								
WG1882509-3 DUP		**WG1882509-2**						
pH		7.74	7.74	J	pH units	0.00	0.2	30-MAY-14
WG1882509-4 DUP		**L1462646-1**						
pH		7.81	7.78	J	pH units	0.03	0.2	30-MAY-14
WG1882509-1 LCS								
pH			7.01		pH units		6.9-7.1	30-MAY-14
Batch R2851484								
WG1883659-3 DUP		**WG1883659-2**						
pH		7.05	7.04	J	pH units	0.01	0.2	02-JUN-14
WG1883659-7 DUP		**L1463463-1**						
pH		7.98	7.99	J	pH units	0.01	0.2	02-JUN-14
WG1883659-1 LCS								
pH			7.07		pH units		6.9-7.1	02-JUN-14
PHENOLS-4AAP-WT	Water							

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R2853132								
WG1885166-3 CVS								
Phenols (4AAP)			89.7		%		85-115	04-JUN-14
WG1885166-4 DUP		**L1463249-1**						
Phenols (4AAP)		0.0010	0.0010		mg/L	1.3	20	04-JUN-14
WG1885166-2 LCS								
Phenols (4AAP)			102.9		%		85-115	04-JUN-14
WG1885166-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	04-JUN-14
WG1885166-5 MS		**L1463249-1**						
Phenols (4AAP)			107.7		%		75-125	04-JUN-14
SO4-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Sulphate (SO4)		649	650		mg/L	0.1	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Sulphate (SO4)		504	504		mg/L	0.0	25	03-JUN-14
WG1884238-2 LCS								
Sulphate (SO4)			100.5		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Sulphate (SO4)		100.5	100.3		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Sulphate (SO4)			N/A	MS-B	%		-	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Sulphate (SO4)			N/A	MS-B	%		-	03-JUN-14
SOLIDS-TDS-WT	Water							
Batch R2852274								
WG1884231-3 DUP		**L1462922-1**						
Total Dissolved Solids		1560	1580		mg/L	1.5	20	04-JUN-14
WG1884231-2 LCS								
Total Dissolved Solids			95.2		%		85-115	04-JUN-14
WG1884231-1 MB								
Total Dissolved Solids			<20		mg/L		20	04-JUN-14
Batch R2852276								
WG1884226-3 DUP		**L1462714-1**						
Total Dissolved Solids		293	296		mg/L	1.0	20	04-JUN-14
WG1884226-2 LCS								

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R2852276								
WG1884226-2 LCS								
Total Dissolved Solids			96.5		%		85-115	04-JUN-14
WG1884226-1 MB								
Total Dissolved Solids			<20		mg/L		20	04-JUN-14
SOLIDS-TSS-WT	Water							
Batch R2851614								
WG1883656-3 DUP		**L1462727-1**						
Total Suspended Solids		390	460		mg/L	16	20	03-JUN-14
WG1883656-2 LCS								
Total Suspended Solids			97.2		%		85-115	03-JUN-14
WG1883656-1 MB								
Total Suspended Solids			<2.0		mg/L		2	03-JUN-14
TC-MF-WT	Water							
Batch R2849880								
WG1882328-3 DUP		**L1462479-6**						
Total Coliforms		0	0		CFU/100mL	0.0	50	31-MAY-14
WG1882328-1 MB								
Total Coliforms			0		CFU/100mL		1	31-MAY-14
WG1882328-2 MB								
Total Coliforms			0		CFU/100mL		1	31-MAY-14
TKN-WT	Water							
Batch R2850885								
WG1883690-1 CVS								
Total Kjeldahl Nitrogen			96.3		%		75-125	02-JUN-14
WG1883223-3 DUP		**L1462591-1**						
Total Kjeldahl Nitrogen		0.62	0.66		mg/L	6.1	20	02-JUN-14
WG1883223-4 DUP		**L1462342-2**						
Total Kjeldahl Nitrogen		224	217		mg/L	3.1	20	02-JUN-14
WG1883223-2 LCS								
Total Kjeldahl Nitrogen			97.5		%		75-125	02-JUN-14
WG1883223-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-JUN-14
Batch R2851222								
WG1884042-1 CVS								
Total Kjeldahl Nitrogen			96.5		%		75-125	03-JUN-14
WG1884007-3 DUP		**L1462885-1**						
Total Kjeldahl Nitrogen		0.27	0.30		mg/L	11	20	03-JUN-14

Quality Control Report

Workorder: L1462687 Report Date: 12-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R2851222								
WG1884007-4 DUP		**L1462687-3**						
Total Kjeldahl Nitrogen		13.6	12.8		mg/L	6.4	20	03-JUN-14
WG1884007-2 LCS								
Total Kjeldahl Nitrogen			107.7		%		75-125	03-JUN-14
WG1884007-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	03-JUN-14
TURBIDITY-WT	Water							
Batch R2849047								
WG1882361-2 CVS								
Turbidity			99.0		%		85-115	30-MAY-14
WG1882361-4 DUP		**L1462343-4**						
Turbidity		0.37	0.36		NTU	2.7	20	30-MAY-14
WG1882361-1 MB								
Turbidity			<0.10		NTU		0.1	30-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CHAIN OF CUSTODY RECORD

COC NO.: 36933

PAGE 1 OF 1

(See Reverse Side for Instructions)

B9409

CONESTOGA-ROVERS & ASSOCIATES

Address: 1379 CLYDE AVENUE, SUITE 200, OTTAWA

Phone: 613 727 0510 Fax:

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS
Project Name: ORLEANS BLVD	**Lab Contact:**
Project Location: OTTAWA	**Lab Location:** WATERLOO
Chemistry Contact: A. MACPHEE	**Lab Quote No:** 20-077307
Sampler(s): N. BOUCHARD	**SSOW ID:**
	Cooler No: 3 of 4
	Carrier: FED EX
	Airbill No: 8652 5877 8486
	Date Shipped: 5/29/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	45804-(GW-P-J)	MS/MSD Request	Comments/ Special Instructions:
1	GW-45804-052914-MB-004	5/29/14		WG	G									14	X		PLEASE SEE P.O.
2	-005			WG	G									14	X		
3	-006			WG	G									8	X		-006 as PARTIALLY FULL OTHER COOLER
4																	
5																	
6																	METALS FILTERED IN FIELD
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	

PLEASE SEE P.O.

MB.

L1462687-COFC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 36

All Samples in Cooler must be on COC

Notes/ Special Requirements: 9.8°C

	Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.		CRA	5/29/14	17h00		ALS	May 30/14	9:00
2.								
3.								

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

00067

CHAIN OF CUSTODY RECORD

COC NO.: 36935
PAGE 1 OF 1
(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES

Address: 197 COLONNADE ROAD, SUITE 400, OTTAWA
Phone: 613 727 0510 Fax:

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS	**Lab Location:** WATERLOO	**SSOW ID:**
Project Name: ORGANOWORLD	**Lab Contact:**	**Lab Quote No:** P.O. 20-017357	**Cooler No:** 2 of 4
Project Location: OTTAWA			**Carrier:** FEDEX
Chemistry Contact: A. MACAHEE			**Airbill No:** 8652 5577 8496
Sampler(s): M. BOUCHARD			**Date Shipped:** 5/29/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	HCl	HNO_3	H_2SO_4	NaOH	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested (See Back of COC for Definitions): 45804-GW-P-T35	Metals Filtered?	MS/MSD Request	Comments/ Special Instructions:
1	GW-45804-052914-MB-007	5/29/14		WG	G									14	X -4	X		PLEASE SEE P.O.
2	" " " -008	5/29/14		WG	G									14	X -5	X		FOR PARAMETERS
3	" " " -009	5/29/14		WG	G									8	X -6	X		
4																		
5																		-009 PAIRS W
6																		OTHER COOLER
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		

PLEASE SEE P.O.

MB

L1462687-COFC

TAT Required in business days (use separate COCs for different TATs):
☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 36
All Samples in Cooler must be on COC

Notes/ Special Requirements: SEE P.O. 9.4°C

	Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.		CRA	5/29/14	17h00		ALS	May 30/14	9:00
2.								
3.								

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

0006722

CHAIN OF CUSTODY RECORD

COC NO.: 36932

PAGE 1 OF 1

(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES

Address: 1791 COLONNADE ROAD, SUITE 402, OTTAWA

Phone: 613 727-0520 Fax:

Project No/ Phase/Task Code: 45804-58	Laboratory Name: ALS
Project Name: ORLEANWOOD	Lab Contact:
Project Location: OTTAWA	Lab Location: WATERLOO
Chemistry Contact: ARESSE MACPHEE	Lab Quote No: 20-017397
Sampler(s): M. BOUCHARD	SSOW ID:
	Cooler No: 4 of 4
	Carrier: FEDEX
	Airbill No: 8652 5577 8486
	Date Shipped: 5/29/14

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Sample Type: Matrix Code (see back of COC)	Sample Type: Grab (G) or Comp (C)	Container Quantity & Preservation: Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	Analysis Requested (See Back of COC for Definitions): 45804-GW-P	MS/MSD Request	Comments/ Special Instructions:
1	GW-45804-052914-MB-010	5/29/14		GW	G									14	X		PLEASE SEE P.O.
2	↓ ↓ ↓ -012	5/29/14		GW	G									14	X		
3	↓ ↓ ↓ -009	5/29/14		GW	G									6	X		REST OF -009 IN OTHER COOLER
4																	
5																	
6																	
7																	
8																	
9																	
10	MB.																
11																	
12																	
13																	
14																	
15																	

L1462687-COFC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 34

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	5/29/14		1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

000673

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

CHAIN OF CUSTODY RECORD

COC NO.: 36916

PAGE 1 OF 1

(See Reverse Side for Instructions)

CONESTOGA-ROVERS & ASSOCIATES

Address: 179 COLONNADE RD, SUITE 400, OTTAWA

Phone: 613 727 0510 Fax: _____

Project No/ Phase/Task Code: 45804-58	**Laboratory Name:** ALS	**Lab Location:** WATERLOO	**SSOW ID:**
Project Name: ORGANWORLD	**Lab Contact:**	**Lab Quote No:** 20-017357	**Cooler No:** 1 of 4
Project Location: OTTAWA			**Carrier:** FED EX
Chemistry Contact: A. MACPHEE			**Airbill No:** 8652 5577 8486
Sampler(s): N. BOUCHARD			**Date Shipped:** 5/29/2014

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd/yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	pH, Alk, cond, TDS	TDS, TSS, COD, Anions	TP, TKN, NH3, COD	Phenols, DOC	Total, Filtered Lead (Pb)	Dissolved methane/HG	F1 - F4	Xylenes	Benzo(a)anthracene	Filtered metals	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
1	GW-45804-052914-MB-016	5/29/14		WG	G				-11					14	X	X	X	X	X	X	X	X	X	X		PLEASE REVIEW
2	" " " -011	"		WG	G			-8, -9						11	X	X	X	X	X	X	F1			X		P.O FOR PARAMETERS
3	" " " -006	"		WG	G									6							XXX					
4																										-011, -006
5																										OTHER BOTTLES
6																										IN SEP. COOLER
7																										
8																										
9																										
10																										
11																										
12																										
13																										
14																										
15																										

mb

SEE P.O FOR DETAILS PLEASE!

L1462687-COFC

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 31

All Samples in Cooler must be on COC

Notes/ Special Requirements: SEE LAB P.O.

	RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.		CRA	5/29/2014	17h00	1.			
2.					2.			
3.					3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

CRA Form: COC-10B (20110804)

000674

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 31-MAY-14
Report Date: 09-JUN-14 13:20 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1463249

Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers: 36917
Legal Site Desc:

Wayne Smith, C.Chem., C.E.T.
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1463249-1 GW-45804-053014-MB-013 Sampled By: M. BOUCHARD on 30-MAY-14 @ 09:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.32		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	10.6		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	230		1.0	C.U.		31-MAY-14	R2852281
pH	7.68		0.10	pH units		02-JUN-14	R2851484
Total Suspended Solids	38.0		2.0	mg/L	03-JUN-14	04-JUN-14	R2852025
Total Dissolved Solids	1510		20	mg/L	03-JUN-14	04-JUN-14	R2852274
Turbidity	96.0		0.10	NTU	31-MAY-14	31-MAY-14	R2849552
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	475		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0364		0.00025	mg/L		05-JUN-14	
Ammonia, Total (as N)	7.40		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	179		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	7.43		0.15	mg/L	02-JUN-14	03-JUN-14	R2851402
Phosphorus, Total	0.127		0.030	mg/L	03-JUN-14	04-JUN-14	R2852124
Sulphate (SO4)	504		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.2		1.0	mg/L	04-JUN-14	04-JUN-14	R2853220
Bacteriological Tests							
E. Coli	<2	DLM	2	CFU/100mL	31-MAY-14	01-JUN-14	R2849832
Fecal Coliforms	<2	DLM	2	CFU/100mL	31-MAY-14	01-JUN-14	R2849834
Total Coliforms	<2	DLM	2	CFU/100mL	31-MAY-14	01-JUN-14	R2849831
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					31-MAY-14	R2849460
Arsenic (As)-Dissolved	0.0024		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Boron (B)-Dissolved	0.075		0.050	mg/L	31-MAY-14	02-JUN-14	R2850466
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	31-MAY-14	02-JUN-14	R2850466
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	31-MAY-14	02-JUN-14	R2850466
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Iron (Fe)-Dissolved	8.82		0.050	mg/L	31-MAY-14	02-JUN-14	R2850466
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Manganese (Mn)-Dissolved	5.02	DLM	0.010	mg/L	31-MAY-14	03-JUN-14	R2850466
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0084		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	31-MAY-14	02-JUN-14	R2850466
Zinc (Zn)-Dissolved	0.0041		0.0030	mg/L	31-MAY-14	02-JUN-14	R2850466
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	31-MAY-14	05-JUN-14	R2852901

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1463249-1 GW-45804-053014-MB-013 Sampled By: M. BOUCHARD on 30-MAY-14 @ 09:15 Matrix: WATER							
Aggregate Organics							
COD	102		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0010		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-JUN-14	R2851340
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853294
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853294
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853294
Surrogate: 2-Bromobenzotrifluoride	97.7		60-140	%	05-JUN-14	05-JUN-14	R2853294
Surrogate: 3,4-Dichlorotoluene	96.3		60-140	%		03-JUN-14	R2851340
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	05-JUN-14	06-JUN-14	R2854342
Benzo(a)pyrene	<0.0050		0.0050	ug/L	05-JUN-14	06-JUN-14	R2854342
Surrogate: 2-Fluorobiphenyl	75.4		30-130	%	05-JUN-14	06-JUN-14	R2854342
Surrogate: d14-Terphenyl	89.0		50-150	%	05-JUN-14	06-JUN-14	R2854342
L1463249-2 GW-45804-053014-MB-014 Sampled By: M. BOUCHARD on 30-MAY-14 @ 09:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.38		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	15.7		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	146		1.0	C.U.		31-MAY-14	R2852281
pH	7.77		0.10	pH units		02-JUN-14	R2851484
Total Suspended Solids	5.6		2.0	mg/L	03-JUN-14	04-JUN-14	R2852025
Total Dissolved Solids	644		20	mg/L	03-JUN-14	04-JUN-14	R2852274
Turbidity	15.7		0.10	NTU	31-MAY-14	31-MAY-14	R2849552
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	234		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.0173		0.00042	mg/L		05-JUN-14	
Ammonia, Total (as N)	2.08		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	85.2		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	2.88		0.15	mg/L	02-JUN-14	03-JUN-14	R2851402
Phosphorus, Total	0.174		0.030	mg/L	03-JUN-14	04-JUN-14	R2852124
Sulphate (SO4)	194		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.4		1.0	mg/L	04-JUN-14	04-JUN-14	R2853220

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1463249-2 GW-45804-053014-MB-014 Sampled By: M. BOUCHARD on 30-MAY-14 @ 09:45 Matrix: WATER							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849832
Fecal Coliforms	0		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849834
Total Coliforms	5		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849831
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					31-MAY-14	R2849460
Arsenic (As)-Dissolved	0.0041		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Boron (B)-Dissolved	<0.050		0.050	mg/L	31-MAY-14	02-JUN-14	R2850466
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	31-MAY-14	02-JUN-14	R2850466
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	31-MAY-14	02-JUN-14	R2850466
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Iron (Fe)-Dissolved	2.78		0.050	mg/L	31-MAY-14	02-JUN-14	R2850466
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Manganese (Mn)-Dissolved	1.23		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0045		0.0010	mg/L	31-MAY-14	02-JUN-14	R2850466
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	31-MAY-14	02-JUN-14	R2850466
Zinc (Zn)-Dissolved	0.0045		0.0030	mg/L	31-MAY-14	02-JUN-14	R2850466
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	31-MAY-14	05-JUN-14	R2852901
COD	45		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	<0.0010		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-JUN-14	R2851340
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853472
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853472
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853472
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853472
Surrogate: 2-Bromobenzotrifluoride	92.6		60-140	%	05-JUN-14	05-JUN-14	R2853472
Surrogate: 3,4-Dichlorotoluene	94.3		60-140	%		03-JUN-14	R2851340
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	05-JUN-14	06-JUN-14	R2854342
Benzo(a)pyrene	<0.0050		0.0050	ug/L	05-JUN-14	06-JUN-14	R2854342
Surrogate: 2-Fluorobiphenyl	82.3		30-130	%	05-JUN-14	06-JUN-14	R2854342
Surrogate: d14-Terphenyl	92.9		50-150	%	05-JUN-14	06-JUN-14	R2854342
L1463249-3 GW-45804-053014-MB-015 Sampled By: M. BOUCHARD on 30-MAY-14 @ 10:40 Matrix: WATER							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1463249-3 GW-45804-053014-MB-015 Sampled By: M. BOUCHARD on 30-MAY-14 @ 10:40 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH	04-JUN-14	04-JUN-14	R2852574
Temperature, Client	10.0		0.1	Deg. C	04-JUN-14	04-JUN-14	R2852574
Physical Tests							
Color, Apparent	283		1.0	C.U.		31-MAY-14	R2852281
pH	7.89		0.10	pH units		02-JUN-14	R2851484
Total Suspended Solids	4.0		2.0	mg/L	03-JUN-14	04-JUN-14	R2852009
Total Dissolved Solids	650		20	mg/L	03-JUN-14	04-JUN-14	R2852274
Turbidity	34.0		0.10	NTU	31-MAY-14	31-MAY-14	R2849552
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	224		10	mg/L		03-JUN-14	R2852238
Unionized ammonia	0.00788		0.00030	mg/L		05-JUN-14	
Ammonia, Total (as N)	1.30		0.050	mg/L		04-JUN-14	R2853099
Chloride (Cl)	87.2		2.0	mg/L		03-JUN-14	R2852414
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		03-JUN-14	R2852414
Total Kjeldahl Nitrogen	2.15		0.15	mg/L	02-JUN-14	03-JUN-14	R2851402
Phosphorus, Total	0.043		0.030	mg/L	03-JUN-14	04-JUN-14	R2852124
Sulphate (SO4)	193		2.0	mg/L		03-JUN-14	R2852414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.9		1.0	mg/L	04-JUN-14	04-JUN-14	R2853220
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849832
Fecal Coliforms	0		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849834
Total Coliforms	0		0	CFU/100mL	31-MAY-14	01-JUN-14	R2849831
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					02-JUN-14	R2850039
Dissolved Metals Filtration Location	FIELD					31-MAY-14	R2849460
Arsenic (As)-Dissolved	0.0063		0.0010	mg/L	31-MAY-14	03-JUN-14	R2850466
Boron (B)-Dissolved	<0.050		0.050	mg/L	31-MAY-14	03-JUN-14	R2850466
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	31-MAY-14	03-JUN-14	R2850466
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	03-JUN-14	R2850466
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	31-MAY-14	03-JUN-14	R2850466
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	03-JUN-14	R2850466
Iron (Fe)-Dissolved	5.16		0.050	mg/L	31-MAY-14	03-JUN-14	R2850466
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	31-MAY-14	03-JUN-14	R2850466
Manganese (Mn)-Dissolved	2.99	DLM	0.010	mg/L	31-MAY-14	03-JUN-14	R2850466
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-JUN-14	02-JUN-14	R2850494
Molybdenum (Mo)-Dissolved	0.0042		0.0010	mg/L	31-MAY-14	03-JUN-14	R2850466
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	31-MAY-14	03-JUN-14	R2850466
Zinc (Zn)-Dissolved	0.0070		0.0030	mg/L	31-MAY-14	03-JUN-14	R2850466
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	31-MAY-14	05-JUN-14	R2852901

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1463249-3 GW-45804-053014-MB-015 Sampled By: M. BOUCHARD on 30-MAY-14 @ 10:40 Matrix: WATER							
Aggregate Organics							
COD	54		10	mg/L	05-JUN-14	05-JUN-14	R2853208
Phenols (4AAP)	0.0014		0.0010	mg/L	04-JUN-14	04-JUN-14	R2853132
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-JUN-14	R2851340
F2 (C10-C16)	<100		100	ug/L	05-JUN-14	05-JUN-14	R2853472
F2-Naphth	<100		100	ug/L		06-JUN-14	
F3 (C16-C34)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853472
F3-PAH	<250		250	ug/L		06-JUN-14	
F4 (C34-C50)	<250		250	ug/L	05-JUN-14	05-JUN-14	R2853472
Total Hydrocarbons (C6-C50)	<380		380	ug/L		06-JUN-14	
Chrom. to baseline at nC50	YES				05-JUN-14	05-JUN-14	R2853472
Surrogate: 2-Bromobenzotrifluoride	94.9		60-140	%	05-JUN-14	05-JUN-14	R2853472
Surrogate: 3,4-Dichlorotoluene	91.1		60-140	%		03-JUN-14	R2851340
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	05-JUN-14	06-JUN-14	R2854342
Benzo(a)pyrene	<0.0050		0.0050	ug/L	05-JUN-14	06-JUN-14	R2854342
Surrogate: 2-Fluorobiphenyl	71.6		30-130	%	05-JUN-14	06-JUN-14	R2854342
Surrogate: d14-Terphenyl	88.1		50-150	%	05-JUN-14	06-JUN-14	R2854342

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLM	L1463249-3
Matrix Spike	Boron (B)-Dissolved	MS-B	L1463249-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1463249-1, -2, -3
Matrix Spike	Chloride (Cl)	MS-B	L1463249-1, -2, -3
Matrix Spike	Sulphate (SO4)	MS-B	L1463249-1, -2, -3
Matrix Spike	Chloride (Cl)	MS-B	L1463249-1, -2, -3
Matrix Spike	Chloride (Cl)	MS-B	L1463249-1, -2, -3
Matrix Spike	Sulphate (SO4)	MS-B	L1463249-1, -2, -3
Matrix Spike	Ammonia, Total (as N)	MS-B	L1463249-1, -2, -3

Qualifiers for Sample Submission Listed:

Qualifier	Description
CINT	Cooling initiated. Samples were packaged with ice or ice packs upon receipt.

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.

Reference Information

2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA SW846 7470A
Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT Water Dissolved Metals in Water by ICPMS EPA 200.8
The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)
A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT Water Phosphorus, Total APHA 4500-P B E
Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

Reference Information

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

36917

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2852238								
WG1884758-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.6		%		80-120	03-JUN-14
WG1884758-2 CVS								
Alkalinity, Total (as CaCO3)			100.7		%		85-115	03-JUN-14
WG1884758-4 DUP		**L1461791-4**						
Alkalinity, Total (as CaCO3)		344	334		mg/L	2.9	20	03-JUN-14
WG1884758-5 DUP		**L1461921-1**						
Alkalinity, Total (as CaCO3)		466	468		mg/L	0.3	20	03-JUN-14
WG1884758-6 DUP		**L1462714-1**						
Alkalinity, Total (as CaCO3)		243	239		mg/L	1.7	20	03-JUN-14
WG1884758-7 DUP		**L1463704-1**						
Alkalinity, Total (as CaCO3)		228	232		mg/L	1.7	20	03-JUN-14
WG1884758-8 DUP		**L1464009-4**						
Alkalinity, Total (as CaCO3)		26	25		mg/L	3.6	20	03-JUN-14
WG1884758-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	03-JUN-14
BOD-C-WT	Water							
Batch R2852901								
WG1882898-2 DUP		**L1463093-5**						
BOD Carbonaceous		1650	1570		mg/L	5.4	20	05-JUN-14
WG1882898-3 LCS								
BOD Carbonaceous			107.1		%		85-115	05-JUN-14
WG1882898-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	05-JUN-14
C-DIS-ORG-WT	Water							
Batch R2853220								
WG1884968-3 DUP		**L1462885-1**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1884968-5 DUP		**L1461539-4**						
Dissolved Organic Carbon		8.1	8.0		mg/L	1.9	20	04-JUN-14
WG1884968-2 LCS								
Dissolved Organic Carbon			94.0		%		80-120	04-JUN-14
WG1884968-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	04-JUN-14
WG1884968-4 MS		**L1462885-1**						
Dissolved Organic Carbon			97.7		%		70-130	04-JUN-14
WG1884968-6 MS		**L1461539-4**						
Dissolved Organic Carbon			92.0		%		70-130	04-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Chloride (Cl)		217	217		mg/L	0.1	20	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Chloride (Cl)		179	179		mg/L	0.0	20	03-JUN-14
WG1884238-4 DUP		**L1462608-1**						
Chloride (Cl)		2.0	<2.0	RPD-NA	mg/L	N/A	20	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Chloride (Cl)		299	300		mg/L	0.3	20	03-JUN-14
WG1884238-2 LCS								
Chloride (Cl)			100.4		%		85-115	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Chloride (Cl)		100.4	100.2		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Chloride (Cl)			<2.0		mg/L		2	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
WG1884238-5 MS		**L1462608-1**						
Chloride (Cl)			97.4		%		75-125	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Chloride (Cl)			N/A	MS-B	%		-	03-JUN-14
COD-WT	Water							
Batch R2853208								
WG1885752-3 DUP		**L1462542-10**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	05-JUN-14
WG1885752-5 DUP		**L1464420-6**						
COD		10	12		mg/L	18	20	05-JUN-14
WG1885752-7 DUP		**L1462687-11**						
COD		12	14		mg/L	15	20	05-JUN-14
WG1885752-2 LCS								
COD			100.0		%		80-120	05-JUN-14
WG1885752-1 MB								
COD			<10		mg/L		10	05-JUN-14
WG1885752-4 MS		**L1462542-10**						
COD			102.0		%		85-115	05-JUN-14
WG1885752-6 MS		**L1464420-6**						
COD			101.0		%		85-115	05-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COLOUR-WT	Water							
Batch R2852281								
WG1882885-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			99.7		%		80-120	31-MAY-14
WG1882885-2 CVS								
Color, Apparent			99.7		%		85-115	31-MAY-14
WG1882885-4 DUP		**L1462687-1**						
Color, Apparent		12.0	12.5		C.U.	3.8	20	31-MAY-14
WG1882885-1 MB								
Color, Apparent			<1.0		C.U.		1	31-MAY-14
EC-MF-WT	Water							
Batch R2849832								
WG1882944-3 DUP		**L1463056-1**						
E. Coli		0	0		CFU/100mL	0.0	50	01-JUN-14
WG1882944-1 MB								
E. Coli			0		CFU/100mL		1	01-JUN-14
WG1882944-2 MB								
E. Coli			0		CFU/100mL		1	01-JUN-14
F1-HS-WT	Water							
Batch R2851340								
WG1883845-7 CVS								
F1 (C6-C10)			98.7		%		80-120	03-JUN-14
WG1883845-10 DUP		**WG1883845-9**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	03-JUN-14
WG1883845-8 MB								
F1 (C6-C10)			<100		ug/L		100	03-JUN-14
Surrogate: 3,4-Dichlorotoluene			98.9		%		60-140	03-JUN-14
F2-F4-WT	Water							
Batch R2853294								
WG1885994-1 CVS								
F2 (C10-C16)			105.4		%		80-120	05-JUN-14
F3 (C16-C34)			103.9		%		80-120	05-JUN-14
F4 (C34-C50)			103.2		%		80-120	05-JUN-14
WG1885994-2 CVS								
F2 (C10-C16)			89.6		%		80-120	05-JUN-14
F3 (C16-C34)			100.8		%		80-120	05-JUN-14
F4 (C34-C50)			103.0		%		80-120	05-JUN-14
WG1885449-2 LCS								
F2 (C10-C16)			104.2		%		65-135	05-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2853294								
WG1885449-2 LCS								
F3 (C16-C34)			103.0		%		65-135	05-JUN-14
F4 (C34-C50)			98.6		%		65-135	05-JUN-14
WG1885449-3 LCSD		**WG1885449-2**						
F2 (C10-C16)		104.2	105.7		%	1.4	50	05-JUN-14
F3 (C16-C34)		103.0	104.8		%	1.7	50	05-JUN-14
F4 (C34-C50)		98.6	100.1		%	1.5	50	05-JUN-14
WG1885449-1 MB								
F2 (C10-C16)			<100		ug/L		100	05-JUN-14
F3 (C16-C34)			<250		ug/L		250	05-JUN-14
F4 (C34-C50)			<250		ug/L		250	05-JUN-14
Surrogate: 2-Bromobenzotrifluoride			97.1		%		60-140	05-JUN-14
Batch R2853472								
WG1886318-1 CVS								
F2 (C10-C16)			92.8		%		80-120	05-JUN-14
F3 (C16-C34)			96.8		%		80-120	05-JUN-14
F4 (C34-C50)			98.5		%		80-120	05-JUN-14
WG1885454-2 LCS								
F2 (C10-C16)			94.6		%		65-135	05-JUN-14
F3 (C16-C34)			102.1		%		65-135	05-JUN-14
F4 (C34-C50)			100.7		%		65-135	05-JUN-14
WG1885454-3 LCSD		**WG1885454-2**						
F2 (C10-C16)		94.6	99.1		%	4.7	50	05-JUN-14
F3 (C16-C34)		102.1	106.8		%	4.5	50	05-JUN-14
F4 (C34-C50)		100.7	103.6		%	2.9	50	05-JUN-14
WG1885454-1 MB								
F2 (C10-C16)			<100		ug/L		100	05-JUN-14
F3 (C16-C34)			<250		ug/L		250	05-JUN-14
F4 (C34-C50)			<250		ug/L		250	05-JUN-14
Surrogate: 2-Bromobenzotrifluoride			90.4		%		60-140	05-JUN-14
FC-MF-WT	Water							
Batch R2849834								
WG1882946-3 DUP		**L1463249-2**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	01-JUN-14
WG1882946-1 MB								
Fecal Coliforms			0		CFU/100mL		1	01-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC-MF-WT	Water							
Batch R2849834								
WG1882946-2 MB								
Fecal Coliforms			0		CFU/100mL		1	01-JUN-14
HG-D-CVAA-WT	Water							
Batch R2850494								
WG1883434-3 DUP		**L1462687-1**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-JUN-14
WG1883434-2 LCS								
Mercury (Hg)-Dissolved			107.0		%		80-120	02-JUN-14
WG1883434-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	02-JUN-14
WG1883434-4 MS		**L1462687-2**						
Mercury (Hg)-Dissolved			111.0		%		70-130	02-JUN-14
MET-D-MS-WT	Water							
Batch R2850466								
WG1883400-1 CVS								
Arsenic (As)-Dissolved			98.9		%		80-120	02-JUN-14
Boron (B)-Dissolved			104.7		%		80-120	02-JUN-14
Cadmium (Cd)-Dissolved			100.6		%		80-120	02-JUN-14
Chromium (Cr)-Dissolved			96.8		%		80-120	02-JUN-14
Cobalt (Co)-Dissolved			99.5		%		80-120	02-JUN-14
Copper (Cu)-Dissolved			99.2		%		80-120	02-JUN-14
Iron (Fe)-Dissolved			99.0		%		80-120	02-JUN-14
Lead (Pb)-Dissolved			103.1		%		80-120	02-JUN-14
Manganese (Mn)-Dissolved			101.8		%		80-120	02-JUN-14
Molybdenum (Mo)-Dissolved			97.3		%		80-120	02-JUN-14
Nickel (Ni)-Dissolved			99.2		%		80-120	02-JUN-14
Zinc (Zn)-Dissolved			92.2		%		80-120	02-JUN-14
WG1883400-3 CVS								
Arsenic (As)-Dissolved			98.0		%		80-120	03-JUN-14
Boron (B)-Dissolved			96.9		%		80-120	03-JUN-14
Cadmium (Cd)-Dissolved			97.6		%		80-120	03-JUN-14
Chromium (Cr)-Dissolved			99.3		%		80-120	03-JUN-14
Cobalt (Co)-Dissolved			98.9		%		80-120	03-JUN-14
Copper (Cu)-Dissolved			99.6		%		80-120	03-JUN-14
Iron (Fe)-Dissolved			100.8		%		80-120	03-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2850466								
WG1883400-3 CVS								
Lead (Pb)-Dissolved			98.9		%		80-120	03-JUN-14
Manganese (Mn)-Dissolved			99.8		%		80-120	03-JUN-14
Molybdenum (Mo)-Dissolved			95.2		%		80-120	03-JUN-14
Nickel (Ni)-Dissolved			99.8		%		80-120	03-JUN-14
Zinc (Zn)-Dissolved			93.0		%		80-120	03-JUN-14
WG1882929-4 DUP		**WG1882929-3**						
Arsenic (As)-Dissolved		0.0071	0.0071		mg/L	0.5	20	02-JUN-14
Boron (B)-Dissolved		0.297	0.294		mg/L	0.7	20	02-JUN-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	02-JUN-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-JUN-14
Cobalt (Co)-Dissolved		0.00153	0.00150		mg/L	2.0	20	02-JUN-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	02-JUN-14
Iron (Fe)-Dissolved		0.374	0.375		mg/L	0.1	20	02-JUN-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	02-JUN-14
Manganese (Mn)-Dissolved		0.358	0.344		mg/L	3.8	20	02-JUN-14
Molybdenum (Mo)-Dissolved		0.0198	0.0201		mg/L	1.7	20	02-JUN-14
Nickel (Ni)-Dissolved		0.0023	0.0023		mg/L	1.3	20	02-JUN-14
Zinc (Zn)-Dissolved		0.0035	0.0031		mg/L	11	20	02-JUN-14
WG1882929-2 LCS								
Arsenic (As)-Dissolved			91.9		%		80-120	02-JUN-14
Boron (B)-Dissolved			88.6		%		80-120	02-JUN-14
Cadmium (Cd)-Dissolved			93.3		%		80-120	02-JUN-14
Chromium (Cr)-Dissolved			87.6		%		80-120	02-JUN-14
Cobalt (Co)-Dissolved			90.2		%		80-120	02-JUN-14
Copper (Cu)-Dissolved			89.3		%		80-120	02-JUN-14
Iron (Fe)-Dissolved			91.4		%		80-120	02-JUN-14
Lead (Pb)-Dissolved			97.5		%		80-120	02-JUN-14
Manganese (Mn)-Dissolved			91.3		%		80-120	02-JUN-14
Molybdenum (Mo)-Dissolved			95.3		%		80-120	02-JUN-14
Nickel (Ni)-Dissolved			89.2		%		80-120	02-JUN-14
Zinc (Zn)-Dissolved			88.1		%		80-120	02-JUN-14
WG1882929-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	02-JUN-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	02-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2850466								
WG1882929-1 MB								
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	02-JUN-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	02-JUN-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	02-JUN-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	02-JUN-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	02-JUN-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	02-JUN-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	02-JUN-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	02-JUN-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	02-JUN-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	02-JUN-14
WG1882929-5 MS		**WG1882929-3**						
Arsenic (As)-Dissolved			87.0		%		70-130	02-JUN-14
Boron (B)-Dissolved			N/A	MS-B	%		-	02-JUN-14
Cadmium (Cd)-Dissolved			83.8		%		70-130	02-JUN-14
Chromium (Cr)-Dissolved			82.9		%		70-130	02-JUN-14
Cobalt (Co)-Dissolved			79.9		%		70-130	02-JUN-14
Copper (Cu)-Dissolved			75.9		%		70-130	02-JUN-14
Iron (Fe)-Dissolved			79.8		%		70-130	02-JUN-14
Lead (Pb)-Dissolved			84.7		%		70-130	02-JUN-14
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	02-JUN-14
Molybdenum (Mo)-Dissolved			84.6		%		70-130	02-JUN-14
Nickel (Ni)-Dissolved			76.7		%		70-130	02-JUN-14
Zinc (Zn)-Dissolved			74.9		%		70-130	02-JUN-14
NH3-WT	Water							
Batch R2853099								
WG1885039-2 CVS								
Ammonia, Total (as N)			93.4		%		85-115	04-JUN-14
WG1885039-11 DUP		**L1462922-1**						
Ammonia, Total (as N)		0.057	0.063		mg/L	8.5	20	04-JUN-14
WG1885039-3 DUP		**L1464420-4**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1885039-5 DUP		**L1462542-3**						
Ammonia, Total (as N)		29.7	28.1		mg/L	5.7	20	04-JUN-14
WG1885039-7 DUP		**L1462591-4**						
Ammonia, Total (as N)		0.175	0.148		mg/L			04-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2853099								
WG1885039-7 DUP		**L1462591-4**						
Ammonia, Total (as N)		0.175	0.148		mg/L	17	20	04-JUN-14
WG1885039-9 DUP		**L1462714-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1885039-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	04-JUN-14
WG1885039-10 MS		**L1462714-1**						
Ammonia, Total (as N)			81.8		%		75-125	04-JUN-14
WG1885039-12 MS		**L1462922-1**						
Ammonia, Total (as N)			89.5		%		75-125	04-JUN-14
WG1885039-4 MS		**L1464420-4**						
Ammonia, Total (as N)			100.2		%		75-125	04-JUN-14
WG1885039-6 MS		**L1462542-3**						
Ammonia, Total (as N)			N/A	MS-B	%		-	04-JUN-14
WG1885039-8 MS		**L1462591-4**						
Ammonia, Total (as N)			96.5		%		75-125	04-JUN-14
NO2-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-2 LCS								
Nitrite-N (NO2-N)			99.98		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Nitrite-N (NO2-N)		99.98	99.8		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Nitrite-N (NO2-N)			96.2		%		70-130	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Nitrite-N (NO2-N)			96.1		%		70-130	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Nitrite-N (NO2-N)			101.6		%		70-130	03-JUN-14
NO3-WT	Water							

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	03-JUN-14
WG1884238-8 DUP		**L1462591-2**						
Nitrate-N (NO3-N)		0.63	0.63		mg/L	0.0	25	03-JUN-14
WG1884238-2 LCS								
Nitrate-N (NO3-N)			99.2		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Nitrate-N (NO3-N)		99.2	99.0		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Nitrate-N (NO3-N)			89.9		%		70-130	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Nitrate-N (NO3-N)			88.8		%		70-130	03-JUN-14
WG1884238-9 MS		**L1462591-2**						
Nitrate-N (NO3-N)			94.9		%		70-130	03-JUN-14
P-TOTAL-WT	Water							
Batch R2852124								
WG1884901-1 CVS								
Phosphorus, Total			97.6		%		85-115	04-JUN-14
WG1884833-3 DUP		**L1463183-8**						
Phosphorus, Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	04-JUN-14
WG1884833-4 DUP		**L1463084-1**						
Phosphorus, Total		2.19	2.11		mg/L	3.7	20	04-JUN-14
WG1884833-2 LCS								
Phosphorus, Total			103.0		%		80-120	04-JUN-14
WG1884833-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	04-JUN-14
PAH-CCME-WT	Water							
Batch R2854342								
WG1886849-1 CVS								
Anthracene			116.2		%		60-130	06-JUN-14
Benzo(a)pyrene			108.4		%		70-130	06-JUN-14
WG1886401-2 LCS								
Anthracene			104.8		%		50-140	06-JUN-14

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R2854342								
WG1886401-2 LCS								
Benzo(a)pyrene			95.7		%		60-130	06-JUN-14
WG1886401-3 LCSD		**WG1886401-2**						
Anthracene		104.8	109.1		%	4.0	50	09-JUN-14
Benzo(a)pyrene		95.7	95.8		%	0.1	50	09-JUN-14
WG1886401-1 MB								
Anthracene			<0.020		ug/L		0.02	06-JUN-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	06-JUN-14
Surrogate: 2-Fluorobiphenyl			66.0		%		30-130	06-JUN-14
Surrogate: d14-Terphenyl			86.4		%		50-150	06-JUN-14
PH-WT	Water							
Batch R2851484								
WG1883659-3 DUP		**WG1883659-2**						
pH		7.05	7.04	J	pH units	0.01	0.2	02-JUN-14
WG1883659-7 DUP		**L1463463-1**						
pH		7.98	7.99	J	pH units	0.01	0.2	02-JUN-14
WG1883659-1 LCS								
pH			7.07		pH units		6.9-7.1	02-JUN-14
PHENOLS-4AAP-WT	Water							
Batch R2853132								
WG1885166-3 CVS								
Phenols (4AAP)			89.7		%		85-115	04-JUN-14
WG1885166-4 DUP		**L1463249-1**						
Phenols (4AAP)		0.0010	0.0010		mg/L	1.3	20	04-JUN-14
WG1885166-2 LCS								
Phenols (4AAP)			102.9		%		85-115	04-JUN-14
WG1885166-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	04-JUN-14
WG1885166-5 MS		**L1463249-1**						
Phenols (4AAP)			107.7		%		75-125	04-JUN-14
SO4-WT	Water							
Batch R2852414								
WG1884238-10 DUP		**L1462687-5**						
Sulphate (SO4)		649	650		mg/L	0.1	25	03-JUN-14
WG1884238-12 DUP		**L1463249-1**						
Sulphate (SO4)		504	504		mg/L	0.0	25	03-JUN-14
WG1884238-2 LCS								

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-WT	Water							
Batch R2852414								
WG1884238-2 LCS								
Sulphate (SO4)			100.5		%		70-130	03-JUN-14
WG1884238-3 LCSD		**WG1884238-2**						
Sulphate (SO4)		100.5	100.3		%	0.2	25	03-JUN-14
WG1884238-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	03-JUN-14
WG1884238-11 MS		**L1462687-5**						
Sulphate (SO4)			N/A	MS-B	%		-	03-JUN-14
WG1884238-13 MS		**L1463249-1**						
Sulphate (SO4)			N/A	MS-B	%		-	03-JUN-14
SOLIDS-TDS-WT	Water							
Batch R2852274								
WG1884231-3 DUP		**L1462922-1**						
Total Dissolved Solids		1560	1580		mg/L	1.5	20	04-JUN-14
WG1884231-2 LCS								
Total Dissolved Solids			95.2		%		85-115	04-JUN-14
WG1884231-1 MB								
Total Dissolved Solids			<20		mg/L		20	04-JUN-14
SOLIDS-TSS-WT	Water							
Batch R2852009								
WG1884167-3 DUP		**L1463739-2**						
Total Suspended Solids		380	400		mg/L	6.5	20	04-JUN-14
WG1884167-2 LCS								
Total Suspended Solids			101.6		%		85-115	04-JUN-14
WG1884167-1 MB								
Total Suspended Solids			<2.0		mg/L		2	04-JUN-14
Batch R2852025								
WG1884162-3 DUP		**L1463201-3**						
Total Suspended Solids		4.0	4.5		mg/L	12	20	04-JUN-14
WG1884162-2 LCS								
Total Suspended Solids			98.4		%		85-115	04-JUN-14
WG1884162-1 MB								
Total Suspended Solids			<2.0		mg/L		2	04-JUN-14
TC-MF-WT	Water							

Quality Control Report

Workorder: L1463249 Report Date: 09-JUN-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC-MF-WT	Water							
Batch R2849831								
WG1882942-3 DUP		**L1463141-1**						
Total Coliforms		0	0		CFU/100mL	0.0	50	01-JUN-14
WG1882942-1 MB								
Total Coliforms			0		CFU/100mL		1	01-JUN-14
WG1882942-2 MB								
Total Coliforms			0		CFU/100mL		1	01-JUN-14
TKN-WT	Water							
Batch R2851402								
WG1884055-1 CVS								
Total Kjeldahl Nitrogen			99.3		%		75-125	03-JUN-14
WG1884008-3 DUP		**L1463086-1**						
Total Kjeldahl Nitrogen		72.4	77.1		mg/L	6.3	20	03-JUN-14
WG1884008-4 DUP		**L1463249-1**						
Total Kjeldahl Nitrogen		7.43	7.12		mg/L	4.2	20	03-JUN-14
WG1884008-2 LCS								
Total Kjeldahl Nitrogen			99.1		%		75-125	03-JUN-14
WG1884008-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	03-JUN-14
TURBIDITY-WT	Water							
Batch R2849552								
WG1882996-4 CVS								
Turbidity			100.0		%		85-115	31-MAY-14
WG1882996-2 DUP		**L1463249-1**						
Turbidity		96.0	96.0		NTU	0.0	20	31-MAY-14
WG1882996-1 MB								
Turbidity			<0.10		NTU		0.1	31-MAY-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CONESTOGA-ROVERS & ASSOCIATES

CHAIN OF CUSTODY RECORD

COC NO.: 36917

PAGE 1 OF 1

(See Reverse Side for Instructions)

Address: 179 COLONNADE ROAD, SUITE 402, OTTAWA

Phone: 613 727 0510 Fax:

Project No/ Phase/Task Code: 45824-5E	Laboratory Name: ALS	Lab Location: WATERLOO	SSOW ID:
Project Name: CENTENNIAL	Lab Contact:	Lab Quote No: PO 22-017307	Cooler No: 1 of 1
Project Location: OTTAWA			Carrier: DROP OFF
Chemistry Contact: AIRESSE MACHTOB			Airbill No:
Sampler(s): N. BOUCHARD			Date Shipped: 5/30/2014

Item	Sample Identification (Containers for each sample may be combined on one line)	Date (mm/dd/yy)	Time (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Unpreserved	Hydrochloric Acid (HCl)	Nitric Acid (HNO_3)	Sulfuric Acid (H_2SO_4)	Sodium Hydroxide (NaOH)	Methanol/Water (Soil VOC)	EnCores 3x5-g, 1x25-g	Other:	Total Containers/Sample	HS/ROH-Gas F-List	Metals + Hg	Nutrients + Alk	MS/MSD Request	Comments/ Special Instructions:
1	GW-45824-C53014-MB-013	5/30/14	9:15	WG	G									1H	X		X		PLEASE SEE
2	MB-014	5/30/14	9:45	WG	G									1H	X		X		F.O.
3	MB-015	5/30/14	10:10	WG	G									1H	X		X		
4	MB-011	5/30/14	8:30	WG	G									3	X	L1462687			PLEASE INCLUDE
5																			-011 w/ SAME
6																			REPORT AS
7	B977 L1463249																		COC 36917
8	31/5/14 11:15 of																		(other -011)
9																			
10																			
11																			
12																			
13																			
14																			
15																			

L1463249-COFC

1 2 3

TAT Required in business days (use separate COCs for different TATs):

☑ 1 Day ☐ 2 Days ☐ 3 Days ☒ 1 Week ☐ 2 Week ☐ Other:

Total Number of Containers: 45

All Samples in Cooler must be on COC

Notes/ Special Requirements:

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
1.	CRA	5/30/2014	11h30	1. Andrew Cameron	ALS	May/30/14	11:30
2.				2. 12.9 C		31/5/14	10:30
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

Distribution: WHITE – Fully Executed Copy (CRA) YELLOW – Receiving Laboratory Copy PINK – Shipper GOLDENROD – Sampling Crew

000697

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 22-AUG-14
Report Date: 03-SEP-14 07:57 (MT)
Version: FINAL REV. 2

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1506459
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Comments:
3-SEP-2014 REVISED PAH LIST AS PER PO

Nancy Smith
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-1 GW-45804-082114-TS-001 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.02		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	22.6		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	39.4	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.15		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	15.2		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1430		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	21.7		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	507		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	1.50		0.0029	mg/L		29-AUG-14	
Ammonia, Total (as N)	25.9		0.050	mg/L		28-AUG-14	R2932568
Chloride (Cl)	114		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	0.31		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	28.1		0.15	mg/L	28-AUG-14	29-AUG-14	R2932593
Phosphorus, Total	0.066		0.030	mg/L	25-AUG-14	26-AUG-14	R2928448
Sulphate (SO4)	592		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.8		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	0.0138		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.161		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	0.00166		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	4.76		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	1.18		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0263		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	0.0046		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-1 GW-45804-082114-TS-001 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Aggregate Organics							
COD	23		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	<0.0010		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	75.5		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	137.9		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	84.8		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-2 GW-45804-082114-TS-002 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.02		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	22.6		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	35.6	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.15		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	10.4		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1410		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	16.3		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	519		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	1.49		0.0029	mg/L		29-AUG-14	
Ammonia, Total (as N)	25.7		0.050	mg/L		28-AUG-14	R2932568
Chloride (Cl)	115		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	0.34		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	26.0		0.15	mg/L	24-AUG-14	25-AUG-14	R2927592
Phosphorus, Total	0.062		0.030	mg/L	25-AUG-14	26-AUG-14	R2928448
Sulphate (SO4)	595		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.8		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-2 GW-45804-082114-TS-002 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	0.0146		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.157		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	0.00174		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	4.95		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	1.23		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0281		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	0.0050		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	0.0052		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	32		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	<0.0010		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	78.1		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	131.3		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	82.8		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-3 GW-45804-082114-TS-003 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-3 GW-45804-082114-TS-003 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	6.68		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	<2.0		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	24		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	<0.10		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		27-AUG-14	R2931110
Ammonia, Total (as N)	0.264		0.050	mg/L		27-AUG-14	R2931722
Chloride (Cl)	<2.0		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	0.27		0.15	mg/L	24-AUG-14	25-AUG-14	R2927592
Phosphorus, Total	<0.030		0.030	mg/L	25-AUG-14	26-AUG-14	R2928448
Sulphate (SO4)	<2.0		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	<0.050		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	<10		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	<0.0010		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927159

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-3 GW-45804-082114-TS-003 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	83.8		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	108.5		60-140	%		25-AUG-14	R2927159
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	92.3		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-4 GW-45804-082114-TS-004 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.13		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	23.1		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	85.8	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.34		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	647	DLM	4.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1270		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	57.8		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	493		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	0.856		0.0038	mg/L		28-AUG-14	
Ammonia, Total (as N)	11.2		0.050	mg/L		27-AUG-14	R2931722
Chloride (Cl)	128		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	0.13		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	15.0		0.15	mg/L	24-AUG-14	25-AUG-14	R2927592
Phosphorus, Total	0.693		0.030	mg/L	25-AUG-14	26-AUG-14	R2928448
Sulphate (SO4)	539		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.3		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	<10	DLM	10	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-4 GW-45804-082114-TS-004 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	<0.010	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	<0.10	DLM	0.10	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00090	DLM	0.00090	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0050	DLM	0.0050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.0050	DLM	0.0050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.010	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	15.8	DLM	0.50	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0050	DLM	0.0050	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	14.6	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0139	DLM	0.0050	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.010	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.030	DLM	0.030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	76		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	<0.0010		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	610		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	600		250	ug/L		28-AUG-14	
F4 (C34-C50)	2430		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F4G-SG (GHH-Silica)	12600		2000	ug/L	22-AUG-14	22-AUG-14	R2935229
Total Hydrocarbons (C6-C50)	3040		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	NO				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	70.4		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	131.0		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.20	DLM	0.20	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	0.426	DLM	0.050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	80.2		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-5 GW-45804-082114-TS-005 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.87		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	21.7		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-5 GW-45804-082114-TS-005 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Physical Tests							
Color, Apparent	12.4	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.41		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	16.8		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1290		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	3.47		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	438		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	17.0		0.047	mg/L		29-AUG-14	
Ammonia, Total (as N)	18.2		0.050	mg/L		28-AUG-14	R2932568
Chloride (Cl)	114		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	19.3		0.15	mg/L	28-AUG-14	29-AUG-14	R2932593
Phosphorus, Total	0.072		0.030	mg/L	25-AUG-14	26-AUG-14	R2928448
Sulphate (SO4)	509		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.4		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	<10	DLM	10	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.068		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	0.296		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	0.568		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	3.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	19		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	0.0023		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-5 GW-45804-082114-TS-005 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	330		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	76.4		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	104.6		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	91.1		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-6 GW-45804-082114-TS-006 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.53		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	19.0		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	102	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.43		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	9.6		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1420		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	48.7		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	673		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	3.50		0.0067	mg/L		29-AUG-14	
Ammonia, Total (as N)	26.0		0.050	mg/L		28-AUG-14	R2932568
Chloride (Cl)	207		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	25.9		0.15	mg/L	28-AUG-14	29-AUG-14	R2932593
Phosphorus, Total	0.161		0.030	mg/L	24-AUG-14	25-AUG-14	R2927635
Sulphate (SO4)	411		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.4		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	1		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	2		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-6 GW-45804-082114-TS-006 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927165
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.096		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	4.68		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	2.50	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0144		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	34		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	0.0011		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	69.5		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	130.6		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	92.7		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-7 GW-45804-082114-TS-007 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.64		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	20.3		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	82.2	PEHT	1.0	C.U.		24-AUG-14	R2926949

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-7 GW-45804-082114-TS-007 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Physical Tests							
pH	7.51		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	12.0		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	1450		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	62.2		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	534		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	1.90		0.0091	mg/L		28-AUG-14	
Ammonia, Total (as N)	10.4		0.050	mg/L		27-AUG-14	R2931722
Chloride (Cl)	160		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	9.80		0.15	mg/L	24-AUG-14	25-AUG-14	R2927755
Phosphorus, Total	0.079		0.030	mg/L	24-AUG-14	25-AUG-14	R2927635
Sulphate (SO4)	497		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.7		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927167
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	0.0040		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.092		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	5.81		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	3.17	DLM	0.010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0151		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	43		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	0.0018		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-7 GW-45804-082114-TS-007 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	24-AUG-14	28-AUG-14	R2926980
F2-Naphth	<100		100	ug/L		28-AUG-14	
F3 (C16-C34)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
F3-PAH	<250		250	ug/L		28-AUG-14	
F4 (C34-C50)	<250		250	ug/L	24-AUG-14	28-AUG-14	R2926980
Total Hydrocarbons (C6-C50)	<380		380	ug/L		28-AUG-14	
Chrom. to baseline at nC50	YES				24-AUG-14	28-AUG-14	R2926980
Surrogate: 2-Bromobenzotrifluoride	70.7		60-140	%	24-AUG-14	28-AUG-14	R2926980
Surrogate: 3,4-Dichlorotoluene	139.3		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	95.5		50-150	%	24-AUG-14	28-AUG-14	R2928482
L1506459-8 GW-45804-082114-TS-008 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.77		0.10	pH	22-AUG-14	22-AUG-14	R2926345
Temperature, Client	18.8		0.1	Deg. C	22-AUG-14	22-AUG-14	R2926345
Physical Tests							
Color, Apparent	138	PEHT	1.0	C.U.		24-AUG-14	R2926949
pH	7.54		0.10	pH units		22-AUG-14	R2927641
Total Suspended Solids	<2.0		2.0	mg/L	27-AUG-14	28-AUG-14	R2931753
Total Dissolved Solids	458		20	mg/L	26-AUG-14	27-AUG-14	R2930497
Turbidity	7.03		0.10	NTU	22-AUG-14	22-AUG-14	R2926186
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	202		10	mg/L		27-AUG-14	R2931110
Unionized ammonia	0.317		0.011	mg/L		28-AUG-14	
Ammonia, Total (as N)	1.49		0.050	mg/L		27-AUG-14	R2931722
Chloride (Cl)	62.7		2.0	mg/L		25-AUG-14	R2929197
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		25-AUG-14	R2929197
Total Kjeldahl Nitrogen	2.10		0.15	mg/L	24-AUG-14	25-AUG-14	R2927755
Phosphorus, Total	<0.030		0.030	mg/L	24-AUG-14	25-AUG-14	R2927635
Sulphate (SO4)	109		2.0	mg/L		25-AUG-14	R2929197
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.3		1.0	mg/L	25-AUG-14	25-AUG-14	R2928859
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927169
Fecal Coliforms	1		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927166
Total Coliforms	7		0	CFU/100mL	22-AUG-14	23-AUG-14	R2927163
Dissolved Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1506459-8 GW-45804-082114-TS-008 Sampled By: T.S. on 21-AUG-14 Matrix: WATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					25-AUG-14	R2927167
Dissolved Metals Filtration Location	FIELD					24-AUG-14	R2927104
Arsenic (As)-Dissolved	0.0101		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Boron (B)-Dissolved	0.053		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	24-AUG-14	25-AUG-14	R2927554
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	24-AUG-14	25-AUG-14	R2927554
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Iron (Fe)-Dissolved	3.91		0.050	mg/L	24-AUG-14	25-AUG-14	R2927554
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Manganese (Mn)-Dissolved	1.96		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	25-AUG-14	25-AUG-14	R2927640
Molybdenum (Mo)-Dissolved	0.0049		0.0010	mg/L	24-AUG-14	25-AUG-14	R2927554
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	24-AUG-14	25-AUG-14	R2927554
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	24-AUG-14	25-AUG-14	R2927554
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	22-AUG-14	27-AUG-14	R2930188
COD	30		10	mg/L	28-AUG-14	28-AUG-14	R2931914
Phenols (4AAP)	0.0023		0.0010	mg/L	27-AUG-14	27-AUG-14	R2931468
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		25-AUG-14	R2927450
F2 (C10-C16)	<100		100	ug/L	28-AUG-14	29-AUG-14	R2932713
F2-Naphth	<100		100	ug/L		29-AUG-14	
F3 (C16-C34)	<250		250	ug/L	28-AUG-14	29-AUG-14	R2932713
F3-PAH	<250		250	ug/L		29-AUG-14	
F4 (C34-C50)	<250		250	ug/L	28-AUG-14	29-AUG-14	R2932713
Total Hydrocarbons (C6-C50)	<380		380	ug/L		29-AUG-14	
Chrom. to baseline at nC50	YES				28-AUG-14	29-AUG-14	R2932713
Surrogate: 2-Bromobenzotrifluoride	71.0		60-140	%	28-AUG-14	29-AUG-14	R2932713
Surrogate: 3,4-Dichlorotoluene	132.3		60-140	%		25-AUG-14	R2927450
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	24-AUG-14	28-AUG-14	R2928482
Benzo(a)pyrene	<0.0050		0.0050	ug/L	24-AUG-14	28-AUG-14	R2928482
Surrogate: d14-Terphenyl	86.7		50-150	%	24-AUG-14	28-AUG-14	R2928482

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Phenols (4AAP)	DLM	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Boron (B)-Dissolved	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Nitrate-N (NO3-N)	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Chloride (Cl)	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulphate (SO4)	MS-B	L1506459-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Ammonia, Total (as N)	MS-B	L1506459-3, -4, -7, -8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

Reference Information

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

F4G-ADD-WT	Water	F4G-SG (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

FC-MF-WT	Water	Fecal Coliforms	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA SW846 7470A

Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT	Water	Dissolved Metals in Water by ICPMS	EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT	Water	Nitrite-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT	Water	Phosphorus, Total	APHA 4500-P B E

Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT	Water	CCME PAHs	SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

Reference Information

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R2931110								
WG1939411-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			108.4		%		80-120	27-AUG-14
WG1939411-2 CVS								
Alkalinity, Total (as CaCO3)			105.3		%		85-115	27-AUG-14
WG1939411-4 DUP		**L1506459-1**						
Alkalinity, Total (as CaCO3)		507	512		mg/L	1.0	20	27-AUG-14
WG1939411-5 DUP		**L1507595-2**						
Alkalinity, Total (as CaCO3)		20	20		mg/L	1.8	20	27-AUG-14
WG1939411-6 DUP		**L1507595-20**						
Alkalinity, Total (as CaCO3)		19	18		mg/L	4.5	20	27-AUG-14
WG1939411-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	27-AUG-14
BOD-C-WT	Water							
Batch R2930188								
WG1936200-2 DUP		**L1506116-2**						
BOD Carbonaceous		1530	1500		mg/L	1.4	20	27-AUG-14
WG1936200-4 DUP		**L1506209-1**						
BOD Carbonaceous		177	176		mg/L	0.6	20	27-AUG-14
WG1936200-3 LCS								
BOD Carbonaceous			104.0		%		85-115	27-AUG-14
WG1936200-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	27-AUG-14
C-DIS-ORG-WT	Water							
Batch R2928859								
WG1937889-3 DUP		**L1506459-3**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	25-AUG-14
WG1937889-5 DUP		**L1506300-1**						
Dissolved Organic Carbon		104	101		mg/L	2.4	20	25-AUG-14
WG1937889-2 LCS								
Dissolved Organic Carbon			100.0		%		80-120	25-AUG-14
WG1937889-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	25-AUG-14
WG1937889-4 MS		**L1506459-3**						
Dissolved Organic Carbon			107.5		%		70-130	25-AUG-14
CL-WT	Water							

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R2929197								
WG1937658-10 DUP		**L1506881-1**						
Chloride (Cl)		74.7	74.7		mg/L	0.0	20	25-AUG-14
WG1937658-6 DUP		**L1506459-8**						
Chloride (Cl)		62.7	62.7		mg/L	0.1	20	25-AUG-14
WG1937658-8 DUP		**L1506601-1**						
Chloride (Cl)		31.3	30.6		mg/L	2.3	20	25-AUG-14
WG1937658-2 LCS								
Chloride (Cl)			101.3		%		85-115	25-AUG-14
WG1937658-3 LCSD		**WG1937658-2**						
Chloride (Cl)		101.3	101.3		%	0.0	25	25-AUG-14
WG1937658-1 MB								
Chloride (Cl)			<2.0		mg/L		2	25-AUG-14
WG1937658-11 MS		**L1506881-1**						
Chloride (Cl)			N/A	MS-B	%		-	25-AUG-14
WG1937658-7 MS		**L1506459-8**						
Chloride (Cl)			N/A	MS-B	%		-	25-AUG-14
WG1937658-9 MS		**L1506601-1**						
Chloride (Cl)			93.6		%		75-125	25-AUG-14
COD-WT	Water							
Batch R2931914								
WG1940255-3 DUP		**L1506459-8**						
COD		30	32		mg/L	6.5	20	28-AUG-14
WG1940255-5 DUP		**L1508061-2**						
COD		899	901		mg/L	0.2	20	28-AUG-14
WG1940255-2 LCS								
COD			98.0		%		85-115	28-AUG-14
WG1940255-1 MB								
COD			<10		mg/L		10	28-AUG-14
WG1940255-4 MS		**L1506459-8**						
COD			96.0		%		75-125	28-AUG-14
COLOUR-WT	Water							
Batch R2926949								
WG1937251-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			95.3		%		80-120	24-AUG-14
WG1937251-2 CVS								
Color, Apparent			100.6		%		85-115	24-AUG-14
WG1937251-4 DUP		**L1506459-1**						
Color, Apparent		39.4	39.1		C.U.	0.7	20	24-AUG-14

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COLOUR-WT	Water							
Batch R2926949								
WG1937251-1 MB								
Color, Apparent			<1.0		C.U.		1	24-AUG-14
EC-MF-WT	Water							
Batch R2927169								
WG1936377-3 DUP		**L1506620-2**						
E. Coli		0	0		CFU/100mL	0.0	50	23-AUG-14
WG1936377-1 MB								
E. Coli			0		CFU/100mL		1	23-AUG-14
WG1936377-2 MB								
E. Coli			0		CFU/100mL		1	23-AUG-14
WG1936377-4 MB								
E. Coli			0		CFU/100mL		1	23-AUG-14
WG1936377-5 MB								
E. Coli			0		CFU/100mL		1	23-AUG-14
F1-HS-WT	Water							
Batch R2927159								
WG1932790-1 CVS								
F1 (C6-C10)			85.6		%		80-120	25-AUG-14
WG1932790-4 DUP		**WG1932790-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	25-AUG-14
WG1932790-2 MB								
F1 (C6-C10)			<100		ug/L		100	25-AUG-14
Surrogate: 3,4-Dichlorotoluene			102.3		%		60-140	25-AUG-14
WG1932790-5 MS		**WG1932790-3**						
F1 (C6-C10)			82.0		%		50-150	25-AUG-14
Batch R2927450								
WG1932789-1 CVS								
F1 (C6-C10)			101.9		%		80-120	25-AUG-14
WG1932789-4 DUP		**WG1932789-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	25-AUG-14
WG1932789-2 MB								
F1 (C6-C10)			<100		ug/L		100	25-AUG-14
Surrogate: 3,4-Dichlorotoluene			121.5		%		60-140	25-AUG-14
WG1932789-5 MS		**WG1932789-3**						
F1 (C6-C10)			96.4		%		50-150	25-AUG-14
F2-F4-WT	Water							

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R2926980								
WG1937277-1 CVS								
F2 (C10-C16)			98.9		%		80-120	24-AUG-14
F3 (C16-C34)			100.2		%		80-120	24-AUG-14
F4 (C34-C50)			99.4		%		80-120	24-AUG-14
WG1936667-2 LCS								
F2 (C10-C16)			112.3		%		65-135	24-AUG-14
F3 (C16-C34)			121.2		%		65-135	24-AUG-14
F4 (C34-C50)			117.9		%		65-135	24-AUG-14
WG1936667-3 LCSD		**WG1936667-2**						
F2 (C10-C16)		112.3	120.4		%	6.9	50	24-AUG-14
F3 (C16-C34)		121.2	128.4		%	5.8	50	24-AUG-14
F4 (C34-C50)		117.9	122.1		%	3.5	50	24-AUG-14
WG1936667-1 MB								
F2 (C10-C16)			<100		ug/L		100	24-AUG-14
F3 (C16-C34)			<250		ug/L		250	24-AUG-14
F4 (C34-C50)			<250		ug/L		250	24-AUG-14
Surrogate: 2-Bromobenzotrifluoride			77.7		%		60-140	24-AUG-14
Batch R2932713								
WG1941209-1 CVS								
F2 (C10-C16)			100.0		%		80-120	29-AUG-14
F3 (C16-C34)			101.9		%		80-120	29-AUG-14
F4 (C34-C50)			103.2		%		80-120	29-AUG-14
WG1939983-2 LCS								
F2 (C10-C16)			118.6		%		65-135	29-AUG-14
F3 (C16-C34)			134.7		%		65-135	29-AUG-14
F4 (C34-C50)			131.7		%		65-135	29-AUG-14
WG1939983-3 LCSD		**WG1939983-2**						
F2 (C10-C16)		118.6	122.3		%	3.0	50	29-AUG-14
F3 (C16-C34)		134.7	134.5		%	0.1	50	29-AUG-14
F4 (C34-C50)		131.7	132.1		%	0.3	50	29-AUG-14
WG1939983-1 MB								
F2 (C10-C16)			<100		ug/L		100	29-AUG-14
F3 (C16-C34)			<250		ug/L		250	29-AUG-14
F4 (C34-C50)			<250		ug/L		250	29-AUG-14
Surrogate: 2-Bromobenzotrifluoride			74.8		%		60-140	29-AUG-14
F4G-ADD-WT	Water							

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F4G-ADD-WT	Water							
Batch R2935229								
WG1942990-2 LCS								
F4G-SG (GHH-Silica)			81.2		%		60-120	22-AUG-14
WG1942990-3 LCSD		**WG1942990-2**						
F4G-SG (GHH-Silica)		81.2	83.2		%	2.4	32	22-AUG-14
WG1942990-1 MB								
F4G-SG (GHH-Silica)			<2000		ug/L		2000	22-AUG-14
FC-MF-WT	Water							
Batch R2927166								
WG1936760-3 DUP		**L1506459-3**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	23-AUG-14
WG1936760-1 MB								
Fecal Coliforms			0		CFU/100mL		1	23-AUG-14
WG1936760-2 MB								
Fecal Coliforms			0		CFU/100mL		1	23-AUG-14
HG-D-CVAA-WT	Water							
Batch R2927640								
WG1937475-4 DUP		**WG1937475-3**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-AUG-14
WG1937477-3 DUP		**L1506459-7**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	25-AUG-14
WG1937475-2 LCS								
Mercury (Hg)-Dissolved			102.0		%		80-120	25-AUG-14
WG1937477-2 LCS								
Mercury (Hg)-Dissolved			97.5		%		80-120	25-AUG-14
WG1937475-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	25-AUG-14
WG1937477-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	25-AUG-14
WG1937475-6 MS		**WG1937475-5**						
Mercury (Hg)-Dissolved			102.0		%		70-130	25-AUG-14
WG1937477-4 MS		**L1506459-8**						
Mercury (Hg)-Dissolved			94.3		%		70-130	25-AUG-14
MET-D-MS-WT	Water							
Batch R2927554								
WG1937471-1 CVS								
Arsenic (As)-Dissolved			99.6		%		80-120	25-AUG-14
Boron (B)-Dissolved			104.1		%		80-120	25-AUG-14

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2927554								
WG1937471-1 CVS								
Cadmium (Cd)-Dissolved			102.8		%		80-120	25-AUG-14
Chromium (Cr)-Dissolved			99.7		%		80-120	25-AUG-14
Cobalt (Co)-Dissolved			99.9		%		80-120	25-AUG-14
Copper (Cu)-Dissolved			100.7		%		80-120	25-AUG-14
Iron (Fe)-Dissolved			99.2		%		80-120	25-AUG-14
Lead (Pb)-Dissolved			98.1		%		80-120	25-AUG-14
Manganese (Mn)-Dissolved			99.0		%		80-120	25-AUG-14
Molybdenum (Mo)-Dissolved			100.3		%		80-120	25-AUG-14
Nickel (Ni)-Dissolved			99.97		%		80-120	25-AUG-14
Zinc (Zn)-Dissolved			93.9		%		80-120	25-AUG-14
WG1937381-4 DUP		**WG1937381-3**						
Arsenic (As)-Dissolved		0.0145	0.0148		mg/L	1.8	20	25-AUG-14
Boron (B)-Dissolved		0.177	0.160		mg/L	10	20	25-AUG-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	25-AUG-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-AUG-14
Cobalt (Co)-Dissolved		0.00173	0.00177		mg/L	2.6	20	25-AUG-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	25-AUG-14
Iron (Fe)-Dissolved		5.03	5.02		mg/L	0.2	20	25-AUG-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	25-AUG-14
Manganese (Mn)-Dissolved		1.24	1.25		mg/L	0.7	20	25-AUG-14
Molybdenum (Mo)-Dissolved		0.0277	0.0270		mg/L	2.5	20	25-AUG-14
Nickel (Ni)-Dissolved		0.0048	0.0048		mg/L	0.5	20	25-AUG-14
Zinc (Zn)-Dissolved		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	25-AUG-14
WG1937381-2 LCS								
Arsenic (As)-Dissolved			98.1		%		80-120	25-AUG-14
Boron (B)-Dissolved			96.4		%		80-120	25-AUG-14
Cadmium (Cd)-Dissolved			97.5		%		80-120	25-AUG-14
Chromium (Cr)-Dissolved			95.1		%		80-120	25-AUG-14
Cobalt (Co)-Dissolved			96.3		%		80-120	25-AUG-14
Copper (Cu)-Dissolved			97.3		%		80-120	25-AUG-14
Iron (Fe)-Dissolved			97.7		%		80-120	25-AUG-14
Lead (Pb)-Dissolved			92.8		%		80-120	25-AUG-14
Manganese (Mn)-Dissolved			95.6		%		80-120	25-AUG-14
Molybdenum (Mo)-Dissolved			98.6				80-120	

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R2927554								
WG1937381-2 LCS								
Molybdenum (Mo)-Dissolved			98.6		%		80-120	25-AUG-14
Nickel (Ni)-Dissolved			96.1		%		80-120	25-AUG-14
Zinc (Zn)-Dissolved			96.1		%		80-120	25-AUG-14
WG1937381-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	25-AUG-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	25-AUG-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	25-AUG-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	25-AUG-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	25-AUG-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	25-AUG-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	25-AUG-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	25-AUG-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	25-AUG-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	25-AUG-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	25-AUG-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	25-AUG-14
WG1937381-5 MS		**WG1937381-3**						
Arsenic (As)-Dissolved			91.1		%		70-130	25-AUG-14
Boron (B)-Dissolved			N/A	MS-B	%		-	25-AUG-14
Cadmium (Cd)-Dissolved			82.8		%		70-130	25-AUG-14
Chromium (Cr)-Dissolved			83.5		%		70-130	25-AUG-14
Cobalt (Co)-Dissolved			80.3		%		70-130	25-AUG-14
Copper (Cu)-Dissolved			78.6		%		70-130	25-AUG-14
Iron (Fe)-Dissolved			N/A	MS-B	%		-	25-AUG-14
Lead (Pb)-Dissolved			79.6		%		70-130	25-AUG-14
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	25-AUG-14
Molybdenum (Mo)-Dissolved			84.7		%		70-130	25-AUG-14
Nickel (Ni)-Dissolved			79.1		%		70-130	25-AUG-14
Zinc (Zn)-Dissolved			82.6		%		70-130	25-AUG-14
NH3-WT	Water							
Batch R2931722								
WG1939273-2 CVS								
Ammonia, Total (as N)			98.0		%		85-115	27-AUG-14
WG1939273-11 DUP		**L1507595-40**						

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2931722								
WG1939273-11 DUP		**L1507595-40**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1939273-3 DUP		**L1508147-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1939273-5 DUP		**L1507326-2**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1939273-7 DUP		**L1507821-1**						
Ammonia, Total (as N)		7.71	7.59		mg/L	1.6	20	27-AUG-14
WG1939273-9 DUP		**L1507595-21**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1939273-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	27-AUG-14
WG1939273-10 MS		**L1507595-21**						
Ammonia, Total (as N)			105.6		%		75-125	27-AUG-14
WG1939273-12 MS		**L1507595-40**						
Ammonia, Total (as N)			104.9		%		75-125	27-AUG-14
WG1939273-4 MS		**L1508147-1**						
Ammonia, Total (as N)			107.7		%		75-125	27-AUG-14
WG1939273-6 MS		**L1507326-2**						
Ammonia, Total (as N)			108.5		%		75-125	27-AUG-14
WG1939273-8 MS		**L1507821-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	27-AUG-14
Batch R2932568								
WG1940206-2 CVS								
Ammonia, Total (as N)			96.6		%		85-115	28-AUG-14
WG1940206-3 DUP		**L1509002-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940206-5 DUP		**L1508061-1**						
Ammonia, Total (as N)		0.186	0.170		mg/L	8.9	20	28-AUG-14
WG1940206-7 DUP		**L1508655-1**						
Ammonia, Total (as N)		<0.050	<0.050	RPD-NA	mg/L	N/A	20	28-AUG-14
WG1940206-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-AUG-14
WG1940206-4 MS		**L1509002-1**						
Ammonia, Total (as N)			103.7		%		75-125	28-AUG-14
WG1940206-6 MS		**L1508061-1**						
Ammonia, Total (as N)			78.3		%		75-125	28-AUG-14
WG1940206-8 MS		**L1508655-1**						

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R2932568								
WG1940206-8 MS		**L1508655-1**						
Ammonia, Total (as N)			105.2		%		75-125	28-AUG-14
NO2-WT	Water							
Batch R2929197								
WG1937658-10 DUP		**L1506881-1**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	25-AUG-14
WG1937658-6 DUP		**L1506459-8**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	25-AUG-14
WG1937658-2 LCS								
Nitrite-N (NO2-N)			102.4		%		70-130	25-AUG-14
WG1937658-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	25-AUG-14
WG1937658-11 MS		**L1506881-1**						
Nitrite-N (NO2-N)			98.9		%		70-130	25-AUG-14
WG1937658-7 MS		**L1506459-8**						
Nitrite-N (NO2-N)			99.2		%		70-130	25-AUG-14
NO3-WT	Water							
Batch R2929197								
WG1937658-10 DUP		**L1506881-1**						
Nitrate-N (NO3-N)		6.12	6.12		mg/L	0.0	25	25-AUG-14
WG1937658-6 DUP		**L1506459-8**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	25-AUG-14
WG1937658-2 LCS								
Nitrate-N (NO3-N)			99.8		%		70-130	25-AUG-14
WG1937658-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	25-AUG-14
WG1937658-11 MS		**L1506881-1**						
Nitrate-N (NO3-N)			N/A	MS-B	%		-	25-AUG-14
WG1937658-7 MS		**L1506459-8**						
Nitrate-N (NO3-N)			93.1		%		70-130	25-AUG-14
P-TOTAL-WT	Water							
Batch R2927635								
WG1937515-1 CVS								
Phosphorus, Total			98.4		%		85-115	25-AUG-14
WG1937394-3 DUP		**L1506790-1**						
Phosphorus, Total		3.35	3.56		mg/L	6.1	20	25-AUG-14
WG1937394-4 DUP		**L1506459-6**						

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-WT	Water							
Batch R2927635								
WG1937394-4 DUP		**L1506459-6**						
Phosphorus, Total		0.161	0.161		mg/L	0.0	20	25-AUG-14
WG1937394-2 LCS								
Phosphorus, Total			97.5		%		80-120	25-AUG-14
WG1937394-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	25-AUG-14
Batch R2928448								
WG1938273-1 CVS								
Phosphorus, Total			99.0		%		85-115	26-AUG-14
WG1938229-3 DUP		**L1507428-2**						
Phosphorus, Total		42.3	44.2		mg/L	4.4	20	26-AUG-14
WG1938229-4 DUP		**L1507428-1**						
Phosphorus, Total		30.6	30.9		mg/L	0.8	20	26-AUG-14
WG1938229-2 LCS								
Phosphorus, Total			95.4		%		80-120	26-AUG-14
WG1938229-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	26-AUG-14
PAH-CCME-WT	Water							
Batch R2928482								
WG1938488-1 CVS								
Anthracene			102.2		%		60-130	26-AUG-14
Benzo(a)pyrene			94.0		%		70-130	26-AUG-14
WG1937385-2 LCS								
Anthracene			97.6		%		50-140	26-AUG-14
Benzo(a)pyrene			89.8		%		60-130	26-AUG-14
WG1937385-3 LCSD		**WG1937385-2**						
Anthracene		97.6	101.6		%	4.1	50	26-AUG-14
Benzo(a)pyrene		89.8	91.3		%	1.7	50	26-AUG-14
WG1937385-1 MB								
Anthracene			<0.020		ug/L		0.02	26-AUG-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	26-AUG-14
Surrogate: d14-Terphenyl			81.6		%		50-150	26-AUG-14
PH-WT	Water							
Batch R2927641								
WG1936320-3 DUP		**WG1936320-2**						
pH		7.90	7.93	J	pH units	0.04	0.2	22-AUG-14
WG1936320-1 LCS								

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R2927641								
WG1936320-1 LCS								
pH			6.97		pH units		6.9-7.1	22-AUG-14
PHENOLS-4AAP-WT	Water							
Batch R2931468								
WG1940146-3 CVS								
Phenols (4AAP)			96.5		%		85-115	27-AUG-14
WG1940146-4 DUP		**L1505895-1**						
Phenols (4AAP)		<0.010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1940146-6 DUP		**L1506076-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1940146-8 DUP		**L1507326-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1940146-2 LCS								
Phenols (4AAP)			95.0		%		85-115	27-AUG-14
WG1940146-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	27-AUG-14
WG1940146-5 MS		**L1505895-1**						
Phenols (4AAP)			101.3		%		75-125	27-AUG-14
WG1940146-7 MS		**L1506076-1**						
Phenols (4AAP)			103.1		%		75-125	27-AUG-14
WG1940146-9 MS		**L1507326-1**						
Phenols (4AAP)			104.9		%		75-125	27-AUG-14
SO4-WT	Water							
Batch R2929197								
WG1937658-6 DUP		**L1506459-8**						
Sulphate (SO4)		109	109		mg/L	0.3	25	25-AUG-14
WG1937658-2 LCS								
Sulphate (SO4)			101.5		%		70-130	25-AUG-14
WG1937658-3 LCSD		**WG1937658-2**						
Sulphate (SO4)		101.5	101.6		%	0.1	25	25-AUG-14
WG1937658-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	25-AUG-14
WG1937658-7 MS		**L1506459-8**						
Sulphate (SO4)			N/A	MS-B	%		-	25-AUG-14
SOLIDS-TDS-WT	Water							

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R2930497								
WG1938248-3 DUP		**L1506544-2**						
Total Dissolved Solids		<20	<20	RPD-NA	mg/L	N/A	20	27-AUG-14
WG1938248-2 LCS								
Total Dissolved Solids			91.4		%		85-115	27-AUG-14
WG1938248-1 MB								
Total Dissolved Solids			<20		mg/L		20	27-AUG-14
SOLIDS-TSS-WT	Water							
Batch R2931753								
WG1939768-3 DUP		**L1506350-1**						
Total Suspended Solids		12.4	10.8		mg/L	14	20	28-AUG-14
WG1939768-2 LCS								
Total Suspended Solids			95.2		%		85-115	28-AUG-14
WG1939768-1 MB								
Total Suspended Solids			<2.0		mg/L		2	28-AUG-14
TC-MF-WT	Water							
Batch R2927163								
WG1936373-3 DUP		**L1506620-4**						
Total Coliforms		0	0		CFU/100mL	0.0	50	23-AUG-14
WG1936373-1 MB								
Total Coliforms			0		CFU/100mL		1	23-AUG-14
WG1936373-2 MB								
Total Coliforms			0		CFU/100mL		1	23-AUG-14
WG1936373-4 MB								
Total Coliforms			0		CFU/100mL		1	23-AUG-14
WG1936373-5 MB								
Total Coliforms			0		CFU/100mL		1	23-AUG-14
TKN-WT	Water							
Batch R2927592								
WG1937463-1 CVS								
Total Kjeldahl Nitrogen			98.3		%		75-125	25-AUG-14
WG1937392-6 DUP		**L1505895-1**						
Total Kjeldahl Nitrogen		1.73	1.83		mg/L	5.5	20	25-AUG-14
WG1937392-7 DUP		**L1506350-1**						
Total Kjeldahl Nitrogen		512	476		mg/L	7.3	20	25-AUG-14
WG1937392-5 LCS								
Total Kjeldahl Nitrogen			96.9		%		75-125	25-AUG-14
WG1937392-4 MB								

Quality Control Report

Workorder: L1506459 Report Date: 03-SEP-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R2927592								
WG1937392-4 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	25-AUG-14
Batch R2927755								
WG1937514-1 CVS								
Total Kjeldahl Nitrogen			98.4		%		75-125	25-AUG-14
WG1937394-3 DUP		**L1506790-1**						
Total Kjeldahl Nitrogen		32.5	32.0		mg/L	1.3	20	25-AUG-14
WG1937394-4 DUP		**L1506459-6**						
Total Kjeldahl Nitrogen		25.9	21.9		mg/L	6.1	20	25-AUG-14
WG1937394-6 DUP		**WG1937394-5**						
Total Kjeldahl Nitrogen		20.6	21.9		mg/L	6.1	20	25-AUG-14
WG1937394-2 LCS								
Total Kjeldahl Nitrogen			97.1		%		75-125	25-AUG-14
WG1937394-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	25-AUG-14
Batch R2932593								
WG1941028-1 CVS								
Total Kjeldahl Nitrogen			97.8		%		75-125	29-AUG-14
WG1941007-3 DUP		**L1508655-9**						
Total Kjeldahl Nitrogen		0.65	0.63		mg/L	2.8	20	29-AUG-14
WG1941007-4 DUP		**L1509367-1**						
Total Kjeldahl Nitrogen		0.71	0.80		mg/L	13	20	29-AUG-14
WG1941007-2 LCS								
Total Kjeldahl Nitrogen			96.4		%		75-125	29-AUG-14
WG1941007-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	29-AUG-14
TURBIDITY-WT	Water							
Batch R2926186								
WG1936480-4 CVS								
Turbidity			102.0		%		85-115	22-AUG-14
WG1936480-2 DUP		**L1506459-1**						
Turbidity		21.7	22.0		NTU	1.4	15	22-AUG-14
WG1936480-1 MB								
Turbidity			<0.10		NTU		0.1	22-AUG-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Colour							
	1	21-AUG-14	24-AUG-14 12:59	48	73	hours	EHT
	2	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	3	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	4	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	5	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	6	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	7	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT
	8	21-AUG-14	24-AUG-14 13:00	48	73	hours	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1506459 were received on 22-AUG-14 09:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # XXXXX
PAGE 1 OF 1

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: 13791 Conestoga Rovers and Associates
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 20-017307
DUE DATE:

CRITERIA: Criteria on report (y/n) ___
Reg 153/04
Table ___
TCLP ___ MISA ___ PWQO ___
OTHER _CLASSDETAILQCPLUS_ALS_____
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ___
EMAIL1 amacphee@craworld.com
EMAIL2 ___
SELECT: pdf ___ digital ___ both ___

SUBMISSION # L1506459
ENTERED BY: RJ
DATE/TIME ENTERED: 22-Aug-14
BIN # 450

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX			SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER							
14/08/21				X			GW-45804- 082114 -TS-001	14	X	8.02	22.61		1
				X			GW-45804- -TS-002	14	X	8.02	22.61		2
				X			GW-45804- -TS-003	14	X	Field Blank			3
				X			GW-45804- -TS-004	14	X	8.13	23.08		4
				X			GW-45804- -TS-005	14	X	9.87	21.66		5
				X			GW-45804- -TS-006	14	X	8.53	18.89		6
				X			GW-45804- -TS-007	14	X	8.64	20.31		7
↓				X			GW-45804- ↓ -TS-008	14	X	8.77	18.75		8

INDICATE BOTTLES FIELD FILTERED/ ⇦ PRESERVED (F/P)

L1506459-COFC

SPECIAL INSTRUCTIONS/COMMENTS

GROUNDWATER METALS ARE FIELD FILTERED
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	14.2
COOLING INITIATED	
AMBIENT ✓	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT

SAMPLED BY:			
RELINQUISHED BY:	DATE & TIME 8/21/14	RECEIVED BY:	DATE & TIME
	DATE & TIME 8/21/14	RECEIVED AT LAB BY:	DATE & TIME 22 Aug 2014 09:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section

White - report copy YELLOW - File copy PINK - Customer Copy

000729

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 25-NOV-14
Report Date: 02-DEC-14 13:13 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1550748
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Nancy Smith
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-1 GW-45804-112514-TS-001 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.07		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	8.5		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	10.9		1.0	C.U.		27-NOV-14	R3109561
pH	7.66		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	10.0		2.0	mg/L	28-NOV-14	30-NOV-14	R3111119
Total Dissolved Solids	1390		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	4.22		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	338		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	<0.00012		0.00012	mg/L		01-DEC-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	68		10	mg/L		27-NOV-14	R3110678
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110678
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110678
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	26-NOV-14	27-NOV-14	R3110285
Phosphorus, Total	0.032		0.030	mg/L	26-NOV-14	27-NOV-14	R3109946
Sulphate (SO4)	695		10	mg/L		27-NOV-14	R3110678
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.1		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	0.062		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.0861		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0233		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	0.0051		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0097		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-1 GW-45804-112514-TS-001 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		01-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	73.2		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	100.9		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	91.2		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	104.3		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-2 GW-45804-112514-TS-002 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.21		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	8.4		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	16.9		1.0	C.U.		27-NOV-14	R3109561
pH	7.72		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	61.2		2.0	mg/L	28-NOV-14	30-NOV-14	R3111119
Total Dissolved Solids	1460		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	9.33		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	329		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	<0.00016		0.00016	mg/L		01-DEC-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	69		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	26-NOV-14	27-NOV-14	R3110285
Phosphorus, Total	0.097		0.030	mg/L	26-NOV-14	27-NOV-14	R3109946
Sulphate (SO4)	710		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.7		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-2 GW-45804-112514-TS-002 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Organic / Inorganic Carbon							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	0.071		0.050	mg/L	26-NOV-14	01-DEC-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	0.00145		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	0.382		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	01-DEC-14	R3111389
Manganese (Mn)-Dissolved	0.234		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0397		0.0010	mg/L	26-NOV-14	01-DEC-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0095		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	280		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	280		250	ug/L		01-DEC-14	
F4 (C34-C50)	300		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	580		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	71.4		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	90.1		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	79.4		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	101.2		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-3 GW-45804-112514-TS-003 Sampled By: T. SAUNDERS on 25-NOV-14							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-3 GW-45804-112514-TS-003 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.92		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	16.0		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	67.7		1.0	C.U.		27-NOV-14	R3109561
pH	7.76		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	21.3		2.0	mg/L	28-NOV-14	30-NOV-14	R3111119
Total Dissolved Solids	1480		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	20.9		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	406		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.0553		0.00015	mg/L		01-DEC-14	
Ammonia, Total (as N)	18.6		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	111		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	20.7		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.089		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	738		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.2		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	10	DLM	10	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0011		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	0.073		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	2.75		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.580		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0070		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0211		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-3 GW-45804-112514-TS-003 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	11		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		01-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	79.0		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	99.6		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	87.3		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	107.0		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-4 GW-45804-112514-TS-004 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.07		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	13.2		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	101		1.0	C.U.		27-NOV-14	R3109561
pH	7.66		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	230	DLM	4.0	mg/L	28-NOV-14	30-NOV-14	R3111119
Total Dissolved Solids	1560		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	43.0		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	485		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.0664		0.00017	mg/L		01-DEC-14	
Ammonia, Total (as N)	19.6		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	111		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	21.7		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.151		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	695		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.7		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-4 GW-45804-112514-TS-004 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Organic / Inorganic Carbon							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	1		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0067		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	0.079		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	0.00056		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	10.7		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	1.62		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0161		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0111		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584
COD	26		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		02-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		02-DEC-14	
F4 (C34-C50)	290		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		02-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	74.5		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	82.3		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	0.026		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	0.0863		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	82.6		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	101.8		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-5 GW-45804-112514-TS-005 Sampled By: T. SAUNDERS on 25-NOV-14							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-5 GW-45804-112514-TS-005 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.98		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	11.6		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	31.7		1.0	C.U.		27-NOV-14	R3109561
pH	8.30		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	9.6		2.0	mg/L	28-NOV-14	30-NOV-14	R3111119
Total Dissolved Solids	269		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	6.03		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	84		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	<0.0012		0.0012	mg/L		01-DEC-14	
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	80		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	<0.030		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	62		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.5		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	1.12		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.0994		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0034		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-5 GW-45804-112514-TS-005 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	0.0015		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		01-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	89.5		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	96.8		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	82.2		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	102.2		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-6 GW-45804-112514-TS-006 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.41		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	11.1		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	203		1.0	C.U.		27-NOV-14	R3109561
pH	7.92		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	3.6		2.0	mg/L	28-NOV-14	30-NOV-14	R3111125
Total Dissolved Solids	479		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	19.6		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	209		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.00646		0.00031	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.03		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	52		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	1.32		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.039		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	126		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.9		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-6 GW-45804-112514-TS-006 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Organic / Inorganic Carbon							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	300	DLM	10	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0081		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	4.80		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	2.41	DLM	0.010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0047		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0092		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584
COD	30		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		01-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	76.2		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	93.0		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	63.4		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	102.9		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-7 GW-45804-112514-TS-007 Sampled By: T. SAUNDERS on 25-NOV-14							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-7 GW-45804-112514-TS-007 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.47		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	8.1		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	146		1.0	C.U.		27-NOV-14	R3109561
pH	7.90		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	7.6		2.0	mg/L	28-NOV-14	30-NOV-14	R3111125
Total Dissolved Solids	513		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	29.4		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	234		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.00696		0.00029	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.22		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	50		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	1.44		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.206		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	141		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.4		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	290	DLM	10	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0016		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	2.54		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.916		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0026		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-7 GW-45804-112514-TS-007 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	24		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		01-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		01-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		01-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	77.4		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	82.0		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	92.1		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	105.1		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-8 GW-45804-112514-TS-008 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.47		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	8.1		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	136		1.0	C.U.		27-NOV-14	R3109561
pH	7.88		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	6.4		2.0	mg/L	28-NOV-14	30-NOV-14	R3111125
Total Dissolved Solids	511		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	28.2		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	238		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.00753		0.00029	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.32		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	50		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	1.54		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.208		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	137		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.3		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-8 GW-45804-112514-TS-008 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Organic / Inorganic Carbon							
Bacteriological Tests							
E. Coli	2		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	4		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	320	DLM	10	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					27-NOV-14	R3110069
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0015		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	2.54		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.901		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110645
Molybdenum (Mo)-Dissolved	0.0027		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0058		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584
COD	15		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3109616
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		02-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		02-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		02-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	78.5		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	104.7		60-140	%		27-NOV-14	R3109616
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	87.9		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	96.4		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-9 GW-45804-112514-TS-009 Sampled By: T. SAUNDERS on 25-NOV-14							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-9 GW-45804-112514-TS-009 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.14		0.10	pH	27-NOV-14	27-NOV-14	R3109623
Temperature, Client	11.3		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109623
Physical Tests							
Color, Apparent	159		1.0	C.U.		27-NOV-14	R3109561
pH	7.84		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	16.4		2.0	mg/L	28-NOV-14	30-NOV-14	R3111125
Total Dissolved Solids	1340		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	52.6		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	545		10	mg/L		27-NOV-14	R3109564
Unionized ammonia	0.0287		0.00017	mg/L		01-DEC-14	
Ammonia, Total (as N)	8.37		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	126		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	9.06		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.088		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	425		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.9		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110041
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110751
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	0.0017		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	0.066		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	5.12		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	3.31	DLM	0.010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110790
Molybdenum (Mo)-Dissolved	0.0063		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0070		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-9 GW-45804-112514-TS-009 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	39		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3110262
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		02-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		02-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		02-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	77.1		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	78.0		60-140	%		27-NOV-14	R3110262
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	83.8		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	109.1		50-150	%	27-NOV-14	01-DEC-14	R3111956
L1550748-10 GW-45804-112514-TS-010 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	7.0		1.0	C.U.		27-NOV-14	R3109561
pH	7.90		0.10	pH units		27-NOV-14	R3111400
Total Suspended Solids	<2.0		2.0	mg/L	28-NOV-14	30-NOV-14	R3111125
Total Dissolved Solids	437		20	mg/L	27-NOV-14	28-NOV-14	R3110290
Turbidity	0.62		0.10	NTU	27-NOV-14	27-NOV-14	R3109959
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	325		10	mg/L		27-NOV-14	R3109564
Ammonia, Total (as N)	<0.050		0.050	mg/L		27-NOV-14	R3110310
Chloride (Cl)	<10		10	mg/L		27-NOV-14	R3110683
Nitrate-N (NO3-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Nitrite-N (NO2-N)	<0.50		0.50	mg/L		27-NOV-14	R3110683
Total Kjeldahl Nitrogen	0.20		0.15	mg/L	26-NOV-14	27-NOV-14	R3110287
Phosphorus, Total	0.031		0.030	mg/L	26-NOV-14	27-NOV-14	R3110282
Sulphate (SO4)	106		10	mg/L		27-NOV-14	R3110683
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.6		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110049
Fecal Coliforms	0		0	CFU/100mL	26-NOV-14	27-NOV-14	R3110048
Total Coliforms	270	DLM	10	CFU/100mL	26-NOV-14	27-NOV-14	R3110041

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1550748-10 GW-45804-112514-TS-010 Sampled By: T. SAUNDERS on 25-NOV-14 Matrix: WATER							
Bacteriological Tests							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110751
Dissolved Metals Filtration Location	FIELD					26-NOV-14	R3109517
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Boron (B)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	26-NOV-14	30-NOV-14	R3111389
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	26-NOV-14	30-NOV-14	R3111389
Copper (Cu)-Dissolved	0.0027		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	26-NOV-14	30-NOV-14	R3111389
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Manganese (Mn)-Dissolved	0.0047		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110790
Molybdenum (Mo)-Dissolved	0.0061		0.0010	mg/L	26-NOV-14	30-NOV-14	R3111389
Nickel (Ni)-Dissolved	0.0038		0.0020	mg/L	26-NOV-14	30-NOV-14	R3111389
Zinc (Zn)-Dissolved	0.0047		0.0030	mg/L	26-NOV-14	30-NOV-14	R3111389
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	26-NOV-14	01-DEC-14	R3111584
COD	13		10	mg/L	01-DEC-14	02-DEC-14	R3112320
Phenols (4AAP)	<0.0010		0.0010	mg/L	28-NOV-14	28-NOV-14	R3111659
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		27-NOV-14	R3110262
F2 (C10-C16)	<100		100	ug/L	27-NOV-14	01-DEC-14	R3111624
F2-Naphth	<100		100	ug/L		02-DEC-14	
F3 (C16-C34)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
F3-PAH	<250		250	ug/L		02-DEC-14	
F4 (C34-C50)	<250		250	ug/L	27-NOV-14	01-DEC-14	R3111624
Total Hydrocarbons (C6-C50)	<380		380	ug/L		02-DEC-14	
Chrom. to baseline at nC50	YES				27-NOV-14	01-DEC-14	R3111624
Surrogate: 2-Bromobenzotrifluoride	78.2		60-140	%	27-NOV-14	01-DEC-14	R3111624
Surrogate: 3,4-Dichlorotoluene	80.5		60-140	%		27-NOV-14	R3110262
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	27-NOV-14	01-DEC-14	R3111956
Benzo(a)pyrene	<0.0050		0.0050	ug/L	27-NOV-14	01-DEC-14	R3111956
Surrogate: 2-Fluorobiphenyl	77.7		30-130	%	27-NOV-14	01-DEC-14	R3111956
Surrogate: d14-Terphenyl	92.8		50-150	%	27-NOV-14	01-DEC-14	R3111956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLM	L1550748-1, -2, -3, -4, -5
Matrix Spike	Ammonia, Total (as N)	MS-B	L1550748-1, -10, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.			
F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.			

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration

Reference Information

using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT	Water	Fecal Coliforms	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA SW846 7470A

Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT	Water	Dissolved Metals in Water by ICPMS	EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT	Water	Nitrite-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT	Water	Phosphorus, Total	APHA 4500-P B E

Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT	Water	CCME PAHs	SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h. Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Reference Information

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3109564								
WG2003654-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			106.2		%		80-120	27-NOV-14
WG2003654-2 CVS								
Alkalinity, Total (as CaCO3)			100.9		%		85-115	27-NOV-14
WG2003654-4 DUP		**L1550313-1**						
Alkalinity, Total (as CaCO3)		22	22		mg/L	2.2	20	27-NOV-14
WG2003654-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	27-NOV-14
BOD-C-WT	Water							
Batch R3111584								
WG2002915-2 DUP		**L1550847-8**						
BOD Carbonaceous		1490	1460		mg/L	2.3	20	01-DEC-14
WG2002915-5 DUP		**L1550919-1**						
BOD Carbonaceous		148	141		mg/L	4.8	20	01-DEC-14
WG2002915-6 DUP		**L1550862-1**						
BOD Carbonaceous		295	275		mg/L	7.0	20	01-DEC-14
WG2002915-3 LCS								
BOD Carbonaceous			92.4		%		85-115	01-DEC-14
WG2002915-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	01-DEC-14
C-DIS-ORG-WT	Water							
Batch R3110842								
WG2003363-7 DUP		**L1551723-5**						
Dissolved Organic Carbon		9.2	9.7		mg/L	5.3	20	27-NOV-14
WG2003363-6 LCS								
Dissolved Organic Carbon			108.0		%		80-120	27-NOV-14
WG2003363-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	27-NOV-14
WG2003363-8 MS		**L1551723-5**						
Dissolved Organic Carbon			109.0		%		70-130	27-NOV-14
CL-WT	Water							
Batch R3110678								
WG2004041-4 DUP		**WG2004041-3**						
Chloride (Cl)		3.4	3.4		mg/L	0.4	20	27-NOV-14
WG2004041-2 LCS								
Chloride (Cl)			102.1		%		85-115	27-NOV-14
WG2004041-1 MB								

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R3110678								
WG2004041-1 MB								
Chloride (Cl)			<2.0		mg/L		2	27-NOV-14
WG2004041-5 MS		**WG2004041-3**						
Chloride (Cl)			100.3		%		75-125	27-NOV-14
Batch R3110683								
WG2004095-4 DUP		**WG2004095-3**						
Chloride (Cl)		18.4	18.5		mg/L	0.5	20	27-NOV-14
WG2004095-2 LCS								
Chloride (Cl)			101.7		%		85-115	27-NOV-14
WG2004095-1 MB								
Chloride (Cl)			<2.0		mg/L		2	27-NOV-14
WG2004095-5 MS		**WG2004095-3**						
Chloride (Cl)			98.6		%		75-125	27-NOV-14
COD-WT	Water							
Batch R3112320								
WG2006323-3 DUP		**L1550748-1**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	02-DEC-14
WG2006323-2 LCS								
COD			98.0		%		85-115	02-DEC-14
WG2006323-1 MB								
COD			<10		mg/L		10	02-DEC-14
WG2006323-4 MS		**L1550748-1**						
COD			112.0		%		75-125	02-DEC-14
COLOUR-WT	Water							
Batch R3109561								
WG2003657-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			94.2		%		80-120	27-NOV-14
WG2003657-2 CVS								
Color, Apparent			99.8		%		85-115	27-NOV-14
WG2003657-4 DUP		**L1550748-1**						
Color, Apparent		10.9	10.6		C.U.	2.4	20	27-NOV-14
WG2003657-1 MB								
Color, Apparent			<1.0		C.U.		1	27-NOV-14
EC-MF-WT	Water							

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3110049								
WG2003320-3 DUP		**L1551034-2**						
E. Coli		0	0		CFU/100mL	0.0	50	27-NOV-14
WG2003320-1 MB								
E. Coli			0		CFU/100mL		1	27-NOV-14
WG2003320-2 MB								
E. Coli			0		CFU/100mL		1	27-NOV-14
F1-HS-WT	Water							
Batch R3109616								
WG2001484-1 CVS								
F1 (C6-C10)			98.4		%		80-120	27-NOV-14
WG2001484-4 DUP		**WG2001484-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	27-NOV-14
WG2001484-2 MB								
F1 (C6-C10)			<100		ug/L		100	27-NOV-14
Surrogate: 3,4-Dichlorotoluene			112.5		%		60-140	27-NOV-14
Batch R3110262								
WG2001485-1 CVS								
F1 (C6-C10)			93.5		%		80-120	27-NOV-14
WG2001485-4 DUP		**L1550748-9**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	27-NOV-14
WG2001485-2 MB								
F1 (C6-C10)			<100		ug/L		100	27-NOV-14
Surrogate: 3,4-Dichlorotoluene			91.1		%		60-140	27-NOV-14
F2-F4-WT	Water							
Batch R3111624								
WG2003736-1 CVS								
F2 (C10-C16)			99.2		%		80-120	01-DEC-14
F3 (C16-C34)			97.9		%		80-120	01-DEC-14
F4 (C34-C50)			99.6		%		80-120	01-DEC-14
WG2003396-2 LCS								
F2 (C10-C16)			91.7		%		65-135	01-DEC-14
F3 (C16-C34)			97.3		%		65-135	01-DEC-14
F4 (C34-C50)			96.4		%		65-135	01-DEC-14
WG2003396-3 LCSD		**WG2003396-2**						
F2 (C10-C16)		91.7	90.7		%	1.1	50	01-DEC-14
F3 (C16-C34)		97.3	97.3		%	0.1	50	01-DEC-14
F4 (C34-C50)		96.4	99.3		%			

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3111624								
WG2003396-3 LCSD		**WG2003396-2**						
F4 (C34-C50)		96.4	99.3		%	3.0	50	01-DEC-14
WG2003396-1 MB								
F2 (C10-C16)			<100		ug/L		100	01-DEC-14
F3 (C16-C34)			<250		ug/L		250	01-DEC-14
F4 (C34-C50)			<250		ug/L		250	01-DEC-14
Surrogate: 2-Bromobenzotrifluoride			64.4		%		60-140	01-DEC-14
FC-MF-WT	Water							
Batch R3110048								
WG2003311-3 DUP		**L1550748-1**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	27-NOV-14
WG2003311-1 MB								
Fecal Coliforms			0		CFU/100mL		1	27-NOV-14
WG2003311-2 MB								
Fecal Coliforms			0		CFU/100mL		1	27-NOV-14
HG-D-CVAA-WT	Water							
Batch R3110645								
WG2003997-3 DUP		**L1550201-1**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2003997-2 LCS								
Mercury (Hg)-Dissolved			95.5		%		80-120	28-NOV-14
WG2003997-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	28-NOV-14
WG2003997-4 MS		**L1550201-2**						
Mercury (Hg)-Dissolved			98.6		%		70-130	28-NOV-14
Batch R3110790								
WG2005113-10 DUP		**WG2005113-9**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2005113-8 LCS								
Mercury (Hg)-Dissolved			97.5		%		80-120	28-NOV-14
WG2005113-7 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	28-NOV-14
WG2005113-12 MS		**WG2005113-11**						
Mercury (Hg)-Dissolved			101.0		%		70-130	28-NOV-14
MET-D-MS-WT	Water							

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R3111389								
WG2002303-1 CVS								
Arsenic (As)-Dissolved			95.3		%		80-120	30-NOV-14
Boron (B)-Dissolved			99.1		%		80-120	30-NOV-14
Cadmium (Cd)-Dissolved			100.3		%		80-120	30-NOV-14
Chromium (Cr)-Dissolved			94.9		%		80-120	30-NOV-14
Cobalt (Co)-Dissolved			98.0		%		80-120	30-NOV-14
Copper (Cu)-Dissolved			96.8		%		80-120	30-NOV-14
Iron (Fe)-Dissolved			97.8		%		80-120	30-NOV-14
Lead (Pb)-Dissolved			97.5		%		80-120	30-NOV-14
Manganese (Mn)-Dissolved			98.0		%		80-120	30-NOV-14
Molybdenum (Mo)-Dissolved			97.7		%		80-120	30-NOV-14
Nickel (Ni)-Dissolved			96.4		%		80-120	30-NOV-14
Zinc (Zn)-Dissolved			94.1		%		80-120	30-NOV-14
WG2002303-3 CVS								
Arsenic (As)-Dissolved			99.2		%		80-120	01-DEC-14
Boron (B)-Dissolved			101.8		%		80-120	01-DEC-14
Cadmium (Cd)-Dissolved			98.7		%		80-120	01-DEC-14
Chromium (Cr)-Dissolved			99.6		%		80-120	01-DEC-14
Cobalt (Co)-Dissolved			97.9		%		80-120	01-DEC-14
Copper (Cu)-Dissolved			100.1		%		80-120	01-DEC-14
Iron (Fe)-Dissolved			98.3		%		80-120	01-DEC-14
Lead (Pb)-Dissolved			101.3		%		80-120	01-DEC-14
Manganese (Mn)-Dissolved			99.4		%		80-120	01-DEC-14
Molybdenum (Mo)-Dissolved			96.4		%		80-120	01-DEC-14
Nickel (Ni)-Dissolved			97.9		%		80-120	01-DEC-14
Zinc (Zn)-Dissolved			95.6		%		80-120	01-DEC-14
WG2003614-4 DUP		**WG2003614-3**						
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-NOV-14
Boron (B)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	30-NOV-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	30-NOV-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-NOV-14
Cobalt (Co)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-NOV-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-NOV-14
Iron (Fe)-Dissolved		0.148	0.144		mg/L	2.4	20	30-NOV-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-NOV-14

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R3111389								
WG2003614-4 DUP		**WG2003614-3**						
Manganese (Mn)-Dissolved		0.0034	0.0032		mg/L	6.1	20	30-NOV-14
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	30-NOV-14
Nickel (Ni)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	30-NOV-14
Zinc (Zn)-Dissolved		0.0034	0.0033		mg/L	3.9	20	30-NOV-14
WG2003614-2 LCS								
Arsenic (As)-Dissolved			98.7		%		80-120	30-NOV-14
Boron (B)-Dissolved			93.1		%		80-120	30-NOV-14
Cadmium (Cd)-Dissolved			99.3		%		80-120	30-NOV-14
Chromium (Cr)-Dissolved			97.5		%		80-120	30-NOV-14
Cobalt (Co)-Dissolved			98.6		%		80-120	30-NOV-14
Copper (Cu)-Dissolved			100.3		%		80-120	30-NOV-14
Iron (Fe)-Dissolved			99.6		%		80-120	30-NOV-14
Lead (Pb)-Dissolved			99.2		%		80-120	30-NOV-14
Manganese (Mn)-Dissolved			98.9		%		80-120	30-NOV-14
Molybdenum (Mo)-Dissolved			97.7		%		80-120	30-NOV-14
Nickel (Ni)-Dissolved			99.2		%		80-120	30-NOV-14
Zinc (Zn)-Dissolved			99.9		%		80-120	30-NOV-14
WG2003614-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	30-NOV-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	30-NOV-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	30-NOV-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	30-NOV-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	30-NOV-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	30-NOV-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	30-NOV-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	30-NOV-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	30-NOV-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	30-NOV-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	30-NOV-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	30-NOV-14
WG2003614-5 MS		**WG2003614-3**						
Arsenic (As)-Dissolved			90.6		%		70-130	30-NOV-14
Boron (B)-Dissolved			78.9		%		70-130	30-NOV-14
Cadmium (Cd)-Dissolved			89.8		%		70-130	30-NOV-14

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R3111389								
WG2003614-5 MS		**WG2003614-3**						
Chromium (Cr)-Dissolved			90.1		%		70-130	30-NOV-14
Cobalt (Co)-Dissolved			89.6		%		70-130	30-NOV-14
Copper (Cu)-Dissolved			91.7		%		70-130	30-NOV-14
Iron (Fe)-Dissolved			88.7		%		70-130	30-NOV-14
Lead (Pb)-Dissolved			86.4		%		70-130	30-NOV-14
Manganese (Mn)-Dissolved			89.2		%		70-130	30-NOV-14
Molybdenum (Mo)-Dissolved			90.6		%		70-130	30-NOV-14
Nickel (Ni)-Dissolved			89.9		%		70-130	30-NOV-14
Zinc (Zn)-Dissolved			91.8		%		70-130	30-NOV-14
NH3-WT	Water							
Batch R3110310								
WG2004110-2 CVS								
Ammonia, Total (as N)			100.4		%		85-115	27-NOV-14
WG2004110-3 DUP		**L1550748-3**						
Ammonia, Total (as N)		18.6	17.4		mg/L	6.3	20	27-NOV-14
WG2004110-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	27-NOV-14
WG2004110-4 MS		**L1550748-3**						
Ammonia, Total (as N)			N/A	MS-B	%		-	27-NOV-14
NO2-WT	Water							
Batch R3110678								
WG2004041-4 DUP		**WG2004041-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	27-NOV-14
WG2004041-2 LCS								
Nitrite-N (NO2-N)			101.5		%		70-130	27-NOV-14
WG2004041-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	27-NOV-14
WG2004041-5 MS		**WG2004041-3**						
Nitrite-N (NO2-N)			102.8		%		70-130	27-NOV-14
Batch R3110683								
WG2004095-4 DUP		**WG2004095-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	27-NOV-14
WG2004095-2 LCS								
Nitrite-N (NO2-N)			102.4		%		70-130	27-NOV-14
WG2004095-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	27-NOV-14

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-WT	Water							
Batch R3110683								
WG2004095-5 MS		**WG2004095-3**						
Nitrite-N (NO2-N)			103.2		%		70-130	27-NOV-14
NO3-WT	Water							
Batch R3110678								
WG2004041-4 DUP		**WG2004041-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	27-NOV-14
WG2004041-2 LCS								
Nitrate-N (NO3-N)			100.3		%		70-130	27-NOV-14
WG2004041-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	27-NOV-14
WG2004041-5 MS		**WG2004041-3**						
Nitrate-N (NO3-N)			97.1		%		70-130	27-NOV-14
Batch R3110683								
WG2004095-4 DUP		**WG2004095-3**						
Nitrate-N (NO3-N)		0.99	0.99		mg/L	0.1	25	27-NOV-14
WG2004095-2 LCS								
Nitrate-N (NO3-N)			101.0		%		70-130	27-NOV-14
WG2004095-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	27-NOV-14
WG2004095-5 MS		**WG2004095-3**						
Nitrate-N (NO3-N)			96.0		%		70-130	27-NOV-14
P-TOTAL-WT	Water							
Batch R3109946								
WG2003834-1 CVS								
Phosphorus, Total			100.2		%		85-115	27-NOV-14
WG2003647-3 DUP		**L1550519-1**						
Phosphorus, Total		2.52	2.42		mg/L	4.0	20	27-NOV-14
WG2003647-2 LCS								
Phosphorus, Total			93.2		%		80-120	27-NOV-14
WG2003647-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	27-NOV-14
Batch R3110282								
WG2003901-1 CVS								
Phosphorus, Total			100.4		%		85-115	27-NOV-14
WG2003651-3 DUP		**L1550748-3**						
Phosphorus, Total		0.089	0.085		mg/L	4.6	20	27-NOV-14
WG2003651-2 LCS								

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-WT	Water							
Batch R3110282								
WG2003651-2 LCS								
Phosphorus, Total			94.4		%		80-120	27-NOV-14
WG2003651-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	27-NOV-14
PAH-CCME-WT	Water							
Batch R3111956								
WG2004572-1 CVS								
Anthracene			97.1		%		60-130	28-NOV-14
Benzo(a)pyrene			101.5		%		70-130	28-NOV-14
WG2003676-2 LCS								
Anthracene			108.7		%		50-140	01-DEC-14
Benzo(a)pyrene			112.4		%		60-130	01-DEC-14
WG2003676-3 LCSD		**WG2003676-2**						
Anthracene		108.7	113.9		%	4.7	50	01-DEC-14
Benzo(a)pyrene		112.4	116.6		%	3.7	50	01-DEC-14
WG2003676-1 MB								
Anthracene			<0.020		ug/L		0.02	01-DEC-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	01-DEC-14
Surrogate: 2-Fluorobiphenyl			89.5		%		30-130	01-DEC-14
Surrogate: d14-Terphenyl			106.6		%		50-150	01-DEC-14
PH-WT	Water							
Batch R3111400								
WG2003856-3 DUP		**L1550713-1**						
pH		7.97	7.94	J	pH units	0.03	0.2	27-NOV-14
WG2003856-1 LCS								
pH			7.01		pH units		6.9-7.1	27-NOV-14
PHENOLS-4AAP-WT	Water							
Batch R3111659								
WG2004988-3 CVS								
Phenols (4AAP)			88.0		%		85-115	28-NOV-14
WG2004988-4 DUP		**L1550748-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2004988-2 LCS								
Phenols (4AAP)			86.6		%		85-115	28-NOV-14
WG2004988-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	28-NOV-14
WG2004988-5 MS		**L1550748-1**						

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R3111659								
WG2004988-5 MS		**L1550748-1**						
Phenols (4AAP)			94.3		%		75-125	28-NOV-14
SO4-WT	Water							
Batch R3110678								
WG2004041-4 DUP		**WG2004041-3**						
Sulphate (SO4)		<2.0	<2.0	RPD-NA	mg/L	N/A	25	27-NOV-14
WG2004041-2 LCS								
Sulphate (SO4)			102.1		%		70-130	27-NOV-14
WG2004041-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	27-NOV-14
WG2004041-5 MS		**WG2004041-3**						
Sulphate (SO4)			100.1		%		70-130	27-NOV-14
Batch R3110683								
WG2004095-4 DUP		**WG2004095-3**						
Sulphate (SO4)		10.8	10.9		mg/L	0.5	25	27-NOV-14
WG2004095-2 LCS								
Sulphate (SO4)			101.7		%		70-130	27-NOV-14
WG2004095-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	27-NOV-14
WG2004095-5 MS		**WG2004095-3**						
Sulphate (SO4)			99.0		%		70-130	27-NOV-14
SOLIDS-TDS-WT	Water							
Batch R3110290								
WG2003711-3 DUP		**L1550908-1**						
Total Dissolved Solids		427	428		mg/L	0.2	20	28-NOV-14
WG2003711-2 LCS								
Total Dissolved Solids			96.9		%		85-115	28-NOV-14
WG2003711-1 MB								
Total Dissolved Solids			<20		mg/L		20	28-NOV-14
SOLIDS-TSS-WT	Water							
Batch R3111119								
WG2004589-3 DUP		**L1550722-2**						
Total Suspended Solids		48	46		mg/L	4.3	20	30-NOV-14
WG2004589-2 LCS								
Total Suspended Solids			105.8		%		85-115	30-NOV-14
WG2004589-1 MB								

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R3111119								
WG2004589-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-NOV-14
Batch R3111125								
WG2004591-3 DUP		**L1550748-10**						
Total Suspended Solids		<2.0	<2.0	RPD-NA	mg/L	N/A	20	30-NOV-14
WG2004591-2 LCS								
Total Suspended Solids			101.2		%		85-115	30-NOV-14
WG2004591-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-NOV-14
TC-MF-WT	Water							
Batch R3110041								
WG2003303-3 DUP		**L1551034-1**						
Total Coliforms		0	0		CFU/100mL	0.0	50	27-NOV-14
WG2003303-1 MB								
Total Coliforms			0		CFU/100mL		1	27-NOV-14
WG2003303-2 MB								
Total Coliforms			0		CFU/100mL		1	27-NOV-14
TKN-WT	Water							
Batch R3110285								
WG2003827-1 CVS								
Total Kjeldahl Nitrogen			94.8		%		75-125	27-NOV-14
WG2003647-3 DUP		**L1550519-1**						
Total Kjeldahl Nitrogen		310	306		mg/L	1.4	20	27-NOV-14
WG2003647-2 LCS								
Total Kjeldahl Nitrogen			107.2		%		75-125	27-NOV-14
WG2003647-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	27-NOV-14
Batch R3110287								
WG2003889-1 CVS								
Total Kjeldahl Nitrogen			89.7		%		75-125	27-NOV-14
WG2003651-3 DUP		**L1550748-3**						
Total Kjeldahl Nitrogen		20.7	20.4		mg/L	1.9	20	27-NOV-14
WG2003651-2 LCS								
Total Kjeldahl Nitrogen			98.6		%		75-125	27-NOV-14
WG2003651-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	27-NOV-14

Quality Control Report

Workorder: L1550748 Report Date: 02-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	Water							
Batch R3109959								
WG2003103-2 CVS								
Turbidity			97.0		%		85-115	27-NOV-14
WG2003103-4 DUP		**L1550627-1**						
Turbidity		0.17	0.18		NTU	5.7	15	27-NOV-14
WG2003103-1 MB								
Turbidity			<0.10		NTU		0.1	27-NOV-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

L1550748-COFC

VICES REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _2__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME 13791
Conestoga Rovers and Associates

PROJECT MANAGER
AIRESSE MACPHEE

JOB #
45804-58

PO #
20-017307

DUE DATE

SAMPLING INFORMATION

CRITERIA | Criteria on report (y/n) ___
Reg 153/04
Table ___
TCLP ___ MISA ___ PWQO ___
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION | ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ___
EMAIL1 amacphee@craworld.com
EMAIL2 ___
SELECT: pdf ___ digital ___ both ___

ANALYSIS REQUEST

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION # L1550748

ENTERED BY: BMARK

DATE/TIME ENTERED: Nov. 25 3:20

BIN # ✓

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT				FIELD TEMP	FIELD PH	COMMENTS	LAB ID
11/25/14				X			GW-45804-112514-TS-001	14	X					8.51	7.07		1
				X			GW-45804-TS-002	14	X					8.44	7.21		2
				X			GW-45804-TS-003	14	X					16.03	6.92		3
				X			GW-45804-TS-004	14	X					13.19	7.07		4
				X			GW-45804-TS-005	14	X					11.60	7.98		5
				X			GW-45804-TS-006	14	X					11.08	7.41		6
				X			GW-45804-TS-007	14	X					8.11	7.47		7
				X			GW-45804-TS-008	14	X					8.11	7.47		8
				X			GW-45804-TS-009	14	X					11.26	7.14		9
				X			GW-45804-TS-010	14	X								10
				X			GW-45804-TS-011	14	X								
				X			GW-45804-TS-012	14	X								

SPECIAL INSTRUCTIONS/COMMENTS

GROUNDWATER METALS AND HG ARE FIELD FILTERED
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION

	MEAN TEMP
FROZEN ✓	1) 9
COLD ✓	2) 14
COOLING INITIATED	3) 15
AMBIENT	4) 10.
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ✓	INIT: Bm.

SAMPLED BY: Trevor Saunders	DATE & TIME 11/25/14	RECEIVED BY: BMARK	DATE & TIME Nov. 25 3pm.
RELINQUISHED BY:	DATE & TIME 11/25/14	RECEIVED AT LAB BY: BMARK	DATE & TIME Nov. 25 3pm.

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section

White - report copy | YELLOW - File copy | PINK - Customer Copy

000762

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 26-NOV-14
Report Date: 03-DEC-14 13:56 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1551246

Project P.O. #: 20-17307
Job Reference: 45804-58
C of C Numbers: 1
Legal Site Desc:

Nancy Smith
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-1 SW-45804-112614-TS-001 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.17		0.10	pH	27-NOV-14	27-NOV-14	R3109628
Temperature, Client	1.8		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109628
Physical Tests							
Color, Apparent	35.2		1.0	C.U.		28-NOV-14	R3111333
pH	8.01		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	8.0		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	637		20	mg/L	28-NOV-14	29-NOV-14	R3110956
Turbidity	7.32		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	203		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00174		0.00085	mg/L		01-DEC-14	
Ammonia, Total (as N)	0.102		0.050	mg/L		28-NOV-14	R3110685
Chloride (Cl)	109		2.0	mg/L		28-NOV-14	R3111691
Nitrate-N (NO3-N)	0.43		0.10	mg/L		28-NOV-14	R3111691
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Total Kjeldahl Nitrogen	0.49		0.15	mg/L	30-NOV-14	01-DEC-14	R3111688
Total Phosphorus	0.0368		0.0030	mg/L		28-NOV-14	R3110389
Sulphate (SO4)	179		2.0	mg/L		28-NOV-14	R3111691
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.4		1.0	mg/L	29-NOV-14	29-NOV-14	R3112042
Bacteriological Tests							
E. Coli	50	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	70	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	1500	DLM	100	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Boron (B)-Total	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3111856
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3111856
Copper (Cu)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Iron (Fe)-Total	0.459		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Lead (Pb)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Manganese (Mn)-Total	0.0850		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110656
Molybdenum (Mo)-Total	0.0082		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	27-NOV-14	01-DEC-14	R3111856
Zinc (Zn)-Total	0.0039		0.0030	mg/L	27-NOV-14	01-DEC-14	R3111856
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	28-NOV-14	03-DEC-14	R3113718
COD	22		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-1 SW-45804-112614-TS-001 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		28-NOV-14	R3110275
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	67.8		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	99.8		60-140	%		28-NOV-14	R3110275
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	91.0		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	109.0		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551246-2 SW-45804-112614-TS-002 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.13		0.10	pH	27-NOV-14	27-NOV-14	R3109628
Temperature, Client	2.4		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109628
Physical Tests							
Color, Apparent	31.2		1.0	C.U.		28-NOV-14	R3111333
pH	8.02		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	8.4		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	837		20	mg/L	28-NOV-14	29-NOV-14	R3110956
Turbidity	7.27		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	214		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00158		0.00081	mg/L		01-DEC-14	
Ammonia, Total (as N)	0.097		0.050	mg/L		28-NOV-14	R3110685
Chloride (Cl)	109		2.0	mg/L		28-NOV-14	R3111691
Nitrate-N (NO3-N)	0.61		0.10	mg/L		28-NOV-14	R3111691
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Total Kjeldahl Nitrogen	0.45		0.15	mg/L	30-NOV-14	01-DEC-14	R3111688
Total Phosphorus	0.0336		0.0030	mg/L		28-NOV-14	R3110389
Sulphate (SO4)	303		2.0	mg/L		28-NOV-14	R3111691
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.3		1.0	mg/L	29-NOV-14	29-NOV-14	R3112042
Bacteriological Tests							
E. Coli	70	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110780

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-2 SW-45804-112614-TS-002 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	80	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	1800	DLM	100	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Boron (B)-Total	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3111856
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3111856
Copper (Cu)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Iron (Fe)-Total	0.339		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Lead (Pb)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Manganese (Mn)-Total	0.0871		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110656
Molybdenum (Mo)-Total	0.0221		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Nickel (Ni)-Total	0.0031		0.0020	mg/L	27-NOV-14	01-DEC-14	R3111856
Zinc (Zn)-Total	0.0057		0.0030	mg/L	27-NOV-14	01-DEC-14	R3111856
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	28-NOV-14	03-DEC-14	R3113718
COD	24		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		28-NOV-14	R3110275
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	72.6		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	105.5		60-140	%		28-NOV-14	R3110275
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	89.4		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	103.2		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551246-3 SW-45804-112614-TS-003 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.84		0.10	pH	27-NOV-14	27-NOV-14	R3109628
Temperature, Client	2.6		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109628

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-3 SW-45804-112614-TS-003 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
Physical Tests							
Color, Apparent	9.0		1.0	C.U.		28-NOV-14	R3111333
pH	7.88		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	<2.0		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	1440	DLM	20	mg/L	28-NOV-14	29-NOV-14	R3110956
Turbidity	4.39		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	235		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00069		0.00043	mg/L		01-DEC-14	
Ammonia, Total (as N)	0.081		0.050	mg/L		28-NOV-14	R3110685
Chloride (Cl)	224		2.0	mg/L		28-NOV-14	R3111691
Nitrate-N (NO3-N)	0.56		0.10	mg/L		28-NOV-14	R3111691
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Total Kjeldahl Nitrogen	0.31		0.15	mg/L	30-NOV-14	01-DEC-14	R3111688
Total Phosphorus	0.0088		0.0030	mg/L		28-NOV-14	R3110389
Sulphate (SO4)	597		2.0	mg/L		28-NOV-14	R3111691
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.0		1.0	mg/L	29-NOV-14	29-NOV-14	R3112042
Bacteriological Tests							
E. Coli	4		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	6		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	1900	DLM	100	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Boron (B)-Total	0.096		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Cadmium (Cd)-Total	0.00011		0.00010	mg/L	27-NOV-14	01-DEC-14	R3111856
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Cobalt (Co)-Total	0.00141		0.00050	mg/L	27-NOV-14	01-DEC-14	R3111856
Copper (Cu)-Total	0.0013		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Iron (Fe)-Total	0.061		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Lead (Pb)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Manganese (Mn)-Total	0.0334		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110656
Molybdenum (Mo)-Total	0.301		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Nickel (Ni)-Total	0.0165		0.0020	mg/L	27-NOV-14	01-DEC-14	R3111856
Zinc (Zn)-Total	0.0068		0.0030	mg/L	27-NOV-14	01-DEC-14	R3111856
Aggregate Organics							
BOD Carbonaceous	4.6		2.0	mg/L	28-NOV-14	03-DEC-14	R3113718
COD	24		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		28-NOV-14	R3110275

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-3 SW-45804-112614-TS-003 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	62.5		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	93.6		60-140	%		28-NOV-14	R3110275
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	03-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	03-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	88.6		30-130	%	28-NOV-14	03-DEC-14	R3111655
Surrogate: d14-Terphenyl	108.7		50-150	%	28-NOV-14	03-DEC-14	R3111655
L1551246-4 SW-45804-112614-TS-004 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.34		0.10	pH	27-NOV-14	27-NOV-14	R3109628
Temperature, Client	3.2		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109628
Physical Tests							
Color, Apparent	35.0		1.0	C.U.		28-NOV-14	R3111333
pH	7.94		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	9.2		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	406		20	mg/L	28-NOV-14	29-NOV-14	R3110956
Turbidity	9.18		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	176		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.0468		0.0014	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.68		0.050	mg/L		28-NOV-14	R3110685
Chloride (Cl)	47.2		2.0	mg/L		28-NOV-14	R3111691
Nitrate-N (NO3-N)	0.10		0.10	mg/L		28-NOV-14	R3111691
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Total Kjeldahl Nitrogen	2.94		0.15	mg/L	30-NOV-14	01-DEC-14	R3111688
Total Phosphorus	0.158		0.0030	mg/L		28-NOV-14	R3110389
Sulphate (SO4)	115		2.0	mg/L		28-NOV-14	R3111691
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.9		1.0	mg/L	29-NOV-14	29-NOV-14	R3112042
Bacteriological Tests							
E. Coli	100	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	110	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	800	DLM	100	CFU/100mL	27-NOV-14	28-NOV-14	R3110772

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-4 SW-45804-112614-TS-004 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Bacteriological Tests							
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Boron (B)-Total	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3111856
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3111856
Copper (Cu)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Iron (Fe)-Total	0.180		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Lead (Pb)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Manganese (Mn)-Total	0.170		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110656
Molybdenum (Mo)-Total	0.0055		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	27-NOV-14	01-DEC-14	R3111856
Zinc (Zn)-Total	0.0046		0.0030	mg/L	27-NOV-14	01-DEC-14	R3111856
Aggregate Organics							
BOD Carbonaceous	4.7		2.0	mg/L	28-NOV-14	03-DEC-14	R3113718
COD	43		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		28-NOV-14	R3110275
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	66.3		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	98.9		60-140	%		28-NOV-14	R3110275
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	03-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	03-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	78.9		30-130	%	28-NOV-14	03-DEC-14	R3111655
Surrogate: d14-Terphenyl	98.4		50-150	%	28-NOV-14	03-DEC-14	R3111655
L1551246-5 SW-45804-112614-TS-005 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.34		0.10	pH	27-NOV-14	27-NOV-14	R3109628
Temperature, Client	3.2		0.1	Deg. C	27-NOV-14	27-NOV-14	R3109628
Physical Tests							
Color, Apparent	38.5		1.0	C.U.		28-NOV-14	R3111333

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-5 SW-45804-112614-TS-005 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Physical Tests							
pH	7.95		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	8.8		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	404		20	mg/L	28-NOV-14	29-NOV-14	R3110956
Turbidity	8.17		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	162		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.0537		0.0014	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.93		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	46.9		2.0	mg/L		28-NOV-14	R3111691
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111691
Total Kjeldahl Nitrogen	2.29		0.15	mg/L	30-NOV-14	01-DEC-14	R3111688
Total Phosphorus	0.170		0.0030	mg/L		28-NOV-14	R3110389
Sulphate (SO4)	114		2.0	mg/L		28-NOV-14	R3111691
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.2		1.0	mg/L	29-NOV-14	29-NOV-14	R3112042
Bacteriological Tests							
E. Coli	90	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	100	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	900	DLM	100	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Total Metals							
Arsenic (As)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Boron (B)-Total	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Cadmium (Cd)-Total	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3111856
Chromium (Cr)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Cobalt (Co)-Total	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3111856
Copper (Cu)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Iron (Fe)-Total	0.173		0.050	mg/L	27-NOV-14	01-DEC-14	R3111856
Lead (Pb)-Total	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Manganese (Mn)-Total	0.166		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Mercury (Hg)-Total	<0.00010		0.00010	mg/L	28-NOV-14	28-NOV-14	R3110656
Molybdenum (Mo)-Total	0.0053		0.0010	mg/L	27-NOV-14	01-DEC-14	R3111856
Nickel (Ni)-Total	<0.0020		0.0020	mg/L	27-NOV-14	01-DEC-14	R3111856
Zinc (Zn)-Total	0.0043		0.0030	mg/L	27-NOV-14	01-DEC-14	R3111856
Aggregate Organics							
BOD Carbonaceous	4.1		2.0	mg/L	28-NOV-14	03-DEC-14	R3113718
COD	41		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551246-5 SW-45804-112614-TS-005 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Hydrocarbons							
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	65.3		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	90.5		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	03-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	03-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	77.7		30-130	%	28-NOV-14	03-DEC-14	R3111655
Surrogate: d14-Terphenyl	95.5		50-150	%	28-NOV-14	03-DEC-14	R3111655

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Total Phosphorus	MS-B	L1551246-1, -2, -3, -4, -5
Matrix Spike	Ammonia, Total (as N)	MS-B	L1551246-5

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-WT Water Chloride EPA 300.0 (IC)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

COD-WT Water Chemical Oxygen Demand APHA 5220 D

The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.

COLOUR-WT Water Colour APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

EC-WW-MF-WT Water E. Coli SM 9222D

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration

Reference Information

using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-WW-MF-WT	Water	Fecal Coliforms	SM 9222D
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA SW846 7470A

Liquid sample is digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

MET-T-MS-WT	Water	Total Metals in Water by ICPMS	EPA 200.8

This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT	Water	Nitrite-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT	Water	Nitrate-N	EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-LOW-WT	Water	Phosphorus, Total, Low Level	APHA 4500-P B E

This analysis is carried by out an discrete colorimetric auto-analyzer using procedures adapted from APHA Method 4500-P "Phosphorus".

PAH-CCME-WT	Water	CCME PAHs	SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT	Water	Sulphate	EPA 300.0 (IC)
SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-WW-MF-WT	Water	Total Coliforms	SM 9222B

Water sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

1

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3111334								
WG2004521-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			106.1		%		80-120	28-NOV-14
WG2004521-2 CVS								
Alkalinity, Total (as CaCO3)			104.9		%		85-115	28-NOV-14
WG2004521-4 DUP		**L1551037-1**						
Alkalinity, Total (as CaCO3)		341	346		mg/L	1.5	20	28-NOV-14
WG2004521-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	28-NOV-14
BOD-C-WT	Water							
Batch R3113718								
WG2004633-2 DUP		**L1551802-2**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	03-DEC-14
WG2004633-5 DUP		**L1551969-2**						
BOD Carbonaceous		4770	4750		mg/L	0.4	20	03-DEC-14
WG2004633-6 DUP		**L1552185-2**						
BOD Carbonaceous		385	381		mg/L	1.0	20	03-DEC-14
WG2004633-7 DUP		**L1552309-1**						
BOD Carbonaceous		180	177		mg/L	1.7	20	03-DEC-14
WG2004633-3 LCS								
BOD Carbonaceous			99.0		%		85-115	03-DEC-14
WG2004633-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	03-DEC-14
C-DIS-ORG-WT	Water							
Batch R3112042								
WG2005427-3 DUP		**L1551246-1**						
Dissolved Organic Carbon		8.4	8.7		mg/L	3.5	20	29-NOV-14
WG2005427-2 LCS								
Dissolved Organic Carbon			108.0		%		80-120	29-NOV-14
WG2005427-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	29-NOV-14
WG2005427-4 MS		**L1551246-1**						
Dissolved Organic Carbon			109.5		%		70-130	29-NOV-14
CL-WT	Water							
Batch R3111691								
WG2004802-4 DUP		**WG2004802-3**						
Chloride (Cl)		<2.0	<2.0	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2004802-2 LCS								

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R3111691								
WG2004802-2 LCS								
Chloride (Cl)			102.0		%		85-115	28-NOV-14
WG2004802-1 MB								
Chloride (Cl)			<2.0		mg/L		2	28-NOV-14
WG2004802-5 MS		**WG2004802-3**						
Chloride (Cl)			99.5		%		75-125	28-NOV-14
COD-WT	Water							
Batch R3112324								
WG2006324-3 DUP		**L1551723-1**						
COD		55	55		mg/L	0.0	20	02-DEC-14
WG2006324-2 LCS								
COD			109.0		%		85-115	02-DEC-14
WG2006324-1 MB								
COD			<10		mg/L		10	02-DEC-14
WG2006324-4 MS		**L1551723-1**						
COD			96.0		%		75-125	02-DEC-14
COLOUR-WT	Water							
Batch R3111333								
WG2004520-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			93.3		%		80-120	28-NOV-14
WG2004520-2 CVS								
Color, Apparent			89.3		%		85-115	28-NOV-14
WG2004520-4 DUP		**L1551037-1**						
Color, Apparent		1.7	1.4	J	C.U.	0.3	2	28-NOV-14
WG2004520-1 MB								
Color, Apparent			<1.0		C.U.		1	28-NOV-14
EC-WW-MF-WT	Water							
Batch R3110780								
WG2004327-1 MB								
E. Coli			0		CFU/100mL		1	28-NOV-14
WG2004327-2 MB								
E. Coli			0		CFU/100mL		1	28-NOV-14
F1-HS-WT	Water							
Batch R3110275								
WG2001488-1 CVS								
F1 (C6-C10)			99.5		%		80-120	28-NOV-14
WG2001488-4 DUP		**WG2001488-3**						

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3110275								
WG2001488-4 DUP		**WG2001488-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	28-NOV-14
WG2001488-2 MB								
F1 (C6-C10)			<100		ug/L		100	28-NOV-14
Surrogate: 3,4-Dichlorotoluene			102.6		%		60-140	28-NOV-14
Batch R3111390								
WG2001490-1 CVS								
F1 (C6-C10)			100.3		%		80-120	28-NOV-14
WG2001490-4 DUP		**WG2001490-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	03-DEC-14
WG2001490-2 MB								
F1 (C6-C10)			<100		ug/L		100	01-DEC-14
Surrogate: 3,4-Dichlorotoluene			100.1		%		60-140	01-DEC-14
F2-F4-WT	Water							
Batch R3113045								
WG2005829-1 CVS								
F2 (C10-C16)			100.3		%		80-120	03-DEC-14
F3 (C16-C34)			99.5		%		80-120	03-DEC-14
F4 (C34-C50)			99.9		%		80-120	03-DEC-14
WG2004542-2 LCS								
F2 (C10-C16)			76.9		%		65-135	03-DEC-14
F3 (C16-C34)			88.2		%		65-135	03-DEC-14
F4 (C34-C50)			91.6		%		65-135	03-DEC-14
WG2004542-3 LCSD		**WG2004542-2**						
F2 (C10-C16)		76.9	77.0		%	0.1	50	03-DEC-14
F3 (C16-C34)		88.2	83.8		%	5.1	50	03-DEC-14
F4 (C34-C50)		91.6	86.9		%	5.2	50	03-DEC-14
WG2004542-1 MB								
F2 (C10-C16)			<100		ug/L		100	03-DEC-14
F3 (C16-C34)			<250		ug/L		250	03-DEC-14
F4 (C34-C50)			<250		ug/L		250	03-DEC-14
Surrogate: 2-Bromobenzotrifluoride			62.2		%		60-140	03-DEC-14
FC-WW-MF-WT	Water							

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC-WW-MF-WT	Water							
Batch R3110773								
WG2004325-4 MB								
Fecal Coliforms			0		CFU/100mL		1	28-NOV-14
WG2004325-5 MB								
Fecal Coliforms			0		CFU/100mL		1	28-NOV-14
HG-T-CVAA-WT	Water							
Batch R3110656								
WG2004624-3 DUP		**L1551063-3**						
Mercury (Hg)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2004624-2 LCS								
Mercury (Hg)-Total			97.5		%		80-120	28-NOV-14
WG2004624-1 MB								
Mercury (Hg)-Total			<0.00010		mg/L		0.0001	28-NOV-14
WG2004624-4 MS		**L1551063-4**						
Mercury (Hg)-Total			104.0		%		70-130	28-NOV-14
MET-T-MS-WT	Water							
Batch R3111856								
WG2005963-1 CVS								
Arsenic (As)-Total			99.2		%		80-120	01-DEC-14
Boron (B)-Total			101.8		%		80-120	01-DEC-14
Cadmium (Cd)-Total			98.7		%		80-120	01-DEC-14
Chromium (Cr)-Total			99.6		%		80-120	01-DEC-14
Cobalt (Co)-Total			97.9		%		80-120	01-DEC-14
Copper (Cu)-Total			100.1		%		80-120	01-DEC-14
Iron (Fe)-Total			98.3		%		80-120	01-DEC-14
Lead (Pb)-Total			101.3		%		80-120	01-DEC-14
Manganese (Mn)-Total			99.4		%		80-120	01-DEC-14
Molybdenum (Mo)-Total			96.4		%		80-120	01-DEC-14
Nickel (Ni)-Total			97.9		%		80-120	01-DEC-14
Zinc (Zn)-Total			95.6		%		80-120	01-DEC-14
WG2005963-3 CVS								
Arsenic (As)-Total			97.5		%		80-120	01-DEC-14
Boron (B)-Total			101.0		%		80-120	01-DEC-14
Cadmium (Cd)-Total			97.6		%		80-120	01-DEC-14
Chromium (Cr)-Total			97.9		%		80-120	01-DEC-14
Cobalt (Co)-Total			98.3		%		80-120	01-DEC-14
Copper (Cu)-Total			98.7		%		80-120	01-DEC-14

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3111856								
WG2005963-3 CVS								
Iron (Fe)-Total			98.5		%		80-120	01-DEC-14
Lead (Pb)-Total			100.2		%		80-120	01-DEC-14
Manganese (Mn)-Total			100.2		%		80-120	01-DEC-14
Molybdenum (Mo)-Total			98.8		%		80-120	01-DEC-14
Nickel (Ni)-Total			98.9		%		80-120	01-DEC-14
Zinc (Zn)-Total			95.5		%		80-120	01-DEC-14
WG2004447-4 DUP		**WG2004447-3**						
Arsenic (As)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
Boron (B)-Total		0.011	0.011		mg/L	2.3	20	01-DEC-14
Cadmium (Cd)-Total		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	01-DEC-14
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Cobalt (Co)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Copper (Cu)-Total		0.0050	0.0050		mg/L	0.4	20	01-DEC-14
Iron (Fe)-Total		0.304	0.288		mg/L	5.5	20	01-DEC-14
Lead (Pb)-Total		0.00063	0.00062		mg/L	2.2	20	01-DEC-14
Manganese (Mn)-Total		0.0372	0.0373		mg/L	0.4	20	01-DEC-14
Molybdenum (Mo)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Nickel (Ni)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
Zinc (Zn)-Total		0.0090	0.0093		mg/L	2.9	20	01-DEC-14
WG2004447-2 LCS								
Arsenic (As)-Total			93.3		%		80-120	01-DEC-14
Boron (B)-Total			93.5		%		80-120	01-DEC-14
Cadmium (Cd)-Total			91.5		%		80-120	01-DEC-14
Chromium (Cr)-Total			90.7		%		80-120	01-DEC-14
Cobalt (Co)-Total			90.9		%		80-120	01-DEC-14
Copper (Cu)-Total			91.6		%		80-120	01-DEC-14
Iron (Fe)-Total			91.7		%		80-120	01-DEC-14
Lead (Pb)-Total			94.6		%		80-120	01-DEC-14
Manganese (Mn)-Total			91.9		%		80-120	01-DEC-14
Molybdenum (Mo)-Total			92.8		%		80-120	01-DEC-14
Nickel (Ni)-Total			90.8		%		80-120	01-DEC-14
Zinc (Zn)-Total			98.3		%		80-120	01-DEC-14
WG2004447-1 MB								
Arsenic (As)-Total			<0.0010		mg/L		0.001	01-DEC-14

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3111856								
WG2004447-1 MB								
Boron (B)-Total			<0.010		mg/L		0.01	01-DEC-14
Cadmium (Cd)-Total			<0.000090		mg/L		0.00009	01-DEC-14
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	01-DEC-14
Cobalt (Co)-Total			<0.00050		mg/L		0.0005	01-DEC-14
Copper (Cu)-Total			<0.0010		mg/L		0.001	01-DEC-14
Iron (Fe)-Total			<0.050		mg/L		0.05	01-DEC-14
Lead (Pb)-Total			<0.00050		mg/L		0.0005	01-DEC-14
Manganese (Mn)-Total			<0.0010		mg/L		0.001	01-DEC-14
Molybdenum (Mo)-Total			<0.00050		mg/L		0.0005	01-DEC-14
Nickel (Ni)-Total			<0.0010		mg/L		0.001	01-DEC-14
Zinc (Zn)-Total			<0.0030		mg/L		0.003	01-DEC-14
WG2004447-5 MS		**WG2004447-3**						
Arsenic (As)-Total			101.2		%		70-130	01-DEC-14
Boron (B)-Total			95.0		%		70-130	01-DEC-14
Cadmium (Cd)-Total			93.1		%		70-130	01-DEC-14
Chromium (Cr)-Total			94.1		%		70-130	01-DEC-14
Cobalt (Co)-Total			92.7		%		70-130	01-DEC-14
Copper (Cu)-Total			92.5		%		70-130	01-DEC-14
Iron (Fe)-Total			96.0		%		70-130	01-DEC-14
Lead (Pb)-Total			98.0		%		70-130	01-DEC-14
Manganese (Mn)-Total			97.5		%		70-130	01-DEC-14
Molybdenum (Mo)-Total			94.9		%		70-130	01-DEC-14
Nickel (Ni)-Total			92.3		%		70-130	01-DEC-14
Zinc (Zn)-Total			95.9		%		70-130	01-DEC-14
NH3-WT	Water							
Batch R3110685								
WG2004638-2 CVS								
Ammonia, Total (as N)			95.3		%		85-115	28-NOV-14
WG2004638-3 DUP		**L1550982-1**						
Ammonia, Total (as N)		0.096	0.116		mg/L	19	20	28-NOV-14
WG2004638-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-NOV-14
WG2004638-4 MS		**L1550982-1**						
Ammonia, Total (as N)			97.6		%		75-125	28-NOV-14

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3110686								
WG2004716-2 CVS								
Ammonia, Total (as N)			98.8		%		85-115	28-NOV-14
WG2004716-3 DUP		**L1551723-1**						
Ammonia, Total (as N)		7.20	7.46		mg/L	3.5	20	28-NOV-14
WG2004716-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-NOV-14
WG2004716-4 MS		**L1551723-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	28-NOV-14
NO2-WT	Water							
Batch R3111691								
WG2004802-4 DUP		**WG2004802-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004802-2 LCS								
Nitrite-N (NO2-N)			101.4		%		70-130	28-NOV-14
WG2004802-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004802-5 MS		**WG2004802-3**						
Nitrite-N (NO2-N)			102.8		%		70-130	28-NOV-14
NO3-WT	Water							
Batch R3111691								
WG2004802-4 DUP		**WG2004802-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004802-2 LCS								
Nitrate-N (NO3-N)			101.2		%		70-130	28-NOV-14
WG2004802-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004802-5 MS		**WG2004802-3**						
Nitrate-N (NO3-N)			98.2		%		70-130	28-NOV-14
P-TOTAL-LOW-WT	Water							
Batch R3110389								
WG2004523-3 DUP		**L1550927-1**						
Total Phosphorus		0.356	0.366		mg/L	2.8	20	28-NOV-14
WG2004523-2 LCS								
Total Phosphorus			101.8		%		80-120	28-NOV-14
WG2004523-1 MB								
Total Phosphorus			<0.0030		mg/L		0.003	28-NOV-14
WG2004523-4 MS		**L1550927-1**						

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-TOTAL-LOW-WT	Water							
Batch R3110389								
WG2004523-4 MS		**L1550927-1**						
Total Phosphorus			N/A	MS-B	%		-	28-NOV-14
PAH-CCME-WT	Water							
Batch R3111655								
WG2006059-1 CVS								
Anthracene			97.6		%		60-130	28-NOV-14
Benzo(a)pyrene			100.7		%		70-130	28-NOV-14
WG2004519-2 LCS								
Anthracene			87.5		%		50-140	01-DEC-14
Benzo(a)pyrene			90.0		%		60-130	01-DEC-14
WG2004519-3 LCSD		**WG2004519-2**						
Anthracene		87.5	78.1		%	11	50	01-DEC-14
Benzo(a)pyrene		90.0	88.6		%	1.5	50	01-DEC-14
WG2004519-1 MB								
Anthracene			<0.020		ug/L		0.02	01-DEC-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	01-DEC-14
Surrogate: 2-Fluorobiphenyl			64.0		%		30-130	01-DEC-14
Surrogate: d14-Terphenyl			94.0		%		50-150	01-DEC-14
PH-WT	Water							
Batch R3111383								
WG2005000-2 DUP		**L1551723-1**						
pH		7.52	7.56	J	pH units	0.04	0.2	28-NOV-14
WG2005000-1 LCS								
pH			6.98		pH units		6.9-7.1	28-NOV-14
PHENOLS-4AAP-WT	Water							
Batch R3111964								
WG2006362-8 CVS								
Phenols (4AAP)			98.4		%		85-115	01-DEC-14
WG2006362-9 DUP		**L1551246-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
WG2006362-7 LCS								
Phenols (4AAP)			89.5		%		85-115	01-DEC-14
WG2006362-6 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	01-DEC-14
WG2006362-10 MS		**L1551246-1**						
Phenols (4AAP)			91.7		%		75-125	01-DEC-14

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-WT	Water							
Batch R3111691								
WG2004802-4 DUP		**WG2004802-3**						
Sulphate (SO4)		<2.0	<2.0	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004802-2 LCS								
Sulphate (SO4)			102.2		%		70-130	28-NOV-14
WG2004802-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	28-NOV-14
WG2004802-5 MS		**WG2004802-3**						
Sulphate (SO4)			101.1		%		70-130	28-NOV-14
SOLIDS-TDS-WT	Water							
Batch R3110956								
WG2004540-3 DUP		**L1551645-1**						
Total Dissolved Solids		274	278		mg/L	1.5	20	29-NOV-14
WG2004540-2 LCS								
Total Dissolved Solids			101.1		%		85-115	29-NOV-14
WG2004540-1 MB								
Total Dissolved Solids			<20		mg/L		20	29-NOV-14
SOLIDS-TSS-WT	Water							
Batch R3111152								
WG2004606-3 DUP		**L1551672-1**						
Total Suspended Solids		2.7	2.7		mg/L	0.0	20	30-NOV-14
WG2004606-2 LCS								
Total Suspended Solids			98.0		%		85-115	30-NOV-14
WG2004606-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-NOV-14
TC-WW-MF-WT	Water							
Batch R3110772								
WG2004319-1 MB								
Total Coliforms			0		CFU/100mL		1	28-NOV-14
WG2004319-2 MB								
Total Coliforms			0		CFU/100mL		1	28-NOV-14
TKN-WT	Water							
Batch R3111688								
WG2005842-1 CVS								
Total Kjeldahl Nitrogen			94.0		%		75-125	01-DEC-14
WG2005798-3 DUP		**L1551702-1**						
Total Kjeldahl Nitrogen		48.1	43.3		mg/L	10	20	01-DEC-14
WG2005798-2 LCS								

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3111688								
WG2005798-2 LCS								
Total Kjeldahl Nitrogen			97.5		%		75-125	01-DEC-14
WG2005798-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	01-DEC-14
TURBIDITY-WT	Water							
Batch R3110316								
WG2004517-4 CVS								
Turbidity			97.0		%		85-115	28-NOV-14
WG2004517-2 DUP		**L1551246-1**						
Turbidity		7.32	7.26		NTU	0.8	15	28-NOV-14
WG2004517-1 MB								
Turbidity			<0.10		NTU		0.1	28-NOV-14

Quality Control Report

Workorder: L1551246 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environment

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

L1551246-COFC

VICES REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME 13791: Conestoga Rovers and Associates
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 20-017307
DUE DATE:

CRITERIA: Criteria on report (y/n) ____
Reg 153/04
Table ____
TCLP ____ MISA ____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ____
EMAIL1 amacphee@craworld.com
EMAIL2 ____

ANALYSIS REQUEST
INDICATE BOTTLES FIELD FILTERED/PRESERVED (F/P)
SUBMISSION #: L1551246
ENTERED BY: BMARK
DATE/TIME ENTERED: Nov. 26 2:55
BIN #: —

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX											
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT			FIELD TEMP	FIELD PH	COMMENTS	LAB ID
14/11/26				X			SW-45804- 141126 -TS-001	14		X			1.83	8.17		1
				X			SW-45804- -TS-002	14		X			2.316	8.13		2
				X			SW-45804- -TS-003	14		X			2.57	7.84		3
				X			SW-45804- -TS-004	14		X			3.116	8.34		4
↓				X			SW-45804- ↓ -TS-005	14		X			3.116	8.34		5

SPECIAL INSTRUCTIONS/COMMENTS

SEE PO FOR SW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION

	MEAN TEMP
FROZEN	
COLD ✓	1.8 5 6 4.
COOLING INITIATED	
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) Y	INIT BM

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	11/26/14	BMARK	Nov. 26 2:40pm
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
	11/26/14	BMARK	Nov. 26 2:40pm.

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

000786

CONESTOGA ROVERS & ASSOCIATES LTD
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 26-NOV-14
Report Date: 03-DEC-14 14:03 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1551723
Project P.O. #: 20-017307
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Nancy Smith
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-1 GW-45804-112614-TS-011 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.15		0.10	pH	28-NOV-14	28-NOV-14	R3110401
Temperature, Client	11.6		0.1	Deg. C	28-NOV-14	28-NOV-14	R3110401
Physical Tests							
Color, Apparent	210		1.0	C.U.		28-NOV-14	R3111333
pH	7.52		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	61.0	DLM	4.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	1470		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	124		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	536		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.0259		0.00018	mg/L		01-DEC-14	
Ammonia, Total (as N)	7.20		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	129		2.0	mg/L		28-NOV-14	R3111697
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Total Kjeldahl Nitrogen	9.81		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	0.069		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	512		2.0	mg/L		28-NOV-14	R3111697
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.9		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	2		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	<0.010	DLM	0.010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	<0.10	DLM	0.10	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00090	DLM	0.00090	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0050	DLM	0.0050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	<0.0050	DLM	0.0050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	<0.010	DLM	0.010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	2.74	DLM	0.50	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0050	DLM	0.0050	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	11.5	DLM	0.010	mg/L	27-NOV-14	01-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	0.0177	DLM	0.0050	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	<0.010	DLM	0.010	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	<0.030	DLM	0.030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-1 GW-45804-112614-TS-011 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	55		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	69.3		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	80.6		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	03-DEC-14	R3111655
Benzo(a)pyrene	0.0183		0.0050	ug/L	28-NOV-14	03-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	86.8		30-130	%	28-NOV-14	03-DEC-14	R3111655
Surrogate: d14-Terphenyl	103.4		50-150	%	28-NOV-14	03-DEC-14	R3111655
L1551723-2 GW-45804-112614-TS-012 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		28-NOV-14	R3111333
pH	7.20		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	<2.0		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	<20		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	0.12		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		28-NOV-14	R3111334
Ammonia, Total (as N)	<0.050		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	<2.0		2.0	mg/L		28-NOV-14	R3111697
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	<0.030		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	<2.0		2.0	mg/L		28-NOV-14	R3111697
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110772

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-2 GW-45804-112614-TS-012 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Bacteriological Tests							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	02-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	<0.0020		0.0020	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	68.4		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	85.7		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	95.0		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	105.5		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551723-3 GW-45804-112614-TS-013 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.90		0.10	pH	28-NOV-14	28-NOV-14	R3110401
Temperature, Client	7.2		0.1	Deg. C	28-NOV-14	28-NOV-14	R3110401

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-3 GW-45804-112614-TS-013 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
Physical Tests							
Color, Apparent	81.9		1.0	C.U.		28-NOV-14	R3111333
pH	7.54		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	24.4		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	1140		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	11.4		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	489		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00386		0.00071	mg/L		01-DEC-14	
Ammonia, Total (as N)	0.273		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	127		2.0	mg/L		28-NOV-14	R3111697
Nitrate-N (NO3-N)	0.40		0.10	mg/L		28-NOV-14	R3111697
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Total Kjeldahl Nitrogen	0.42		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	<0.030		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	333		2.0	mg/L		28-NOV-14	R3111697
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.5		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	0.204		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	0.00142		0.00050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	0.0016		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	0.648		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	0.0301		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	0.0079		0.0020	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	0.0075		0.0030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	0.0015		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-3 GW-45804-112614-TS-013 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	68.4		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	90.2		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	88.4		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	101.3		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551723-4 GW-45804-112614-TS-014 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.48		0.10	pH	28-NOV-14	28-NOV-14	R3110401
Temperature, Client	8.4		0.1	Deg. C	28-NOV-14	28-NOV-14	R3110401
Physical Tests							
Color, Apparent	13.3		1.0	C.U.		28-NOV-14	R3111333
pH	7.52		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	72.8		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	994		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	44.8		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	283		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00030		0.00030	mg/L		01-DEC-14	
Ammonia, Total (as N)	0.051		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	52.5		2.0	mg/L		28-NOV-14	R3111697
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Total Kjeldahl Nitrogen	0.18		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	<0.030		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	456		2.0	mg/L		28-NOV-14	R3111697
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.5		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	1		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-4 GW-45804-112614-TS-014 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	1		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	50	DLM	10	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	0.0300		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	0.0028		0.0020	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200
COD	<10		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	61.6		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	89.8		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	83.0		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	101.2		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551723-5 GW-45804-112614-TS-015 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-5 GW-45804-112614-TS-015 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.92		0.10	pH	28-NOV-14	28-NOV-14	R3110401
Temperature, Client	10.4		0.1	Deg. C	28-NOV-14	28-NOV-14	R3110401
Physical Tests							
Color, Apparent	101		1.0	C.U.		28-NOV-14	R3111333
pH	7.48		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	20.8		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	1130		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	116		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	445		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.0133		0.000097	mg/L		01-DEC-14	
Ammonia, Total (as N)	6.91		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	244		2.0	mg/L		28-NOV-14	R3111697
Nitrate-N (NO3-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111697
Total Kjeldahl Nitrogen	9.31		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	0.105		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	172		2.0	mg/L		28-NOV-14	R3111697
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.2		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	0.0027		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	0.066		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	0.00173		0.00050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	7.82		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	2.45	DLM	0.010	mg/L	27-NOV-14	01-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	0.0339		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	0.0037		0.0020	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	<0.0030		0.0030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-5 GW-45804-112614-TS-015 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Aggregate Organics							
COD	33		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	69.4		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	81.9		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	91.8		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	105.7		50-150	%	28-NOV-14	02-DEC-14	R3111655
L1551723-6 GW-45804-112614-TS-016 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.08		0.10	pH	28-NOV-14	28-NOV-14	R3110401
Temperature, Client	14.3		0.1	Deg. C	28-NOV-14	28-NOV-14	R3110401
Physical Tests							
Color, Apparent	7.5		1.0	C.U.		28-NOV-14	R3111333
pH	7.37		0.10	pH units		28-NOV-14	R3111383
Total Suspended Solids	4.8		2.0	mg/L	28-NOV-14	30-NOV-14	R3111152
Total Dissolved Solids	1340		20	mg/L	29-NOV-14	01-DEC-14	R3111507
Turbidity	0.59		0.10	NTU	28-NOV-14	28-NOV-14	R3110316
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	563		10	mg/L		28-NOV-14	R3111334
Unionized ammonia	0.00423		0.00019	mg/L		01-DEC-14	
Ammonia, Total (as N)	1.13		0.050	mg/L		28-NOV-14	R3110686
Chloride (Cl)	196		2.0	mg/L		28-NOV-14	R3111700
Nitrate-N (NO3-N)	0.68		0.10	mg/L		28-NOV-14	R3111700
Nitrite-N (NO2-N)	<0.10		0.10	mg/L		28-NOV-14	R3111700
Total Kjeldahl Nitrogen	1.16		0.15	mg/L	27-NOV-14	28-NOV-14	R3111449
Phosphorus, Total	<0.030		0.030	mg/L	30-NOV-14	01-DEC-14	R3111503
Sulphate (SO4)	345		2.0	mg/L		28-NOV-14	R3111700
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.6		1.0	mg/L	27-NOV-14	27-NOV-14	R3110842

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1551723-6 GW-45804-112614-TS-016 Sampled By: T. SAUNDERS on 26-NOV-14 Matrix: WATER							
Organic / Inorganic Carbon							
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110780
Fecal Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110773
Total Coliforms	0		0	CFU/100mL	27-NOV-14	28-NOV-14	R3110772
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					28-NOV-14	R3110827
Dissolved Metals Filtration Location	FIELD					27-NOV-14	R3110233
Arsenic (As)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Boron (B)-Dissolved	0.080		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Cadmium (Cd)-Dissolved	<0.00010		0.00010	mg/L	27-NOV-14	01-DEC-14	R3112118
Chromium (Cr)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Cobalt (Co)-Dissolved	<0.00050		0.00050	mg/L	27-NOV-14	01-DEC-14	R3112118
Copper (Cu)-Dissolved	0.0691		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Iron (Fe)-Dissolved	<0.050		0.050	mg/L	27-NOV-14	01-DEC-14	R3112118
Lead (Pb)-Dissolved	<0.0010		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Manganese (Mn)-Dissolved	1.30		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Mercury (Hg)-Dissolved	<0.00010		0.00010	mg/L	02-DEC-14	02-DEC-14	R3112375
Molybdenum (Mo)-Dissolved	0.0048		0.0010	mg/L	27-NOV-14	01-DEC-14	R3112118
Nickel (Ni)-Dissolved	0.0026		0.0020	mg/L	27-NOV-14	01-DEC-14	R3112118
Zinc (Zn)-Dissolved	0.0065		0.0030	mg/L	27-NOV-14	01-DEC-14	R3112118
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	27-NOV-14	02-DEC-14	R3112200
COD	19		10	mg/L	01-DEC-14	02-DEC-14	R3112324
Phenols (4AAP)	<0.0010		0.0010	mg/L	01-DEC-14	01-DEC-14	R3111964
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		03-DEC-14	R3111390
F2 (C10-C16)	<100		100	ug/L	01-DEC-14	03-DEC-14	R3113045
F2-Naphth	<100		100	ug/L		03-DEC-14	
F3 (C16-C34)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
F3-PAH	<250		250	ug/L		03-DEC-14	
F4 (C34-C50)	<250		250	ug/L	01-DEC-14	03-DEC-14	R3113045
Total Hydrocarbons (C6-C50)	<380		380	ug/L		03-DEC-14	
Chrom. to baseline at nC50	YES				01-DEC-14	03-DEC-14	R3113045
Surrogate: 2-Bromobenzotrifluoride	60.2		60-140	%	01-DEC-14	03-DEC-14	R3113045
Surrogate: 3,4-Dichlorotoluene	64.8		60-140	%		03-DEC-14	R3111390
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	28-NOV-14	02-DEC-14	R3111655
Benzo(a)pyrene	<0.0050		0.0050	ug/L	28-NOV-14	02-DEC-14	R3111655
Surrogate: 2-Fluorobiphenyl	87.6		30-130	%	28-NOV-14	02-DEC-14	R3111655
Surrogate: d14-Terphenyl	100.5		50-150	%	28-NOV-14	02-DEC-14	R3111655

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Ammonia, Total (as N)	MS-B	L1551723-1, -2, -3, -4, -5, -6
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1551723-1, -2, -3, -4, -5, -6
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1551723-1, -2, -3, -4, -5, -6

Sample Parameter Qualifier key listed:

Qualifier	Description
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)
Sample is incubated at 20 C– 1 C for 5 days using a nitrification inhibitor.			
C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL
Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.			
CL-WT	Water	Chloride	EPA 300.0 (IC)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
COD-WT	Water	Chemical Oxygen Demand	APHA 5220 D
The dichromate ion oxidizes COD material when the sample is digested and after digestion the sample is then analyzed on a spectrophotometer.			
COLOUR-WT	Water	Colour	APHA 2120
Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.			
EC-MF-WT	Water	E. coli	SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at @44.5–0.2 C for 24–2h. Method ID: WT-TM-1200			
ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC DEC-2000 - PUB# 1310-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.			
F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.			

Reference Information

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA SW846 7470A

Liquid sample is filtered, then digested with a heated, strong, mixed acid solution to convert all forms of mercury to divalent mercury. The divalent mercury is then reduced to elemental mercury, sparged from solution and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-MS-WT Water Dissolved Metals in Water by ICPMS EPA 200.8

The metal constituents of a non-acidified sample that pass through a membrane filter prior to ICP/MS analysis.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-WT Water Nitrite-N EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

NO3-WT Water Nitrate-N EPA 300.0 (IC)

A filtered water sample (drinking waters-unfiltered) is analyzed by ion chromatography.

P-TOTAL-WT Water Phosphorus, Total APHA 4500-P B E

Samples are digested to convert the total phosphorus to orthophosphate. The orthophosphate reacts with ammonium molybdate and potassium antimonyl tartrate to form a antimonyl-phosphomolybdate complex. This complex is measured colorimetrically and reported as phosphorus.

PAH-CCME-WT Water CCME PAHs SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-WT Water Sulphate EPA 300.0 (IC)

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 105–5 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h. Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

Reference Information

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3111334								
WG2004521-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			106.1		%		80-120	28-NOV-14
WG2004521-2 CVS								
Alkalinity, Total (as CaCO3)			104.9		%		85-115	28-NOV-14
WG2004521-4 DUP		**L1551037-1**						
Alkalinity, Total (as CaCO3)		341	346		mg/L	1.5	20	28-NOV-14
WG2004521-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	28-NOV-14
BOD-C-WT	Water							
Batch R3112200								
WG2003985-6 DUP		**L1551149-2**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	02-DEC-14
WG2003985-9 DUP		**L1551725-1**						
BOD Carbonaceous		1210	1180		mg/L	2.5	20	02-DEC-14
WG2003985-7 LCS								
BOD Carbonaceous			96.0		%		85-115	02-DEC-14
WG2003985-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	02-DEC-14
C-DIS-ORG-WT	Water							
Batch R3110842								
WG2003363-7 DUP		**L1551723-5**						
Dissolved Organic Carbon		9.2	9.7		mg/L	5.3	20	27-NOV-14
WG2003363-6 LCS								
Dissolved Organic Carbon			108.0		%		80-120	27-NOV-14
WG2003363-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	27-NOV-14
WG2003363-8 MS		**L1551723-5**						
Dissolved Organic Carbon			109.0		%		70-130	27-NOV-14
CL-WT	Water							
Batch R3111697								
WG2004970-4 DUP		**WG2004970-3**						
Chloride (Cl)		<2.0	<2.0	RPD-NA	mg/L	N/A	20	28-NOV-14
WG2004970-2 LCS								
Chloride (Cl)			101.8		%		85-115	28-NOV-14
WG2004970-1 MB								
Chloride (Cl)			<2.0		mg/L		2	28-NOV-14
WG2004970-5 MS		**WG2004970-3**						

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-WT	Water							
Batch R3111697								
WG2004970-5 MS		**WG2004970-3**						
Chloride (Cl)			100.8		%		75-125	28-NOV-14
Batch R3111700								
WG2004974-4 DUP		**WG2004974-3**						
Chloride (Cl)		43.4	43.5		mg/L	0.1	20	28-NOV-14
WG2004974-2 LCS								
Chloride (Cl)			101.6		%		85-115	28-NOV-14
WG2004974-1 MB								
Chloride (Cl)			<2.0		mg/L		2	28-NOV-14
WG2004974-5 MS		**WG2004974-3**						
Chloride (Cl)			96.3		%		75-125	28-NOV-14
COD-WT	Water							
Batch R3112324								
WG2006324-3 DUP		**L1551723-1**						
COD		55	55		mg/L	0.0	20	02-DEC-14
WG2006324-2 LCS								
COD			109.0		%		85-115	02-DEC-14
WG2006324-1 MB								
COD			<10		mg/L		10	02-DEC-14
WG2006324-4 MS		**L1551723-1**						
COD			96.0		%		75-125	02-DEC-14
COLOUR-WT	Water							
Batch R3111333								
WG2004520-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			93.3		%		80-120	28-NOV-14
WG2004520-2 CVS								
Color, Apparent			89.3		%		85-115	28-NOV-14
WG2004520-4 DUP		**L1551037-1**						
Color, Apparent		1.7	1.4	J	C.U.	0.3	2	28-NOV-14
WG2004520-1 MB								
Color, Apparent			<1.0		C.U.		1	28-NOV-14
EC-MF-WT	Water							
Batch R3110780								
WG2004327-3 DUP		**L1551723-1**						
E. Coli		0	0		CFU/100mL	0.0	50	28-NOV-14
WG2004327-1 MB								

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3110780								
WG2004327-1 MB								
E. Coli			0		CFU/100mL		1	28-NOV-14
WG2004327-2 MB								
E. Coli			0		CFU/100mL		1	28-NOV-14
F1-HS-WT	Water							
Batch R3111390								
WG2001490-1 CVS								
F1 (C6-C10)			100.3		%		80-120	28-NOV-14
WG2001490-4 DUP		**WG2001490-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	03-DEC-14
WG2001490-2 MB								
F1 (C6-C10)			<100		ug/L		100	01-DEC-14
Surrogate: 3,4-Dichlorotoluene			100.1		%		60-140	01-DEC-14
F2-F4-WT	Water							
Batch R3113045								
WG2005829-1 CVS								
F2 (C10-C16)			100.3		%		80-120	03-DEC-14
F3 (C16-C34)			99.5		%		80-120	03-DEC-14
F4 (C34-C50)			99.9		%		80-120	03-DEC-14
WG2004542-2 LCS								
F2 (C10-C16)			76.9		%		65-135	03-DEC-14
F3 (C16-C34)			88.2		%		65-135	03-DEC-14
F4 (C34-C50)			91.6		%		65-135	03-DEC-14
WG2004542-3 LCSD		**WG2004542-2**						
F2 (C10-C16)		76.9	77.0		%	0.1	50	03-DEC-14
F3 (C16-C34)		88.2	83.8		%	5.1	50	03-DEC-14
F4 (C34-C50)		91.6	86.9		%	5.2	50	03-DEC-14
WG2004542-1 MB								
F2 (C10-C16)			<100		ug/L		100	03-DEC-14
F3 (C16-C34)			<250		ug/L		250	03-DEC-14
F4 (C34-C50)			<250		ug/L		250	03-DEC-14
Surrogate: 2-Bromobenzotrifluoride			62.2		%		60-140	03-DEC-14
FC-MF-WT	Water							

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC-MF-WT	Water							
Batch R3110773								
WG2004325-6 DUP		**L1551723-6**						
Fecal Coliforms		0	0		CFU/100mL	0.0	50	28-NOV-14
WG2004325-4 MB								
Fecal Coliforms			0		CFU/100mL		1	28-NOV-14
WG2004325-5 MB								
Fecal Coliforms			0		CFU/100mL		1	28-NOV-14
HG-D-CVAA-WT	Water							
Batch R3112375								
WG2006822-4 DUP		**WG2006822-3**						
Mercury (Hg)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	02-DEC-14
WG2006822-2 LCS								
Mercury (Hg)-Dissolved			104.5		%		80-120	02-DEC-14
WG2006822-1 MB								
Mercury (Hg)-Dissolved			<0.00010		mg/L		0.0001	02-DEC-14
WG2006822-6 MS		**WG2006822-5**						
Mercury (Hg)-Dissolved			104.0		%		70-130	02-DEC-14
MET-D-MS-WT	Water							
Batch R3112118								
WG2006168-1 CVS								
Arsenic (As)-Dissolved			97.5		%		80-120	01-DEC-14
Boron (B)-Dissolved			101.0		%		80-120	01-DEC-14
Cadmium (Cd)-Dissolved			97.6		%		80-120	01-DEC-14
Chromium (Cr)-Dissolved			97.9		%		80-120	01-DEC-14
Cobalt (Co)-Dissolved			98.3		%		80-120	01-DEC-14
Copper (Cu)-Dissolved			98.7		%		80-120	01-DEC-14
Iron (Fe)-Dissolved			98.5		%		80-120	01-DEC-14
Lead (Pb)-Dissolved			100.2		%		80-120	01-DEC-14
Manganese (Mn)-Dissolved			100.2		%		80-120	01-DEC-14
Molybdenum (Mo)-Dissolved			98.8		%		80-120	01-DEC-14
Nickel (Ni)-Dissolved			98.9		%		80-120	01-DEC-14
Zinc (Zn)-Dissolved			95.5		%		80-120	01-DEC-14
WG2006168-3 CVS								
Arsenic (As)-Dissolved			97.5		%		80-120	02-DEC-14
Boron (B)-Dissolved			95.8		%		80-120	02-DEC-14
Cadmium (Cd)-Dissolved			100.9		%		80-120	02-DEC-14
Chromium (Cr)-Dissolved			100.4		%		80-120	02-DEC-14

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R3112118								
WG2006168-3 CVS								
Cobalt (Co)-Dissolved			98.9		%		80-120	02-DEC-14
Copper (Cu)-Dissolved			99.4		%		80-120	02-DEC-14
Iron (Fe)-Dissolved			100.2		%		80-120	02-DEC-14
Lead (Pb)-Dissolved			96.5		%		80-120	02-DEC-14
Manganese (Mn)-Dissolved			99.8		%		80-120	02-DEC-14
Molybdenum (Mo)-Dissolved			95.9		%		80-120	02-DEC-14
Nickel (Ni)-Dissolved			99.0		%		80-120	02-DEC-14
Zinc (Zn)-Dissolved			95.2		%		80-120	02-DEC-14
WG2004454-4 DUP		**WG2004454-3**						
Arsenic (As)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
Boron (B)-Dissolved		0.015	0.015		mg/L	1.7	20	01-DEC-14
Cadmium (Cd)-Dissolved		<0.000090	<0.000090	RPD-NA	mg/L	N/A	20	01-DEC-14
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Cobalt (Co)-Dissolved		0.00297	0.00304		mg/L	2.3	20	01-DEC-14
Copper (Cu)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
Iron (Fe)-Dissolved		6.53	6.54		mg/L	0.1	20	01-DEC-14
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Manganese (Mn)-Dissolved		0.369	0.375		mg/L	1.8	20	01-DEC-14
Molybdenum (Mo)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	01-DEC-14
Nickel (Ni)-Dissolved		0.0032	0.0032		mg/L	0.5	20	01-DEC-14
Zinc (Zn)-Dissolved		0.0035	0.0035		mg/L	0.1	20	01-DEC-14
WG2004454-2 LCS								
Arsenic (As)-Dissolved			98.2		%		80-120	01-DEC-14
Boron (B)-Dissolved			96.2		%		80-120	01-DEC-14
Cadmium (Cd)-Dissolved			97.6		%		80-120	01-DEC-14
Chromium (Cr)-Dissolved			97.6		%		80-120	01-DEC-14
Cobalt (Co)-Dissolved			97.5		%		80-120	01-DEC-14
Copper (Cu)-Dissolved			98.7		%		80-120	01-DEC-14
Iron (Fe)-Dissolved			96.9		%		80-120	01-DEC-14
Lead (Pb)-Dissolved			98.8		%		80-120	01-DEC-14
Manganese (Mn)-Dissolved			99.7		%		80-120	01-DEC-14
Molybdenum (Mo)-Dissolved			95.7		%		80-120	01-DEC-14
Nickel (Ni)-Dissolved			98.2		%		80-120	01-DEC-14
Zinc (Zn)-Dissolved			98.9				80-120	

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-MS-WT	Water							
Batch R3112118								
WG2004454-2 LCS								
Zinc (Zn)-Dissolved			98.9		%		80-120	01-DEC-14
WG2004454-1 MB								
Arsenic (As)-Dissolved			<0.0010		mg/L		0.001	01-DEC-14
Boron (B)-Dissolved			<0.010		mg/L		0.01	01-DEC-14
Cadmium (Cd)-Dissolved			<0.000090		mg/L		0.00009	01-DEC-14
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	01-DEC-14
Cobalt (Co)-Dissolved			<0.00050		mg/L		0.0005	01-DEC-14
Copper (Cu)-Dissolved			<0.0010		mg/L		0.001	01-DEC-14
Iron (Fe)-Dissolved			<0.050		mg/L		0.05	01-DEC-14
Lead (Pb)-Dissolved			<0.00050		mg/L		0.0005	01-DEC-14
Manganese (Mn)-Dissolved			<0.0010		mg/L		0.001	01-DEC-14
Molybdenum (Mo)-Dissolved			<0.00050		mg/L		0.0005	01-DEC-14
Nickel (Ni)-Dissolved			<0.0010		mg/L		0.001	01-DEC-14
Zinc (Zn)-Dissolved			<0.0030		mg/L		0.003	01-DEC-14
WG2004454-5 MS		**WG2004454-3**						
Arsenic (As)-Dissolved			98.3		%		70-130	01-DEC-14
Boron (B)-Dissolved			83.8		%		70-130	01-DEC-14
Cadmium (Cd)-Dissolved			90.7		%		70-130	01-DEC-14
Chromium (Cr)-Dissolved			92.7		%		70-130	01-DEC-14
Cobalt (Co)-Dissolved			87.1		%		70-130	01-DEC-14
Copper (Cu)-Dissolved			87.2		%		70-130	01-DEC-14
Iron (Fe)-Dissolved			N/A	MS-B	%		-	01-DEC-14
Lead (Pb)-Dissolved			89.0		%		70-130	01-DEC-14
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	01-DEC-14
Molybdenum (Mo)-Dissolved			93.1		%		70-130	01-DEC-14
Nickel (Ni)-Dissolved			86.9		%		70-130	01-DEC-14
Zinc (Zn)-Dissolved			89.8		%		70-130	01-DEC-14
NH3-WT	Water							
Batch R3110686								
WG2004716-2 CVS								
Ammonia, Total (as N)			98.8		%		85-115	28-NOV-14
WG2004716-3 DUP		**L1551723-1**						
Ammonia, Total (as N)		7.20	7.46		mg/L	3.5	20	28-NOV-14
WG2004716-1 MB								

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3110686								
WG2004716-1 MB								
Ammonia, Total (as N)			<0.050		mg/L		0.05	28-NOV-14
WG2004716-4 MS		**L1551723-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	28-NOV-14
NO2-WT	Water							
Batch R3111697								
WG2004970-4 DUP		**WG2004970-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004970-2 LCS								
Nitrite-N (NO2-N)			102.9		%		70-130	28-NOV-14
WG2004970-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004970-5 MS		**WG2004970-3**						
Nitrite-N (NO2-N)			101.1		%		70-130	28-NOV-14
Batch R3111700								
WG2004974-4 DUP		**WG2004974-3**						
Nitrite-N (NO2-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004974-2 LCS								
Nitrite-N (NO2-N)			103.0		%		70-130	28-NOV-14
WG2004974-1 MB								
Nitrite-N (NO2-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004974-5 MS		**WG2004974-3**						
Nitrite-N (NO2-N)			96.2		%		70-130	28-NOV-14
NO3-WT	Water							
Batch R3111697								
WG2004970-4 DUP		**WG2004970-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004970-2 LCS								
Nitrate-N (NO3-N)			101.0		%		70-130	28-NOV-14
WG2004970-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004970-5 MS		**WG2004970-3**						
Nitrate-N (NO3-N)			99.9		%		70-130	28-NOV-14
Batch R3111700								
WG2004974-4 DUP		**WG2004974-3**						
Nitrate-N (NO3-N)		<0.10	<0.10	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004974-2 LCS								

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-WT	Water							
Batch R3111700								
WG2004974-2 LCS								
Nitrate-N (NO3-N)			100.6		%		70-130	28-NOV-14
WG2004974-1 MB								
Nitrate-N (NO3-N)			<0.10		mg/L		0.1	28-NOV-14
WG2004974-5 MS		**WG2004974-3**						
Nitrate-N (NO3-N)			94.9		%		70-130	28-NOV-14
P-TOTAL-WT	Water							
Batch R3111503								
WG2005840-1 CVS								
Phosphorus, Total			99.2		%		85-115	01-DEC-14
WG2005797-3 DUP		**L1551626-1**						
Phosphorus, Total		47.9	45.2		mg/L	5.6	20	01-DEC-14
WG2005797-2 LCS								
Phosphorus, Total			99.7		%		80-120	01-DEC-14
WG2005797-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	01-DEC-14
PAH-CCME-WT	Water							
Batch R3111655								
WG2006059-1 CVS								
Anthracene			97.6		%		60-130	28-NOV-14
Benzo(a)pyrene			100.7		%		70-130	28-NOV-14
WG2004519-2 LCS								
Anthracene			87.5		%		50-140	01-DEC-14
Benzo(a)pyrene			90.0		%		60-130	01-DEC-14
WG2004519-3 LCSD		**WG2004519-2**						
Anthracene		87.5	78.1		%	11	50	01-DEC-14
Benzo(a)pyrene		90.0	88.6		%	1.5	50	01-DEC-14
WG2004519-1 MB								
Anthracene			<0.020		ug/L		0.02	01-DEC-14
Benzo(a)pyrene			<0.0050		ug/L		0.005	01-DEC-14
Surrogate: 2-Fluorobiphenyl			64.0		%		30-130	01-DEC-14
Surrogate: d14-Terphenyl			94.0		%		50-150	01-DEC-14
PH-WT	Water							
Batch R3111383								
WG2005000-2 DUP		**L1551723-1**						
pH		7.52	7.56	J	pH units	0.04	0.2	28-NOV-14
WG2005000-1 LCS								

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3111383								
WG2005000-1 LCS								
pH			6.98		pH units		6.9-7.1	28-NOV-14
PHENOLS-4AAP-WT	Water							
Batch R3111964								
WG2006362-8 CVS								
Phenols (4AAP)			98.4		%		85-115	01-DEC-14
WG2006362-9 DUP		**L1551246-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-DEC-14
WG2006362-7 LCS								
Phenols (4AAP)			89.5		%		85-115	01-DEC-14
WG2006362-6 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	01-DEC-14
WG2006362-10 MS		**L1551246-1**						
Phenols (4AAP)			91.7		%		75-125	01-DEC-14
SO4-WT	Water							
Batch R3111697								
WG2004970-4 DUP		**WG2004970-3**						
Sulphate (SO4)		<2.0	<2.0	RPD-NA	mg/L	N/A	25	28-NOV-14
WG2004970-2 LCS								
Sulphate (SO4)			101.8		%		70-130	28-NOV-14
WG2004970-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	28-NOV-14
WG2004970-5 MS		**WG2004970-3**						
Sulphate (SO4)			102.9		%		70-130	28-NOV-14
Batch R3111700								
WG2004974-4 DUP		**WG2004974-3**						
Sulphate (SO4)		40.5	40.4		mg/L	0.2	25	28-NOV-14
WG2004974-2 LCS								
Sulphate (SO4)			101.5		%		70-130	28-NOV-14
WG2004974-1 MB								
Sulphate (SO4)			<2.0		mg/L		2	28-NOV-14
WG2004974-5 MS		**WG2004974-3**						
Sulphate (SO4)			94.9		%		70-130	28-NOV-14
SOLIDS-TDS-WT	Water							

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R3111507								
WG2004545-3 DUP		**L1551494-1**						
Total Dissolved Solids		377	379		mg/L	0.5	20	01-DEC-14
WG2004545-2 LCS								
Total Dissolved Solids			97.5		%		85-115	01-DEC-14
WG2004545-1 MB								
Total Dissolved Solids			<20		mg/L		20	01-DEC-14
SOLIDS-TSS-WT	Water							
Batch R3111152								
WG2004606-3 DUP		**L1551672-1**						
Total Suspended Solids		2.7	2.7		mg/L	0.0	20	30-NOV-14
WG2004606-2 LCS								
Total Suspended Solids			98.0		%		85-115	30-NOV-14
WG2004606-1 MB								
Total Suspended Solids			<2.0		mg/L		2	30-NOV-14
TC-MF-WT	Water							
Batch R3110772								
WG2004319-3 DUP		**L1551723-2**						
Total Coliforms		0	0		CFU/100mL	0.0	50	28-NOV-14
WG2004319-1 MB								
Total Coliforms			0		CFU/100mL		1	28-NOV-14
WG2004319-2 MB								
Total Coliforms			0		CFU/100mL		1	28-NOV-14
TKN-WT	Water							
Batch R3111449								
WG2004626-1 CVS								
Total Kjeldahl Nitrogen			94.7		%		75-125	28-NOV-14
WG2004496-3 DUP		**L1551672-1**						
Total Kjeldahl Nitrogen		0.90	0.85		mg/L	5.5	20	28-NOV-14
WG2004496-2 LCS								
Total Kjeldahl Nitrogen			95.5		%		75-125	28-NOV-14
WG2004496-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	28-NOV-14
TURBIDITY-WT	Water							
Batch R3110316								
WG2004517-4 CVS								
Turbidity			97.0		%		85-115	28-NOV-14
WG2004517-2 DUP		**L1551246-1**						

Quality Control Report

Workorder: L1551723 Report Date: 03-DEC-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	Water							
Batch R3110316								
WG2004517-2 DUP		**L1551246-1**						
Turbidity		7.32	7.26		NTU	0.8	15	28-NOV-14
WG2004517-1 MB								
Turbidity			<0.10		NTU		0.1	28-NOV-14

Client: CONESTOGA ROVERS & ASSOCIATES LTD
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

C of C # XXXXX

PAGE _1_ OF _2_

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: Conestoga Rovers and Associates (13791)

PROJECT MANAGER: AIRESSE MACPHEE

JOB #: 45804-58

PO #: 20-017307

DUE DATE:

CRITERIA: Criteria on report (y/n) ___
Reg 153/04
Table ___
TCLP ___ MISA ___ PWQO ___
OTHER CLASSDETAILQCPLUS_ALS

REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ___
EMAIL1 amacphee@craworld.com
EMAIL2 ___
SELECT: pdf ___ digital ___ both ___

SUBMISSION #: L1551723
ENTERED BY:
DATE/TIME ENTERED: 27/11/14
BIN #: B182

INDICATE BOTTLES FIELD FILTERED/PRESERVED (F/P)

ANALYSIS REQUEST

SAMPLING INFORMATION																	
Sample Date/Time		TYPE		MATRIX													
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT			FIELD TEMP	FIELD PH	COMMENTS	LAB ID
				X			GW-45804- -TS-001	14	X							
				X			GW-45804- -TS-002	14	X							
				X			GW-45804- -TS-003	14	X							
				X			GW-45804- -TS-004	14	X							
				X			GW-45804- -TS-005	14	X							
				X			GW-45804- -TS-006	14	X							
				X			GW-45804- -TS-007	14	X							
				X			GW-45804- -TS-008	14	X							
				X			GW-45804- -TS-009	14	X							
				X			GW-45804- -TS-010	14	X							
111261/14				X			GW-45804- 112614 -TS-011	14	X				11.56	7.15		1
11/26/14				X			GW-45804- 112614 -TS-012	14	X						Field Blank	2

L1551723-COFC

SPECIAL INSTRUCTIONS/COMMENTS

GROUNDWATER METALS AND HG ARE FIELD FILTERED
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION: FROZEN / COLD ✓ / COOLING INITIATED / AMBIENT
MEAN TEMP: 3.3, 3.8 4/4

SAMPLED BY: Trevor Saunders	DATE & TIME 111261/14	RECEIVED BY: BMARK	DATE & TIME Nov. 26	2:40	CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT
RELINQUISHED BY:	DATE & TIME 11/26/14	RECEIVED AT LAB BY: BMARK.	DATE & TIME Nov. 26	2:40.		

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section

White - report copy YELLOW - File copy PINK - Customer Copy

9:00 27/11/14

000812

C of C # XXXXX
PAGE _1__ OF _2__

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: 13791 Conestoga Rovers and Associates
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 20-017307
DUE DATE:

CRITERIA: Criteria on report (y/n) ____ Reg 153/04 Table ____ TCLP ____ MISA ____ PWQO ____ OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX
EMAIL1 amacphee@craworld.com
EMAIL2
SELECT: pdf ____ digital ____ both ____

SUBMISSION # L1551723
ENTERED BY:
DATE/TIME ENTERED: 27/11/14
BIN # B182

SAMPLING INFORMATION — Sample Date/Time; TYPE; MATRIX

Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD TEMP	FIELD PH	COMMENTS	LAB ID
14/11/26				X			GW-45804- 141126 -TS-013	14	X		7.15	7.90		3
				X			GW-45804- -TS-014	14	X		8.44	7.48		4
				X			GW-45804- -TS-015	14	X		10.38	6.92		5
				X			GW-45804- -TS-016	14	X		14.25	7.08		6

L1551723-COFC

SPECIAL INSTRUCTIONS/COMMENTS

GROUNDWATER METALS AND HG ARE FIELD FILTERED
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SAMPLE CONDITION: FROZEN; COLD ✓; COOLING INITIATED; AMBIENT; MEAN TEMP 8; CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____; INIT

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	14/11/26	BMARK	Nov. 26 2:40.
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
	14/11/26	BMARK	Nov. 25 2:40.

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section

White - report copy YELLOW - File copy PINK - Customer Copy

9:00 27/11/14

000813

Appendix G

Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

□51 □□□y □r□□□, □ a□□r□□□, □n□ar□□, □anada □2□ 1□2
□□□□□□□h□□ □51□□88□0510 □a□□ □51□□88□0525
□□□□□□□□□rd□□□□

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

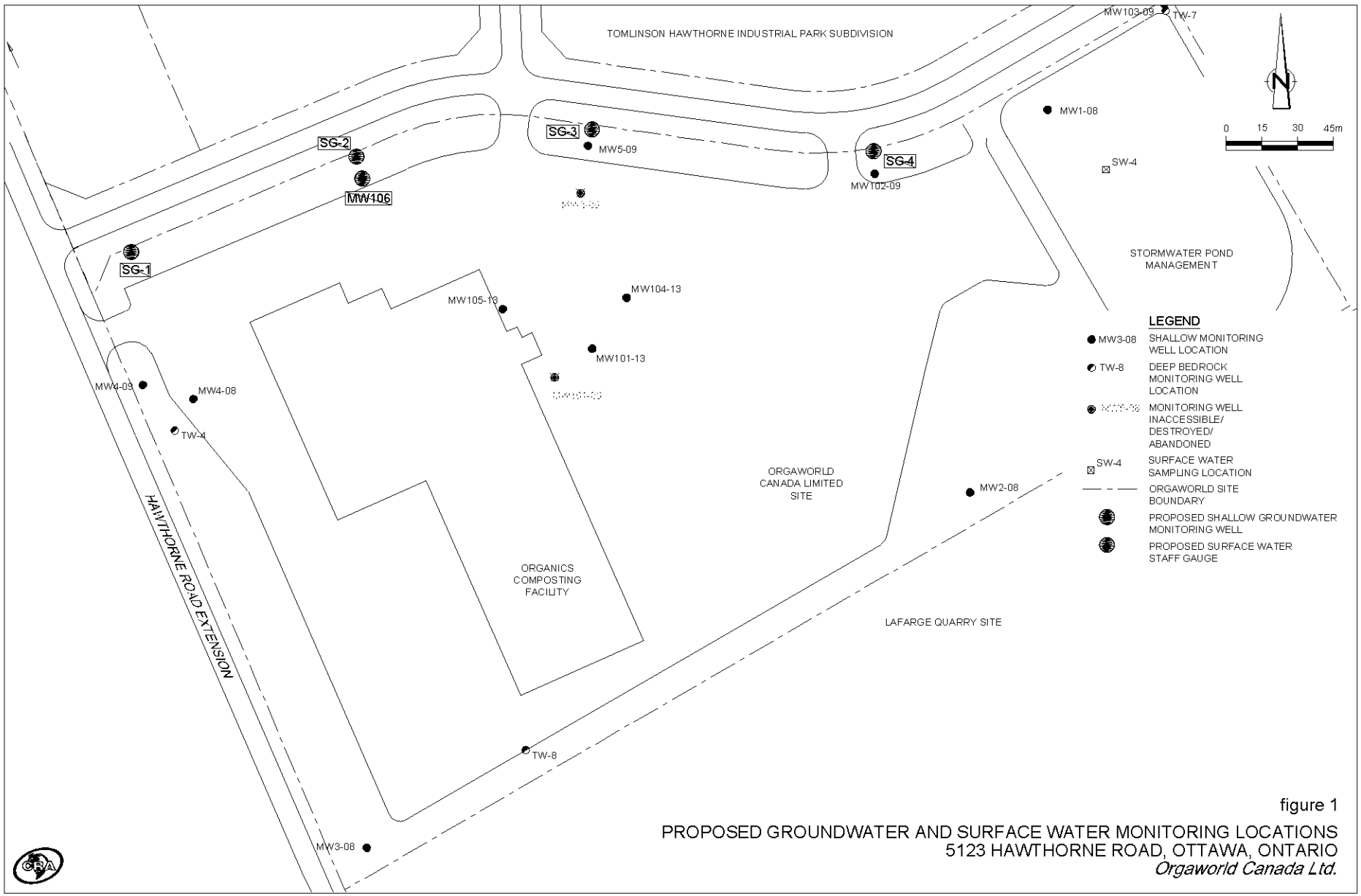


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

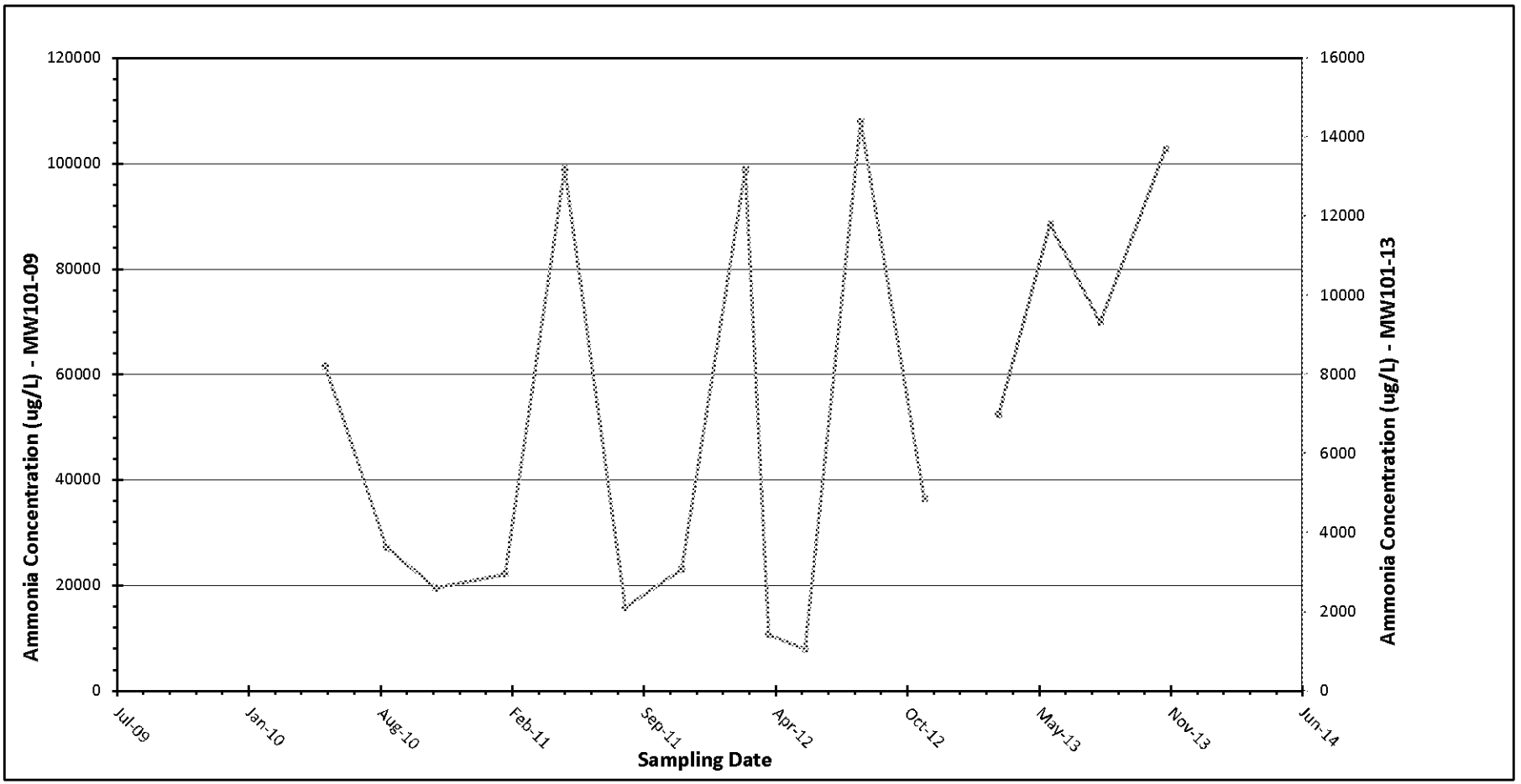


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

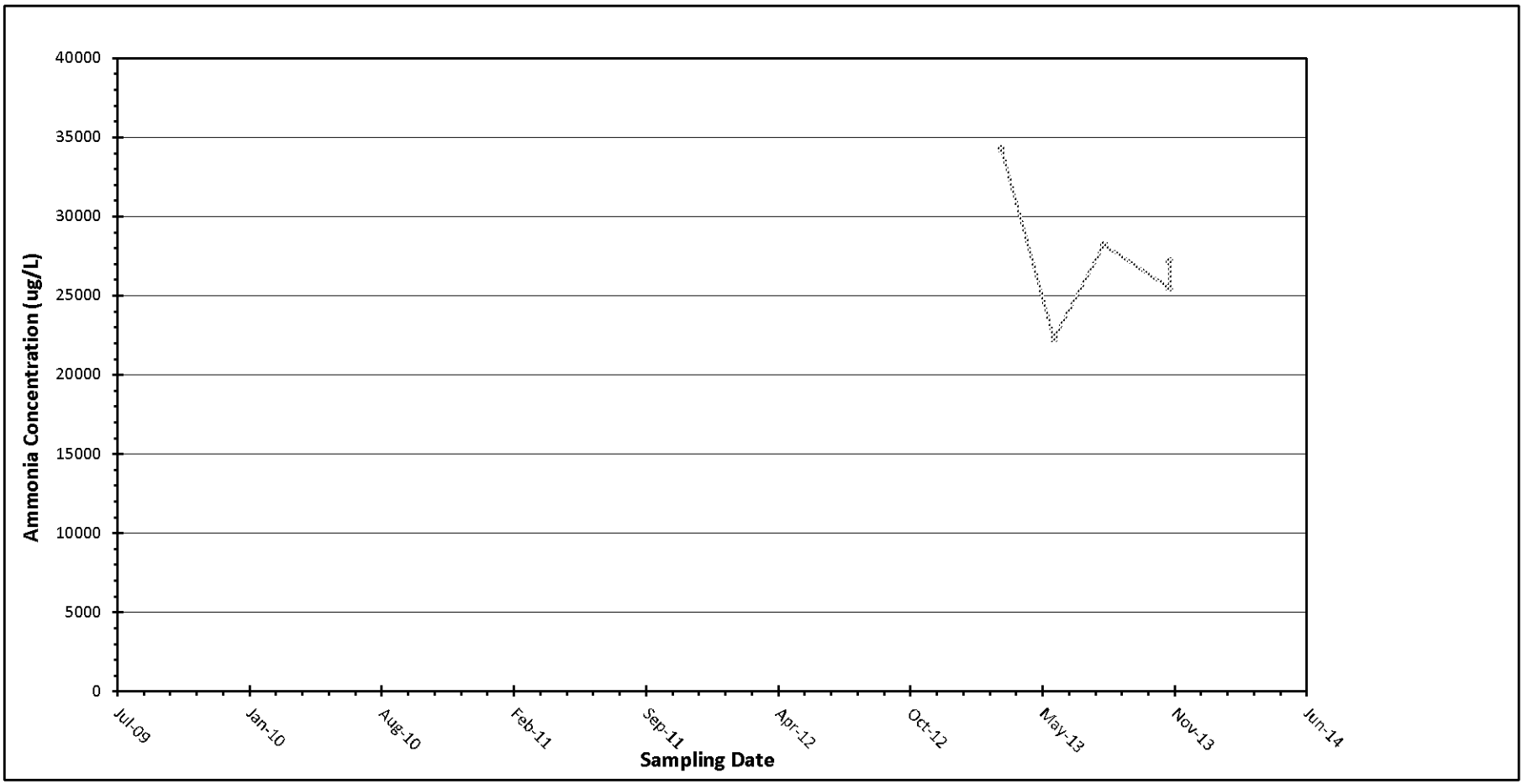


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

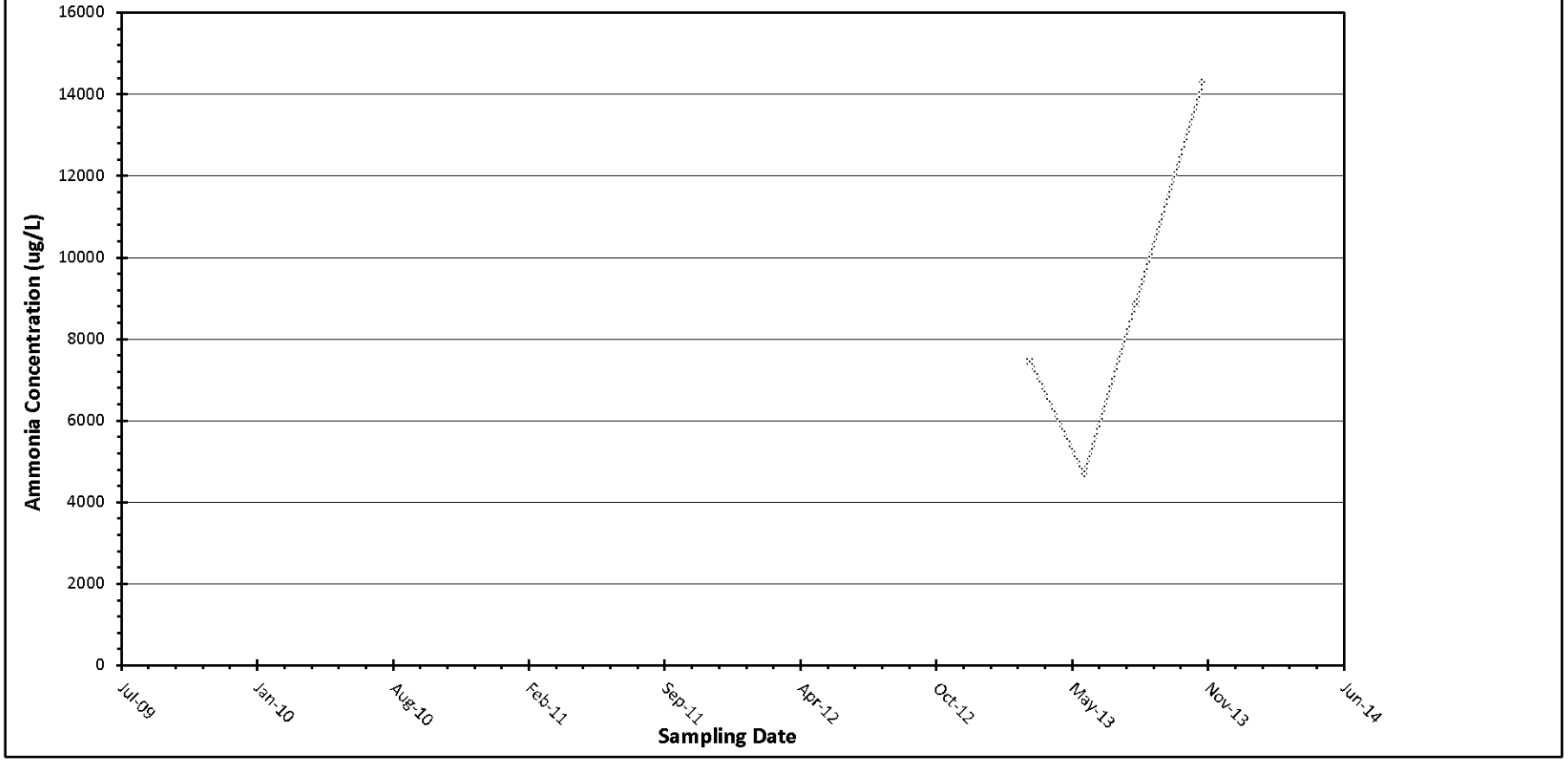


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

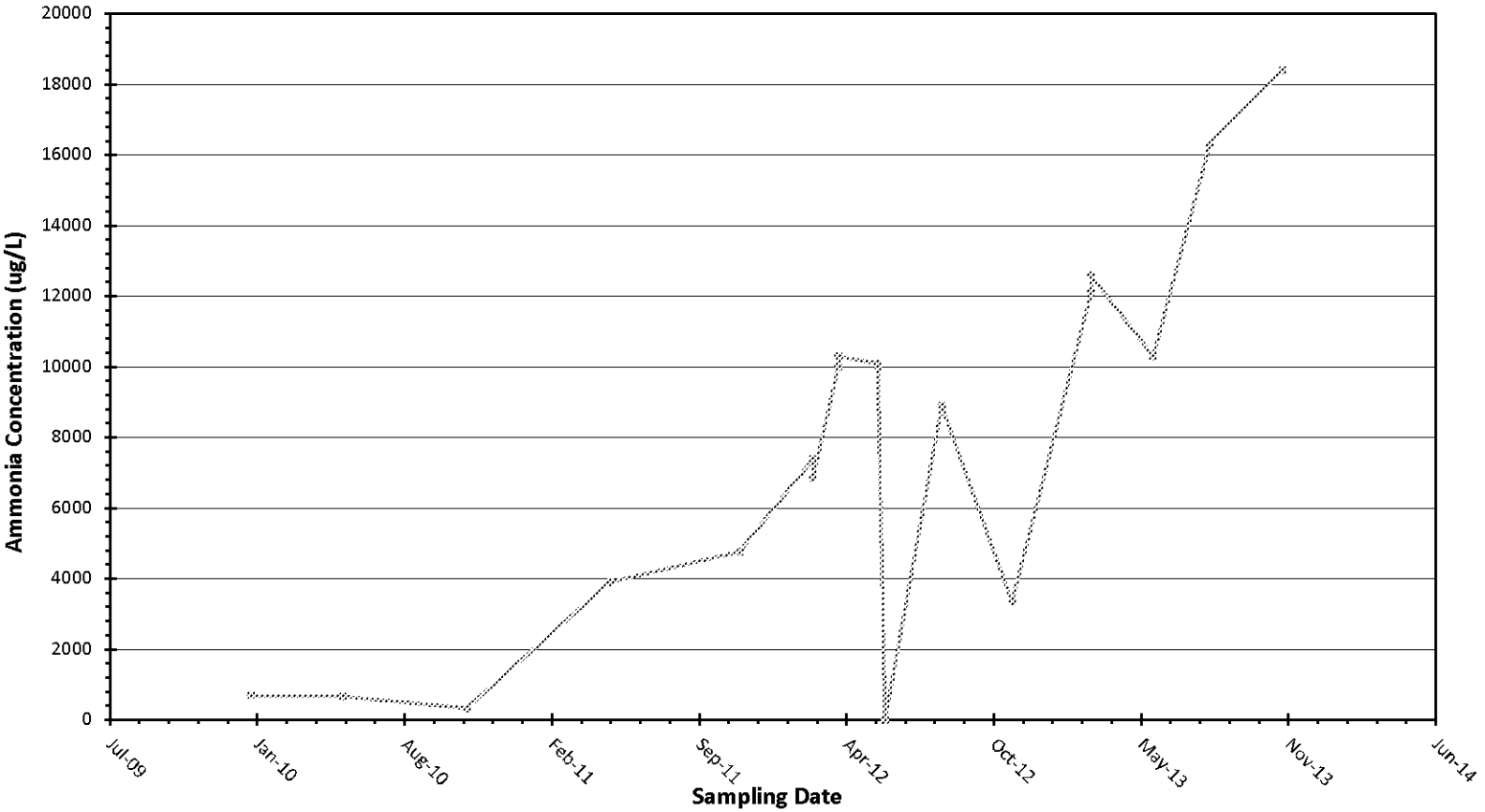


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

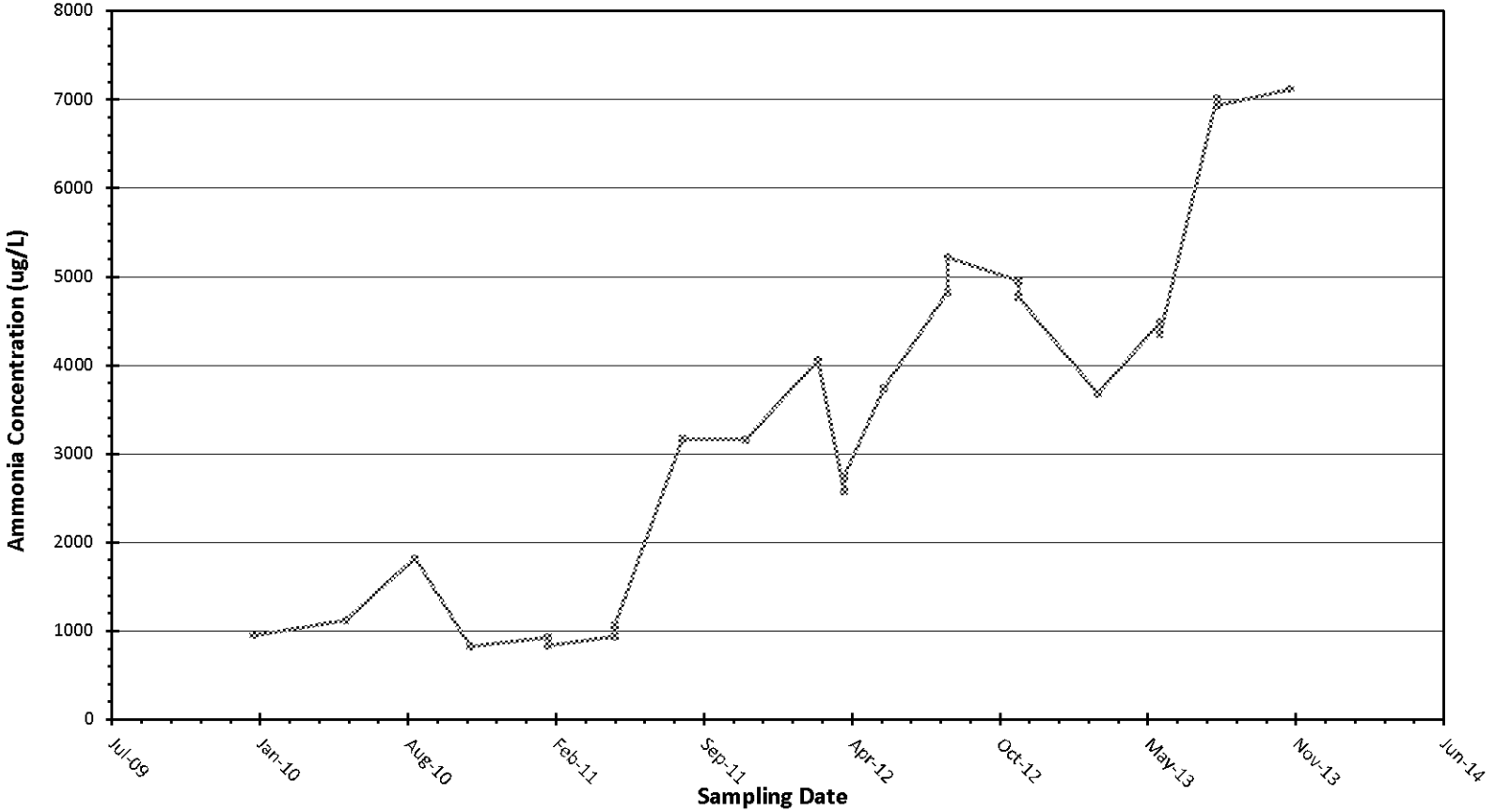


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

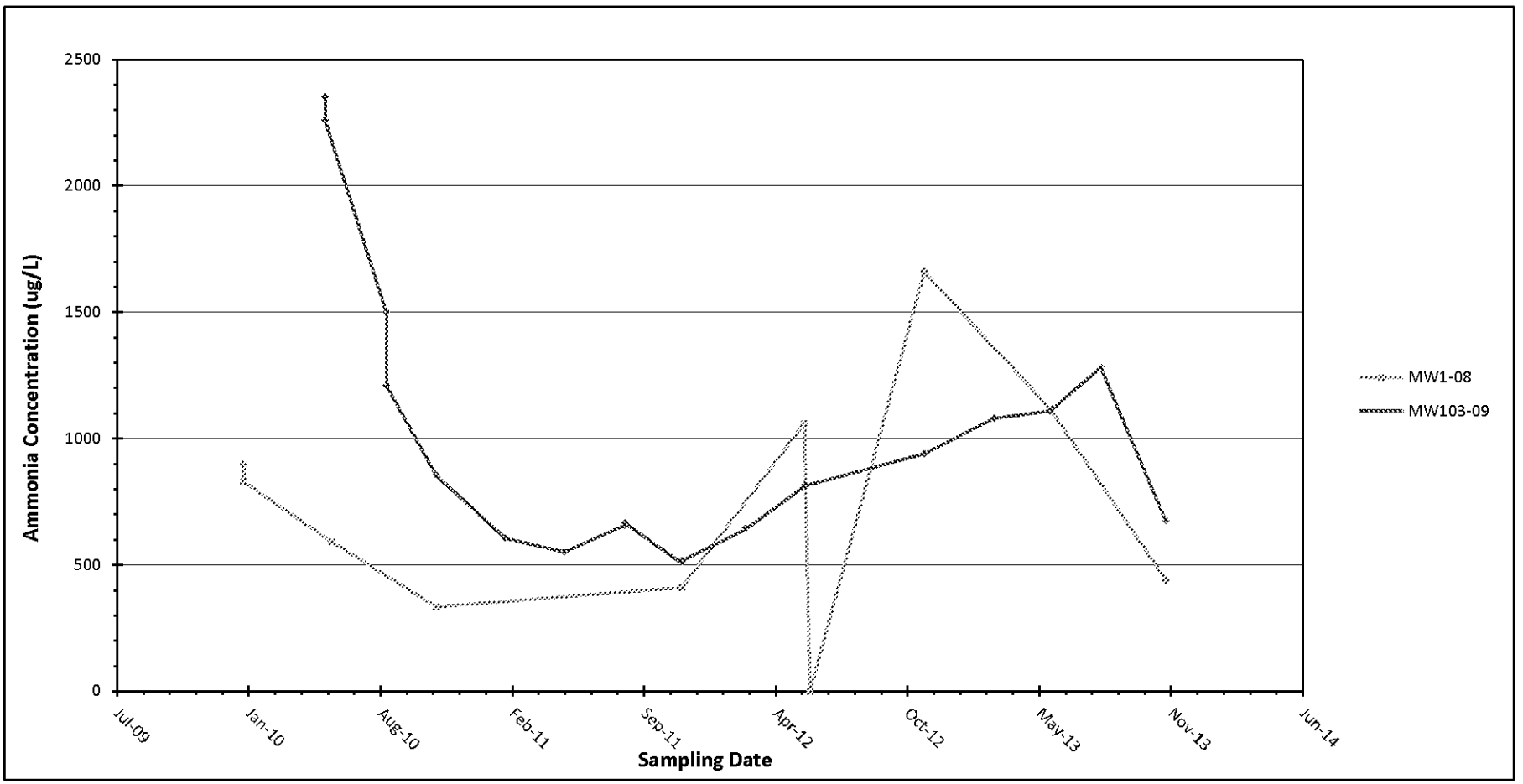


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

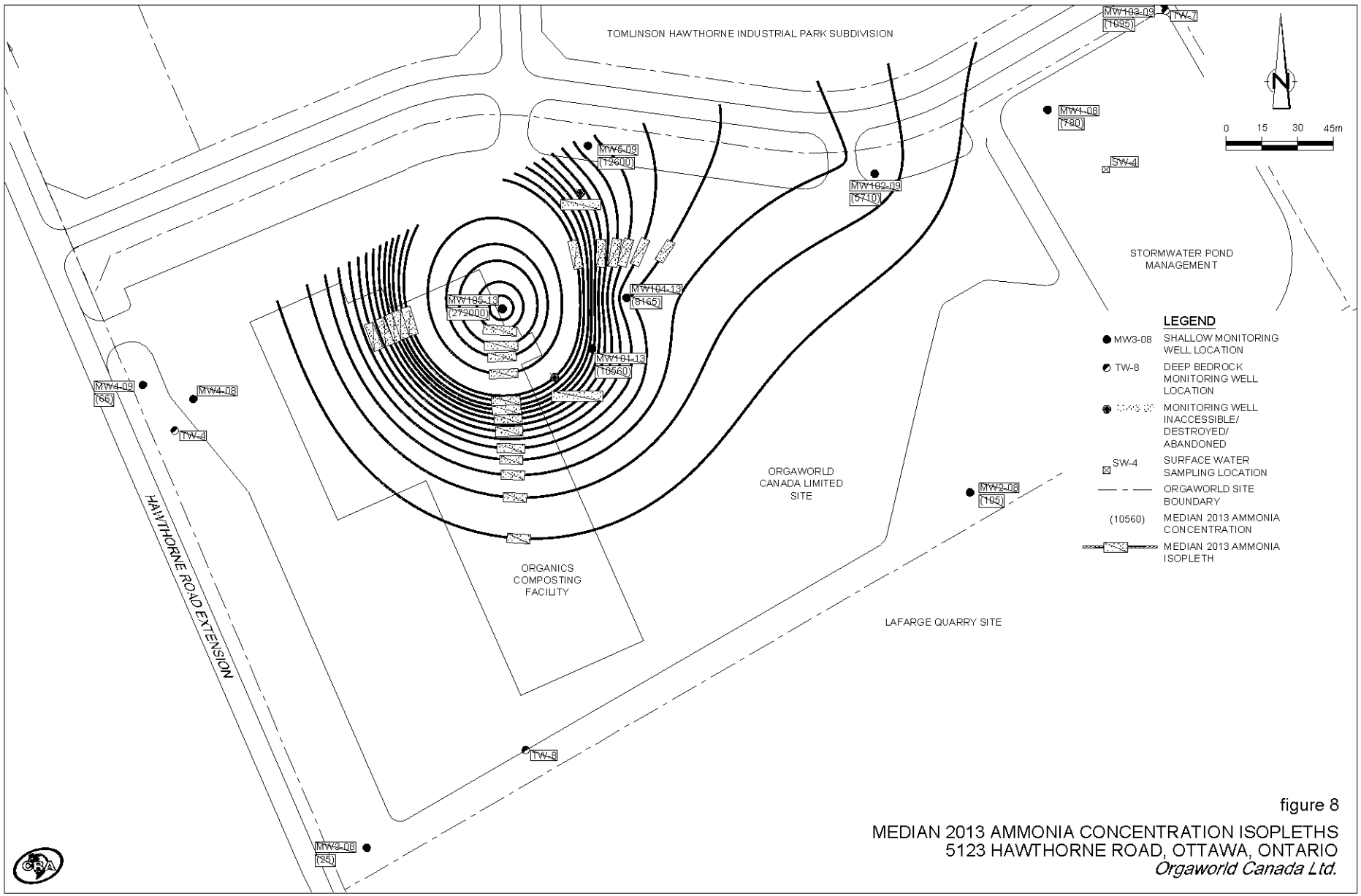


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

000827

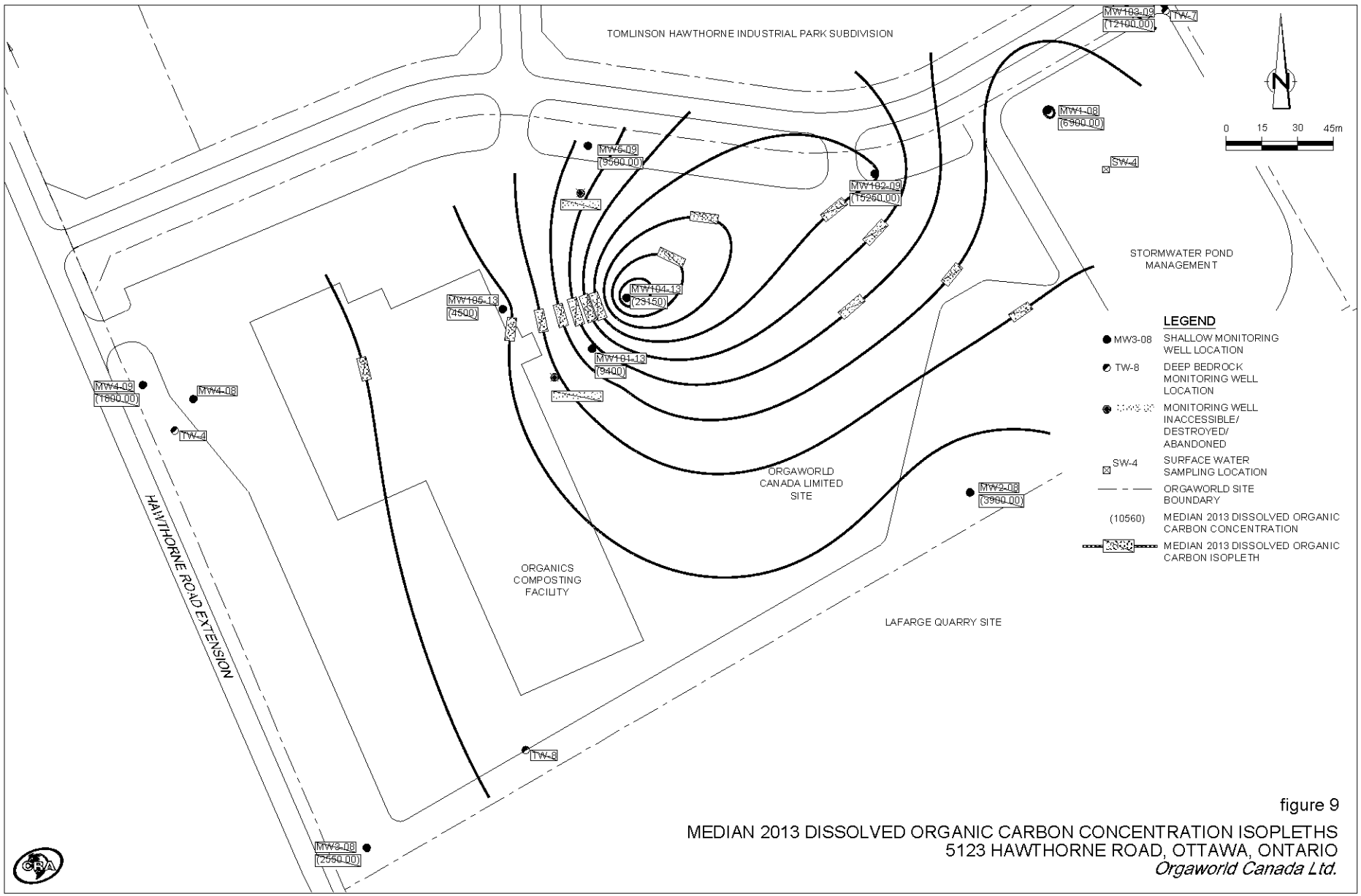


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

000828

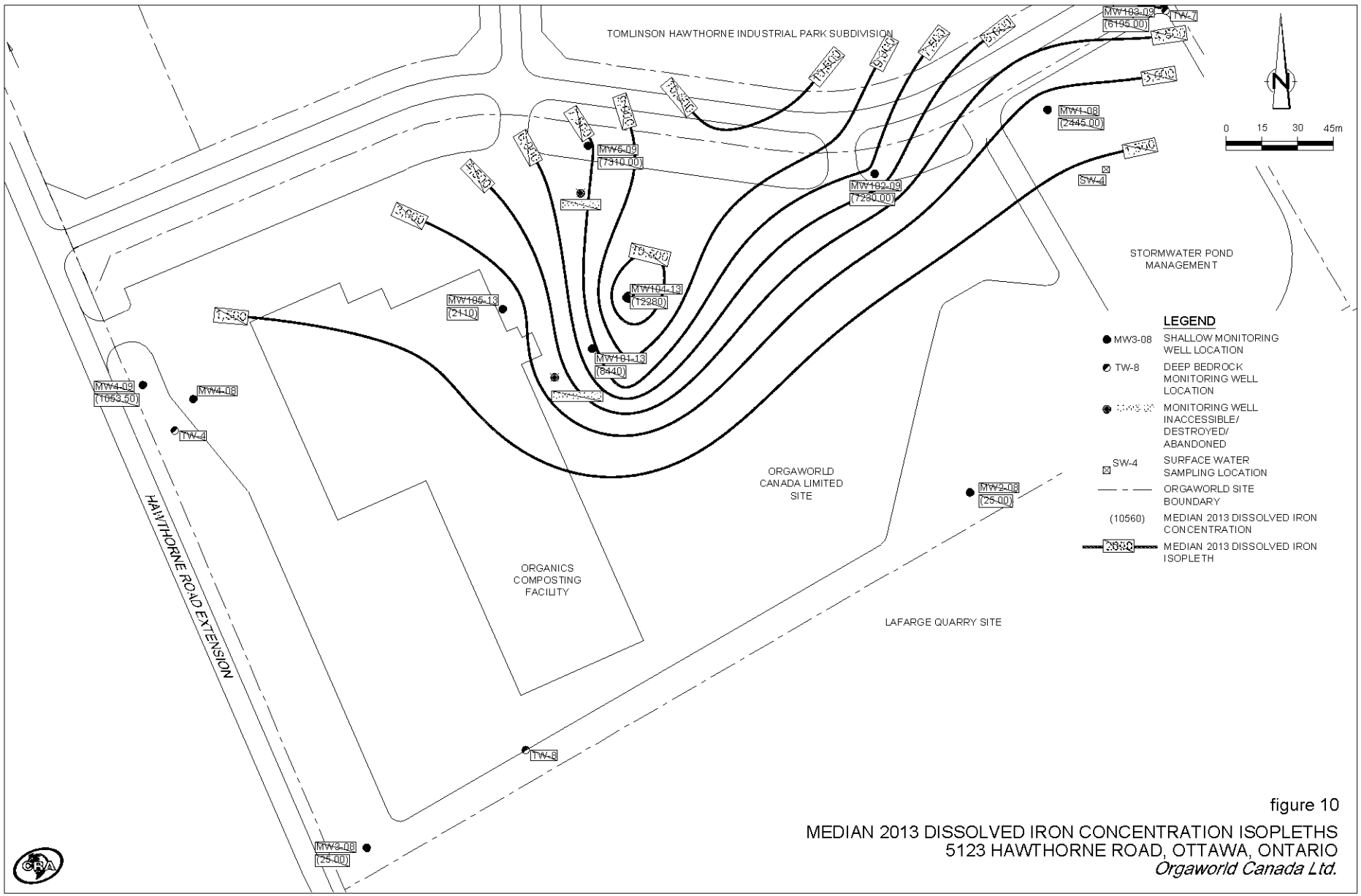


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

000829

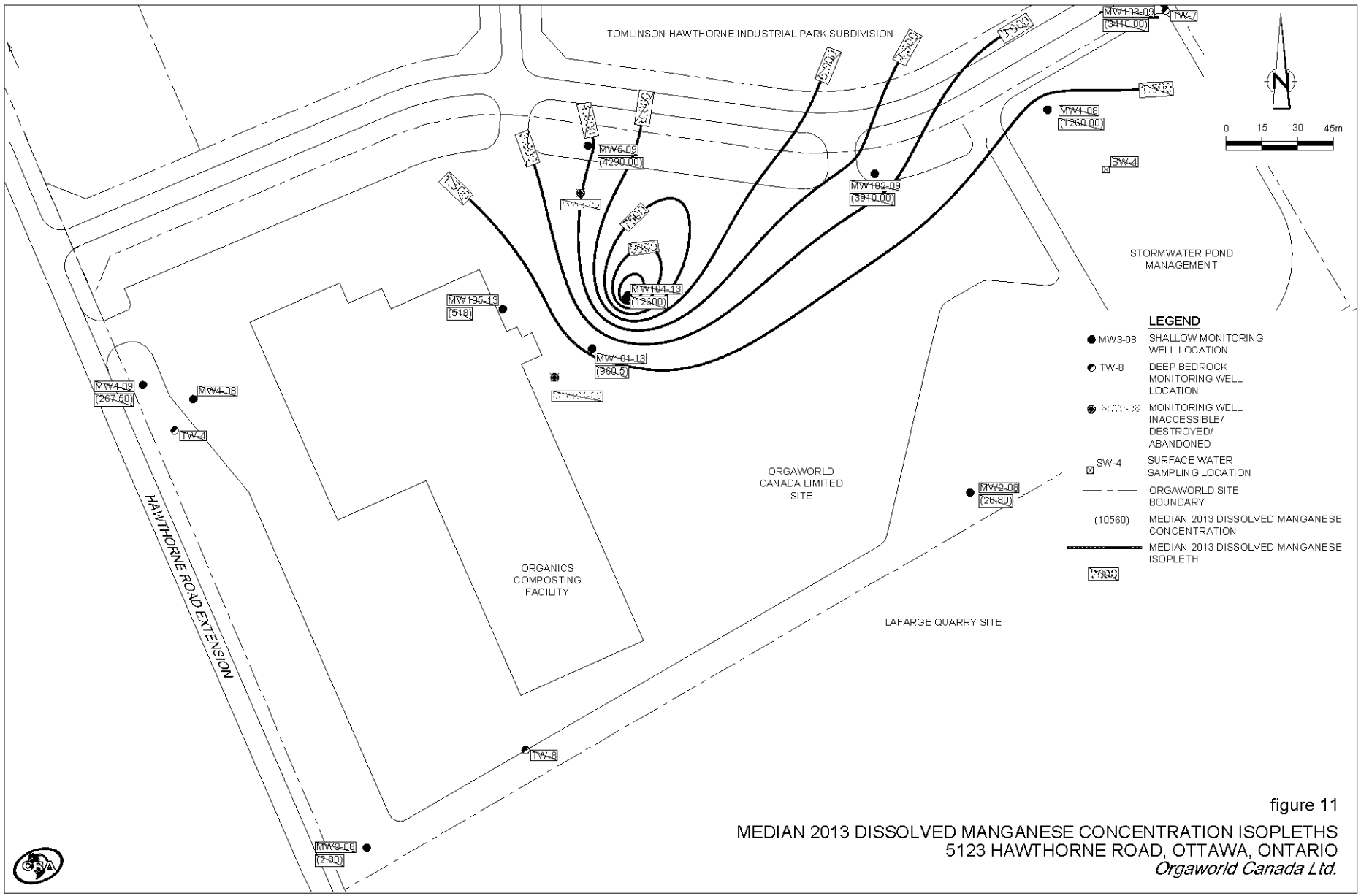


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

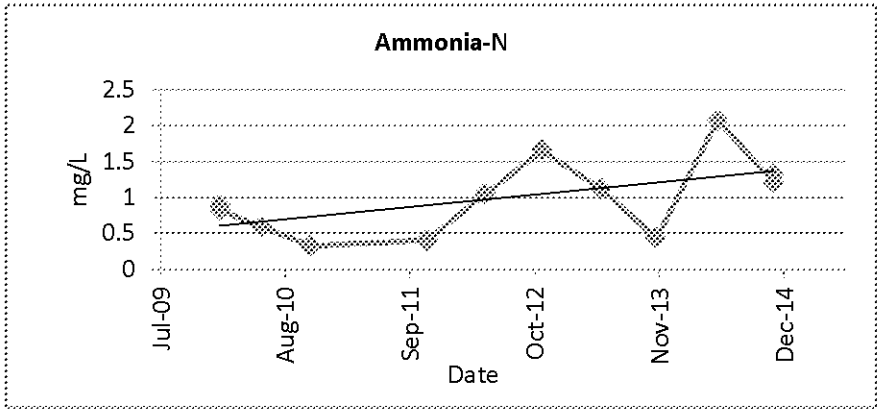
45804-59(MEMO025)GN-WA004 APR 4/2014

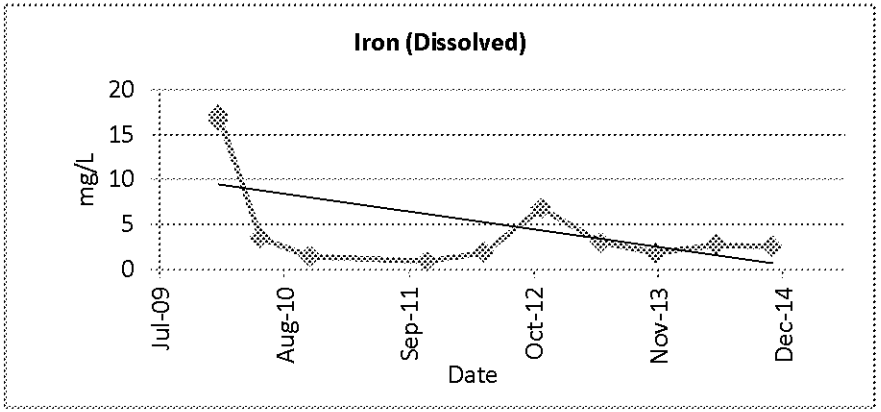
Appendix H

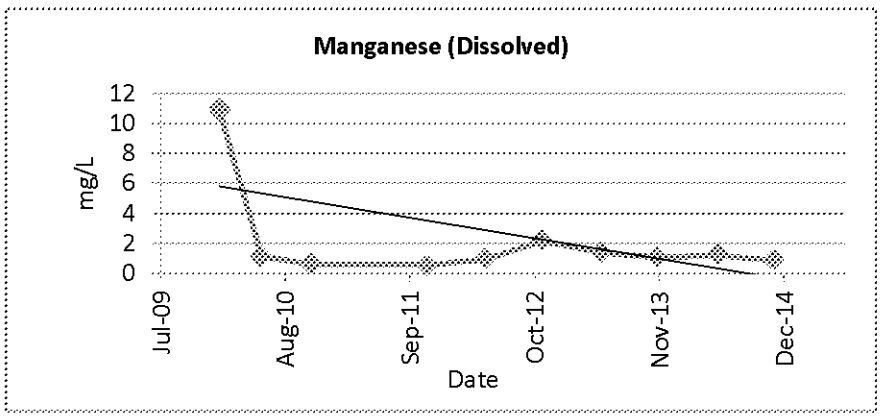
Select Analytical Plots

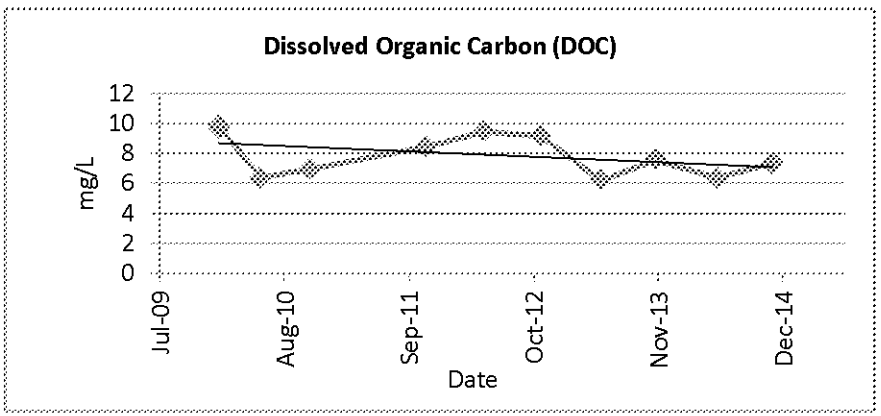
Appendix H1

Select Analytical Plots – Shallow Aquifer









Note: ND results as 1/2 the detection limit

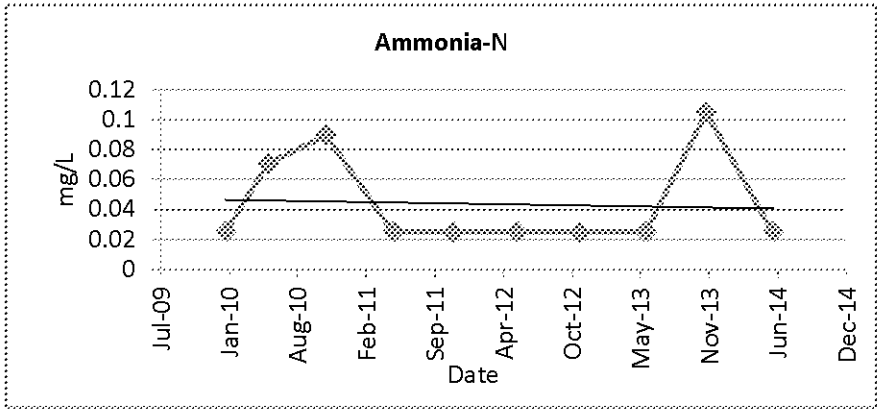
figure H1-A

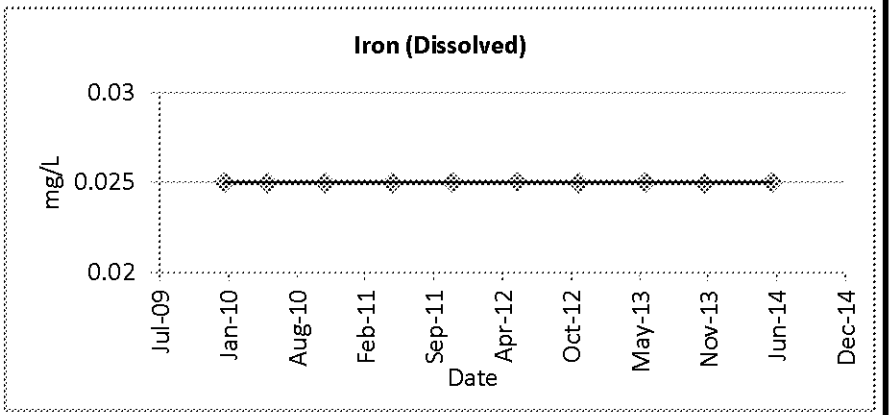
ANALYTICAL PLOTS SELECTED PARAMETERS

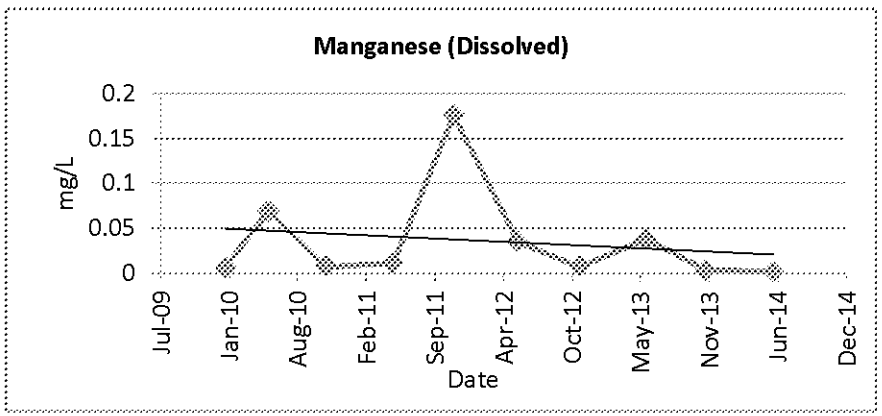
MW1-08

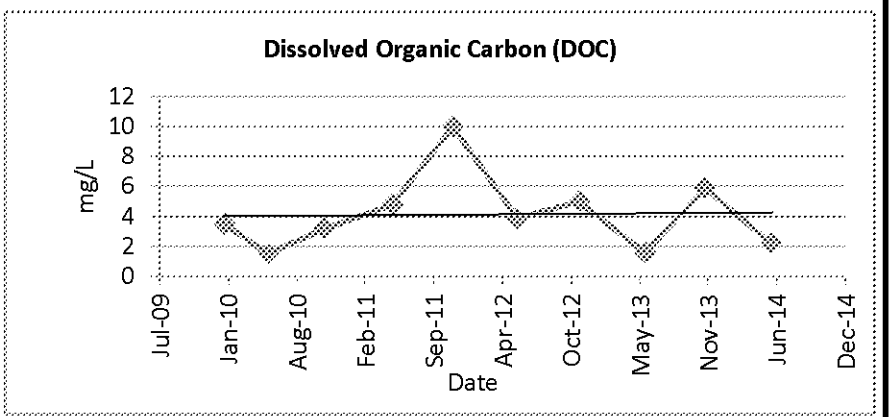
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

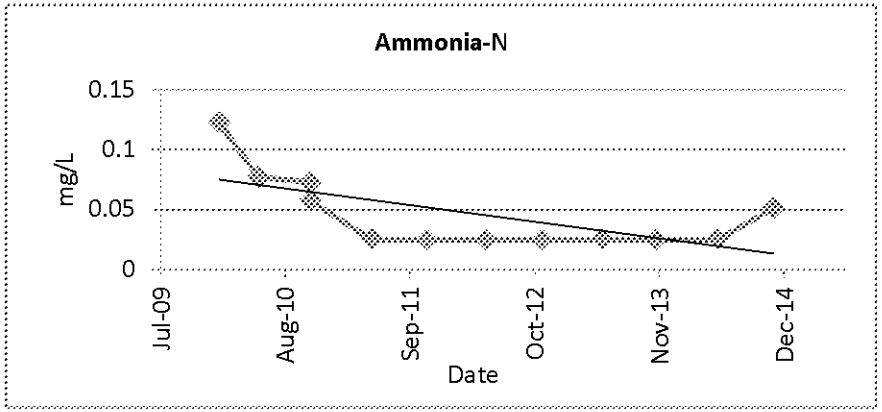
figure H1-B

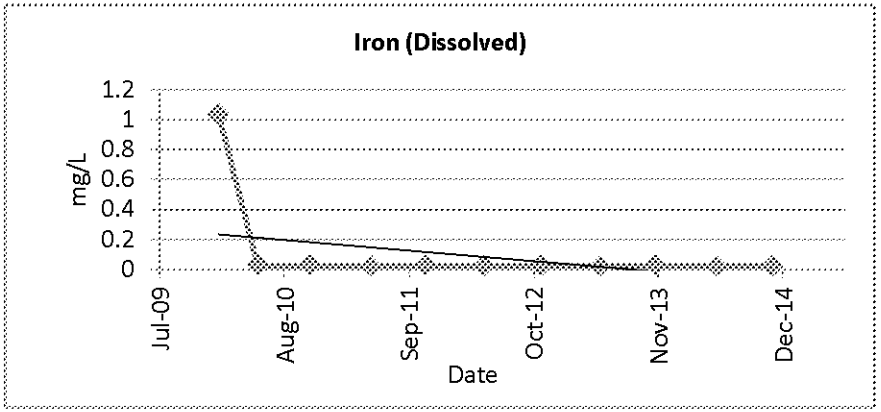
ANALYTICAL PLOTS SELECTED PARAMETERS

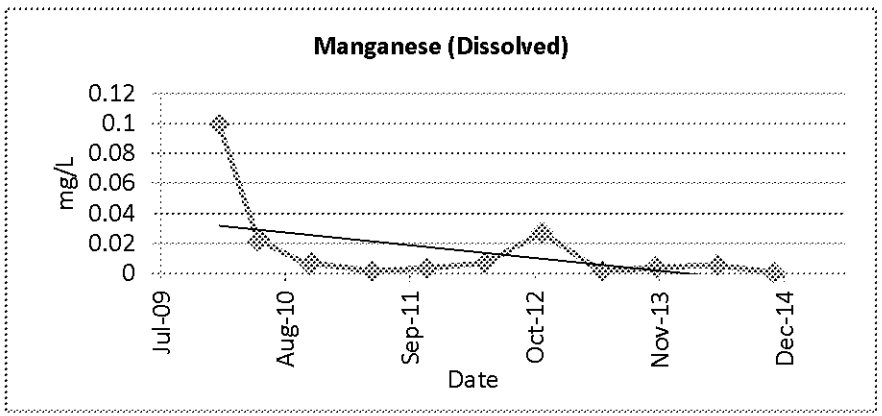
MW2-08

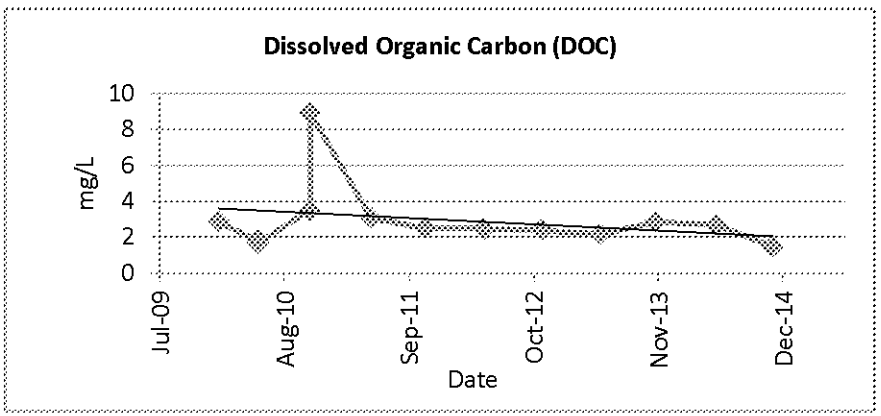
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

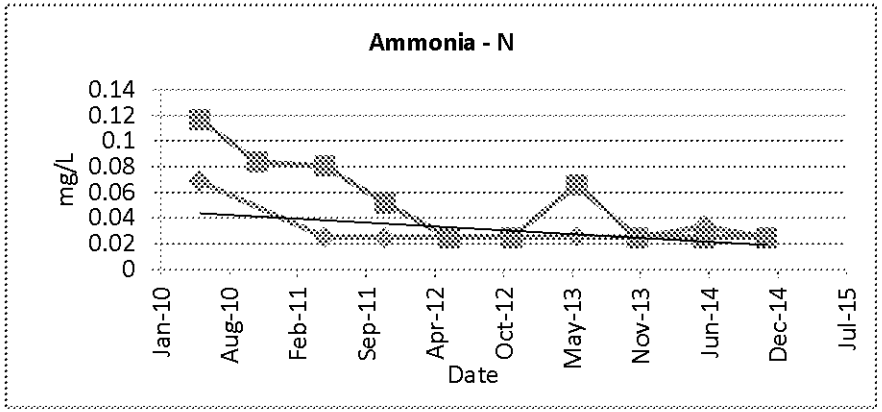
figure H1-C

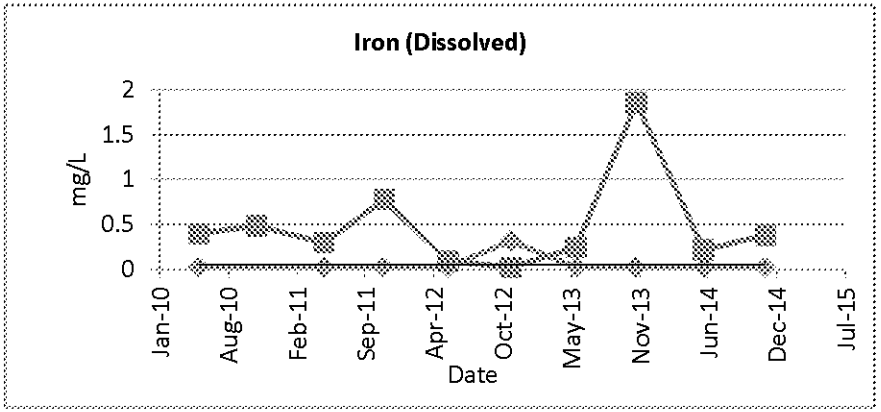
ANALYTICAL PLOTS SELECTED PARAMETERS

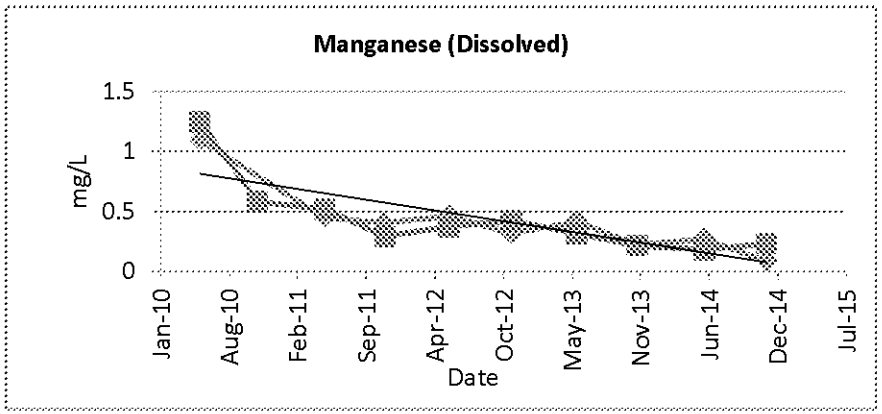
MW3-08

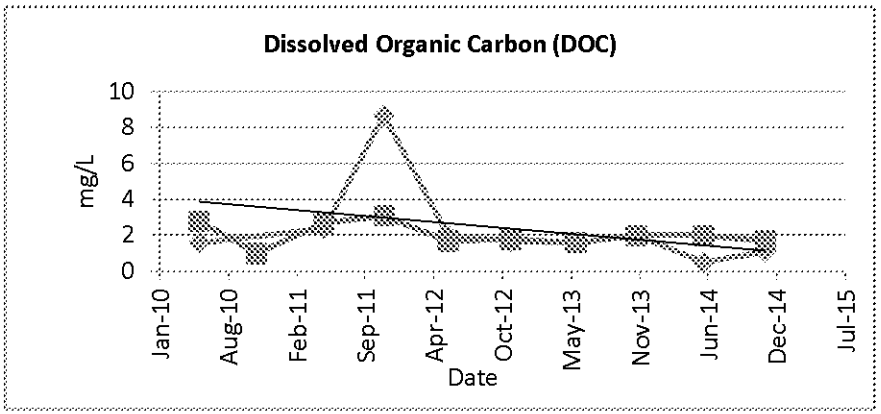
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

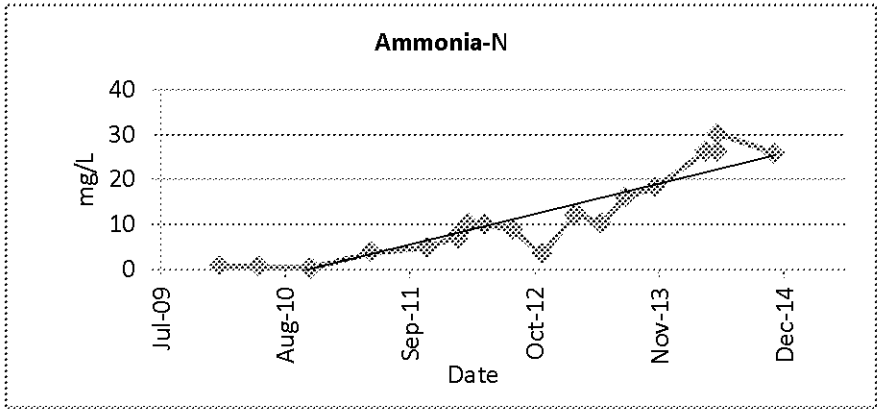
MW4-08
MW4-09

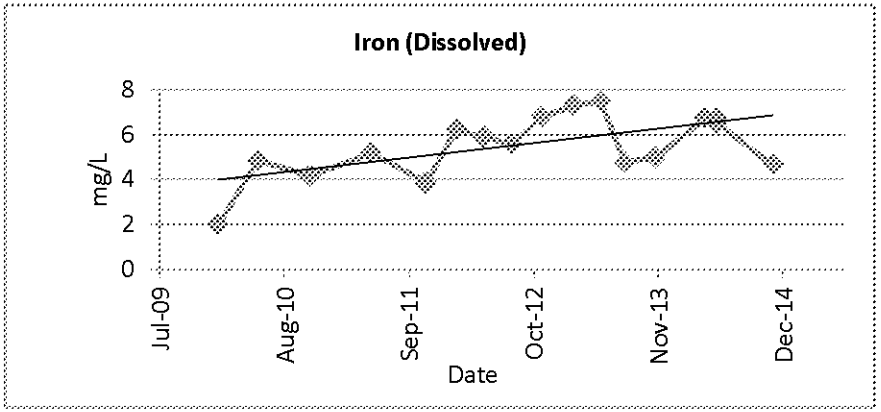
figure H1-D

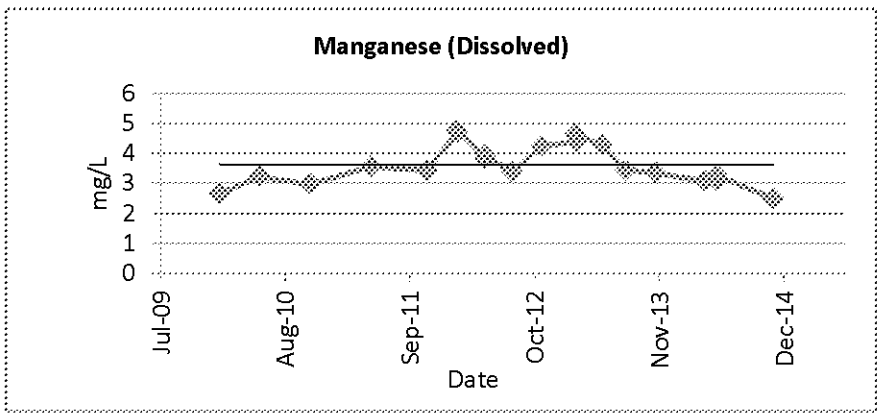
ANALYTICAL PLOTS SELECTED PARAMETERS
MW4-08 & MW4-09
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

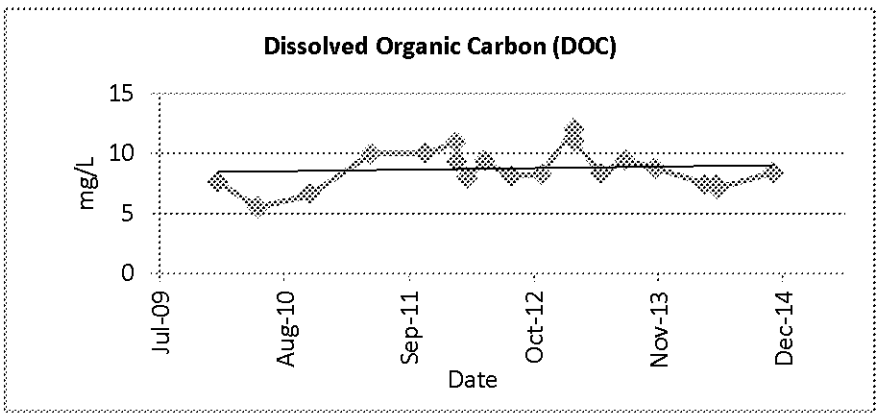
CRA 045804 (56)-APPF

0008836









Note: ND results as 1/2 the detection limit

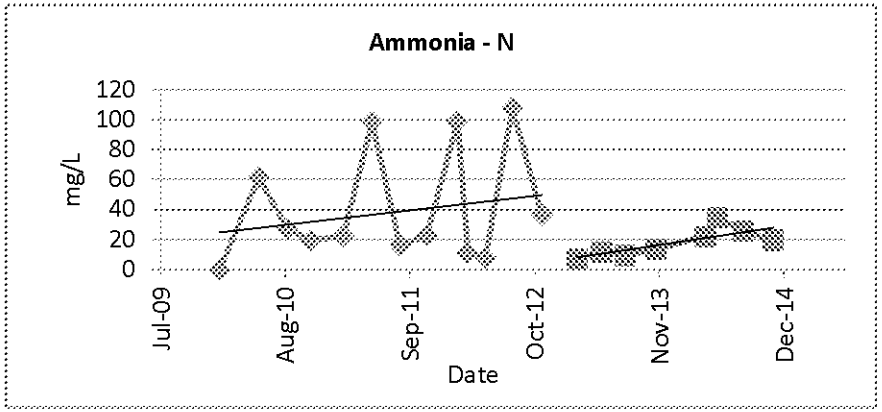
figure H1-E

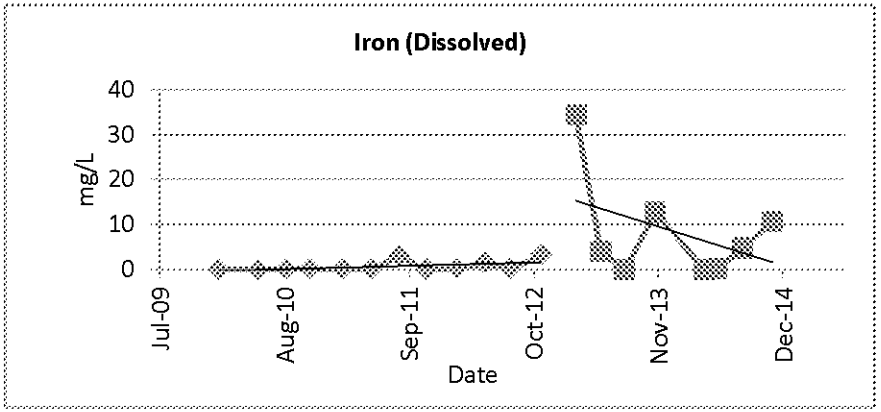
ANALYTICAL PLOTS SELECTED PARAMETERS

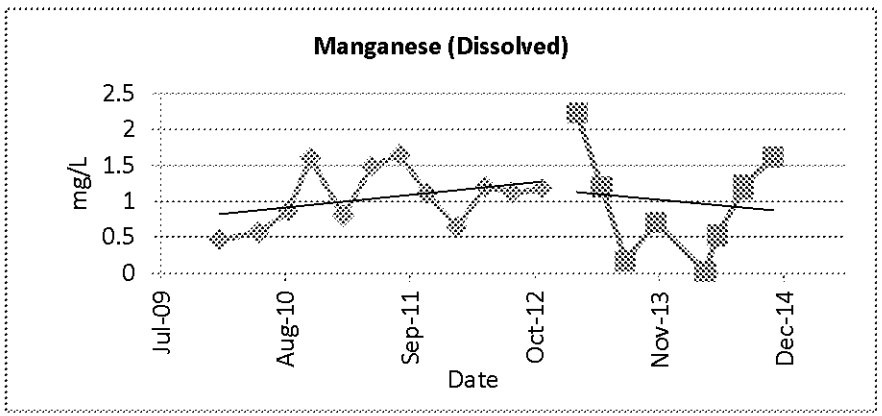
MW5-09

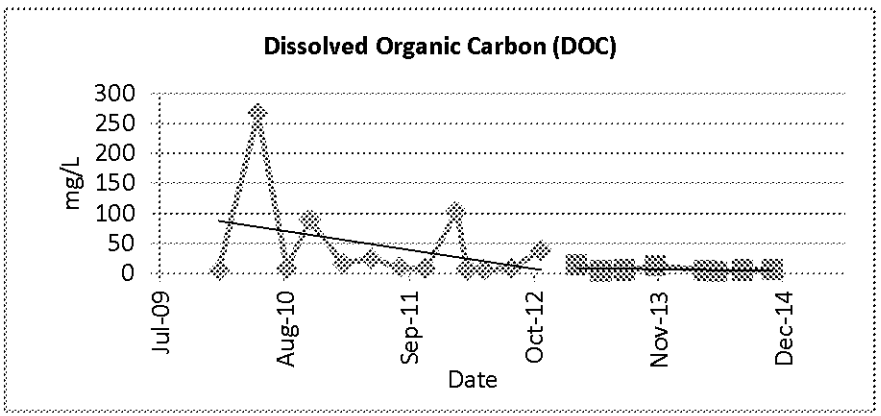
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

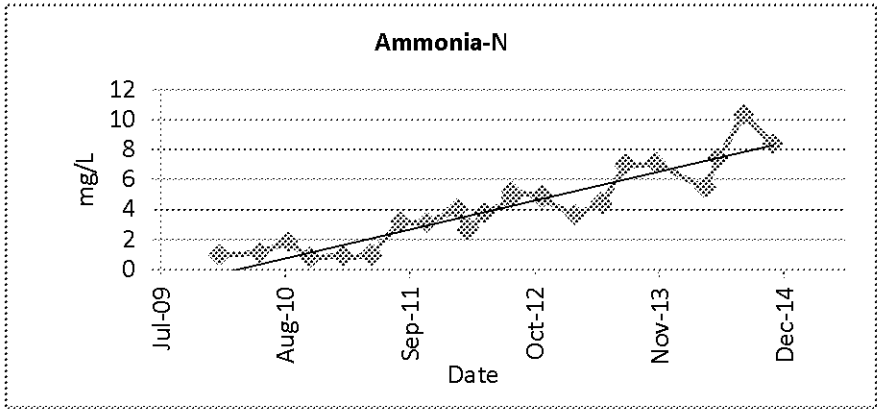
MW101-09
MW101-13

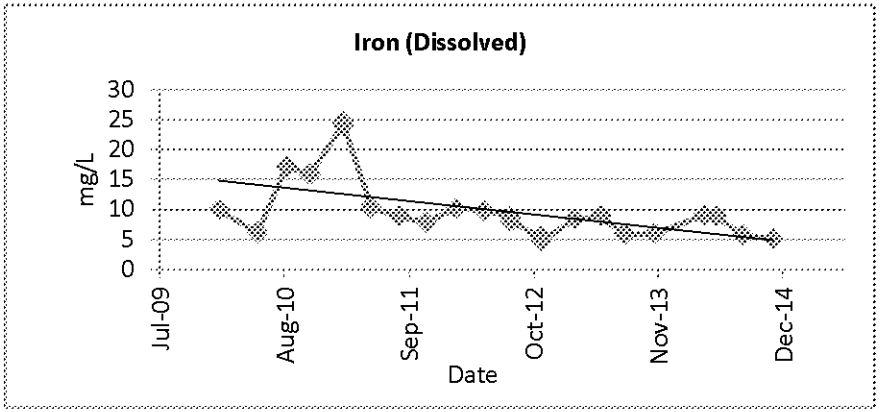
figure H1-F

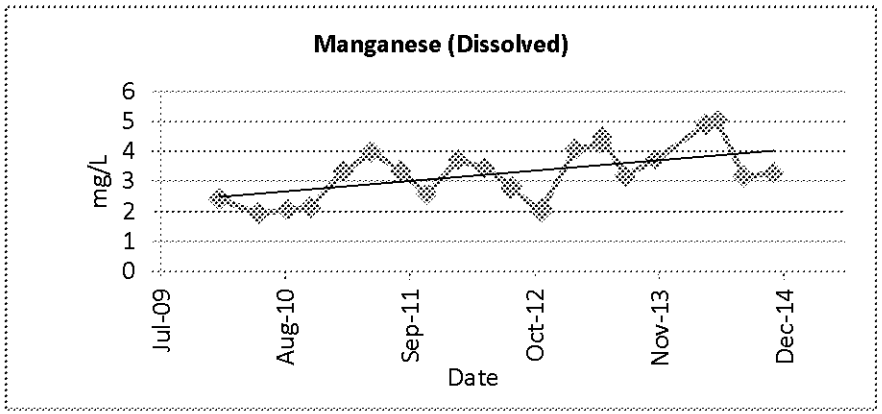
ANALYTICAL PLOTS SELECTED PARAMETERS
MW101-09 & MW101-13
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

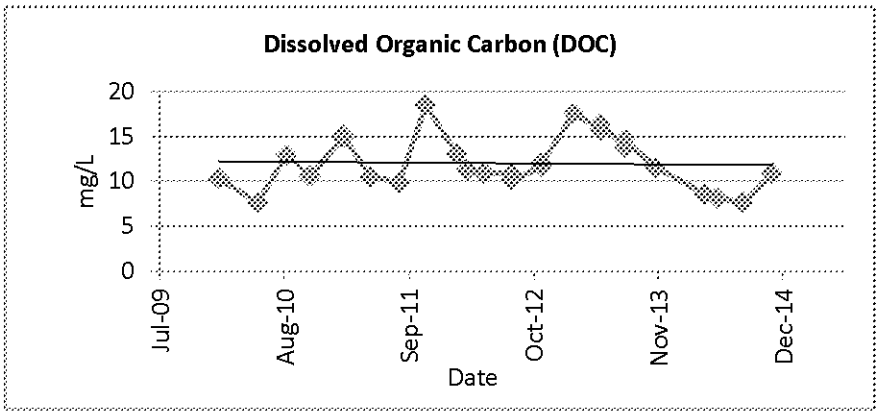
CRA 045804 (56)-APPF

000838









Note: ND results as 1/2 the detection limit

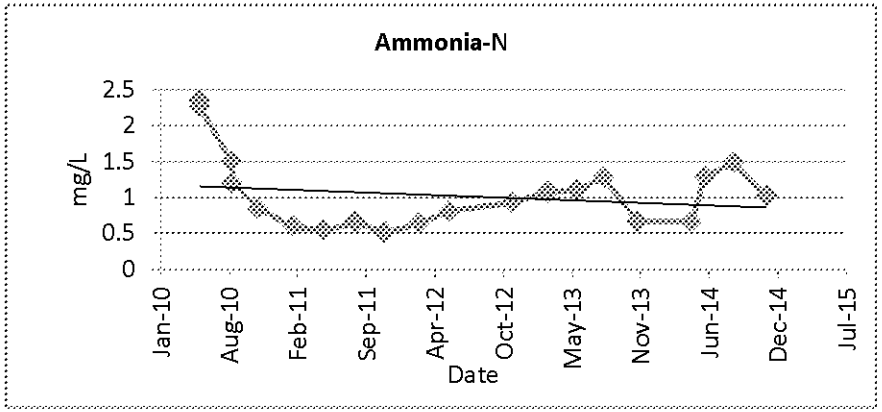
figure H1-G

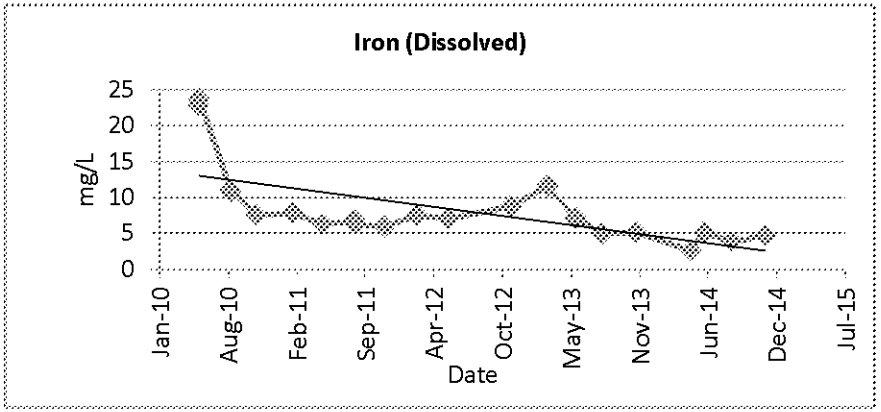
ANALYTICAL PLOTS SELECTED PARAMETERS

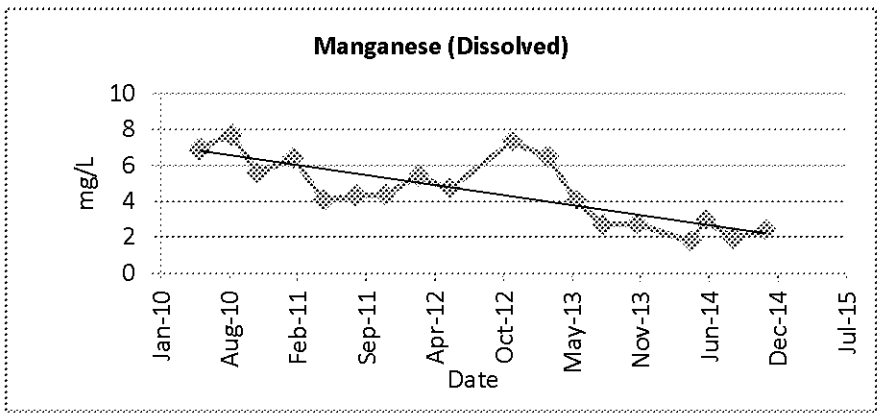
MW102-09

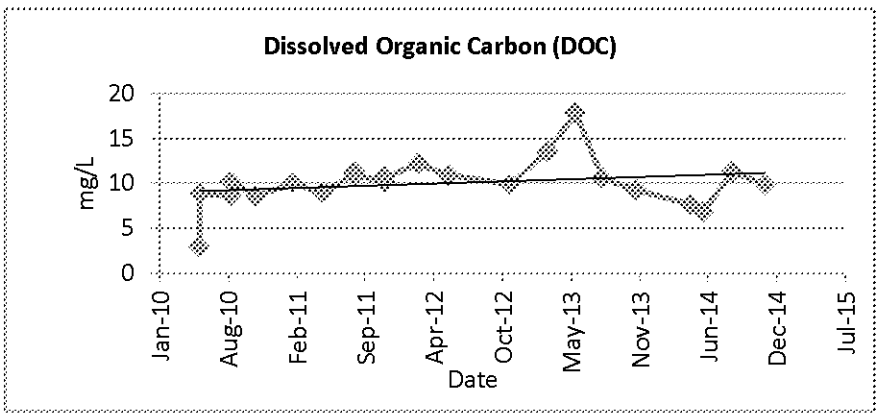
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

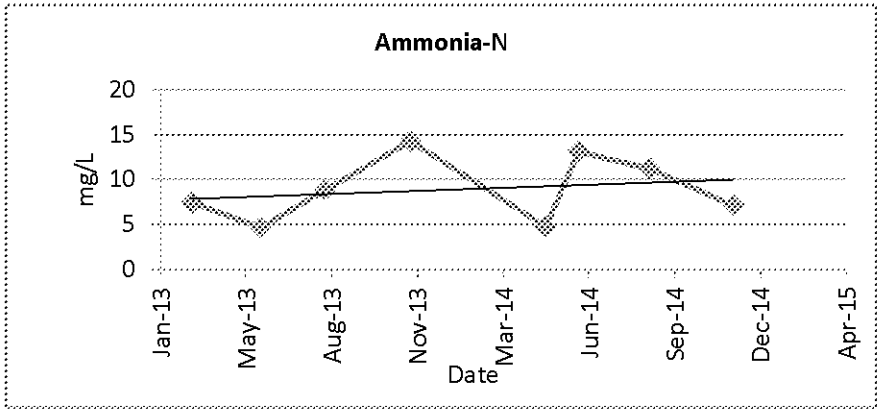
figure H1-H

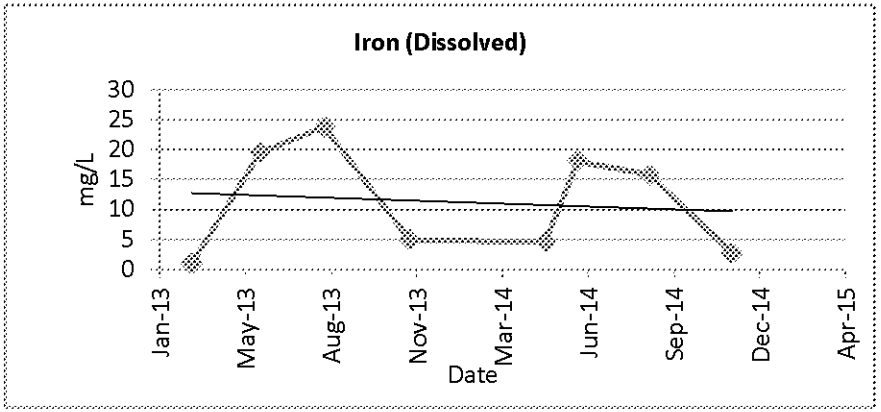
ANALYTICAL PLOTS SELECTED PARAMETERS

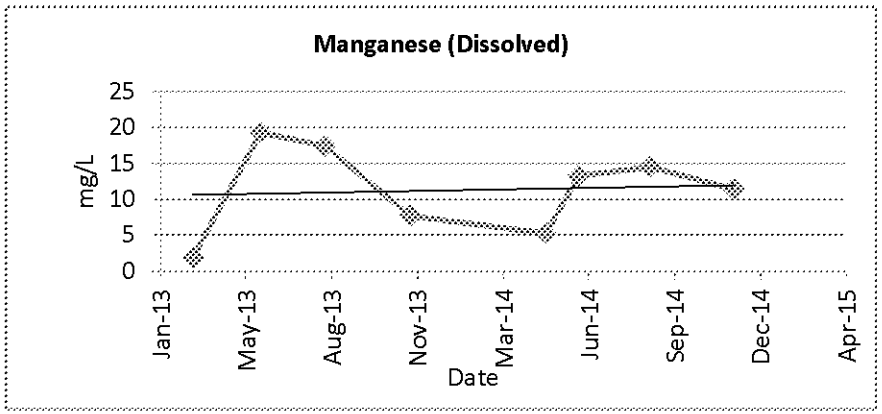
MW103-09

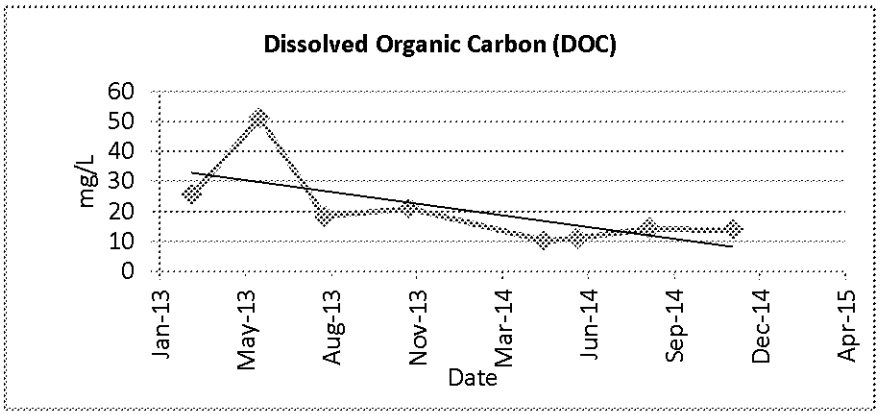
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

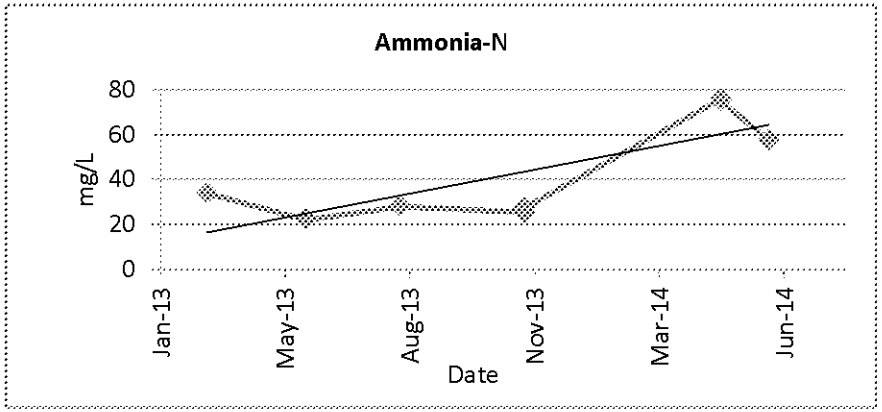
figure H1-I

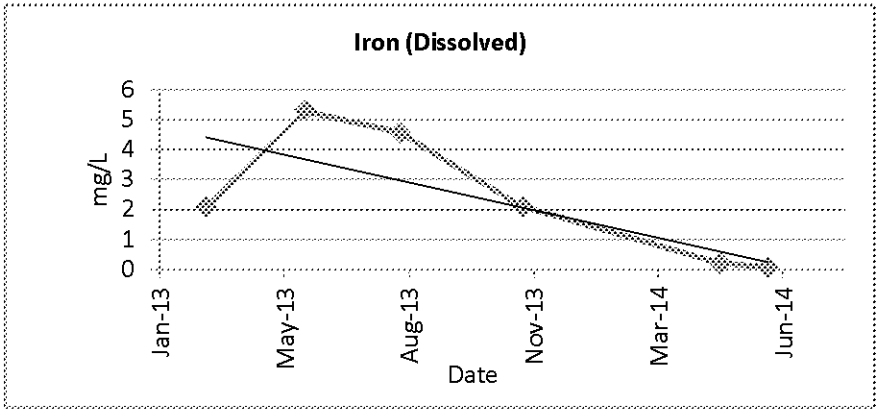
ANALYTICAL PLOTS SELECTED PARAMETERS

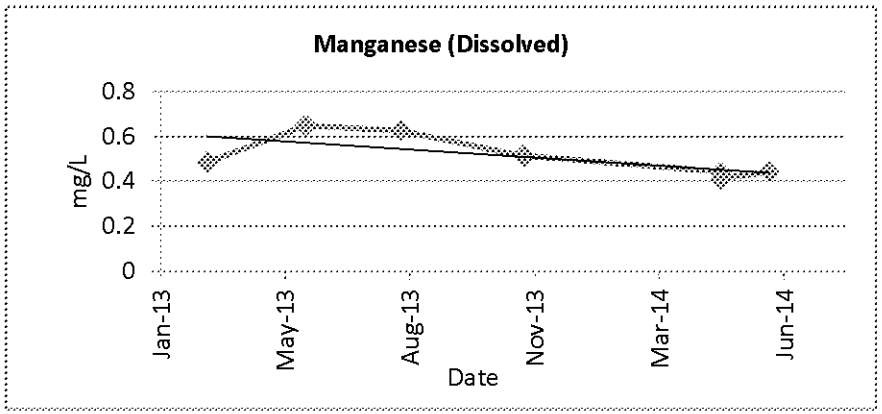
MW104-13

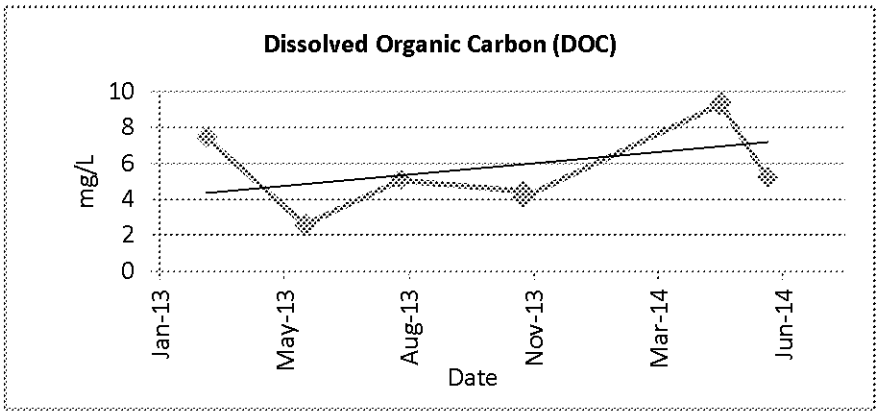
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure H1-J

ANALYTICAL PLOTS SELECTED PARAMETERS

MW105-13

2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

Appendix H2

Select Analytical Plots – Deep Aquifer

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Chloride (Cl)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Nitrate (as N)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Sulfate (SO4)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Total Suspended Solids	DLHC	L1769313-1, -2, -3, -4, -5
Matrix Spike	Boron (B)-Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Zinc (Zn)-Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Phosphorus, Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Nitrate (as N)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Nitrate (as N)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Sulfate (SO4)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	COD	MS-B	L1769313-1, -2, -3, -4, -5

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Reference Information

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-MS-WT Water Total Metals in Water by ICPMS EPA 200.8
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P B E

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

Reference Information

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3460560								
WG2311187-11 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			102.0		%		80-120	18-MAY-16
WG2311187-15 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			86.5		%		80-120	18-MAY-16
WG2311187-12 DUP		**L1769295-6**						
Alkalinity, Total (as CaCO3)		178	183		mg/L	2.9	20	18-MAY-16
WG2311187-16 DUP		**L1769313-5**						
Alkalinity, Total (as CaCO3)		230	226		mg/L	1.7	20	18-MAY-16
WG2311187-10 LCS								
Alkalinity, Total (as CaCO3)			99.3		%		85-115	18-MAY-16
WG2311187-14 LCS								
Alkalinity, Total (as CaCO3)			105.8		%		85-115	18-MAY-16
WG2311187-13 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-MAY-16
WG2311187-9 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-MAY-16
BOD-C-WT	Water							
Batch R3463221								
WG2310040-2 DUP		**L1769177-1**						
BOD Carbonaceous		3.7	3.7		mg/L	0.5	20	22-MAY-16
WG2310040-3 LCS								
BOD Carbonaceous			94.9		%		85-115	22-MAY-16
WG2310040-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-MAY-16
C-DIS-ORG-WT	Water							
Batch R3461753								
WG2311208-3 DUP		**L1768554-1**						
Dissolved Organic Carbon		7.3	6.5		mg/L	13	20	18-MAY-16
WG2311208-2 LCS								
Dissolved Organic Carbon			98.5		%		80-120	18-MAY-16
WG2311208-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-MAY-16
WG2311208-4 MS		**L1768554-1**						
Dissolved Organic Carbon			86.1		%		70-130	18-MAY-16
CL-IC-WT	Water							

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Chloride (Cl)		11.3	11.3		mg/L	0.2	25	18-MAY-16
WG2310495-7 LCS								
Chloride (Cl)			99.1		%		70-130	18-MAY-16
WG2310495-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Chloride (Cl)			98.4		%		70-130	18-MAY-16
COD-T-WT	Water							
Batch R3461740								
WG2311255-7 DUP		**L1768717-1**						
COD		203	207		mg/L	2.1	25	18-MAY-16
WG2311255-6 LCS								
COD			101.2		%		70-130	18-MAY-16
WG2311255-5 MB								
COD			<10		mg/L		10	18-MAY-16
WG2311255-8 MS		**L1768717-1**						
COD			N/A	MS-B	%		-	18-MAY-16
COLOUR-WT	Water							
Batch R3460528								
WG2310240-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			94.7		%		80-120	17-MAY-16
WG2310240-4 DUP		**L1769045-1**						
Color, Apparent		<1.0	<1.0	RPD-NA	C.U.	N/A	20	17-MAY-16
WG2310240-1 MB								
Color, Apparent			<1.0		C.U.		1	17-MAY-16
EC-MF-WT	Water							
Batch R3460530								
WG2309866-2 DUP		**WG2309866-4**						
E. Coli		12000	10000		CFU/100mL	18	65	18-MAY-16
WG2309866-1 MB								
E. Coli			0		CFU/100mL		1	18-MAY-16
F1-HS-WT	Water							
Batch R3460191								
WG2307328-4 DUP		**WG2307328-3**						
F1 (C6-C10)		<100	100	RPD-NA	ug/L	N/A	50	18-MAY-16
WG2307328-1 LCS								

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3460191								
WG2307328-1 LCS								
F1 (C6-C10)			94.1		%		80-120	17-MAY-16
WG2307328-2 MB								
F1 (C6-C10)			<100		ug/L		100	17-MAY-16
Surrogate: 3,4-Dichlorotoluene			101.5		%		60-140	17-MAY-16
F2-F4-WT	Water							
Batch R3463438								
WG2310329-2 LCS								
F2 (C10-C16)			88.6		%		65-135	18-MAY-16
F3 (C16-C34)			92.1		%		65-135	18-MAY-16
F4 (C34-C50)			85.8		%		65-135	18-MAY-16
WG2310329-3 LCSD		**WG2310329-2**						
F2 (C10-C16)		88.6	87.7		%	1.0	50	18-MAY-16
F3 (C16-C34)		92.1	93.9		%	1.9	50	18-MAY-16
F4 (C34-C50)		85.8	84.6		%	1.5	50	18-MAY-16
WG2310329-1 MB								
F2 (C10-C16)			<100		ug/L		100	18-MAY-16
F3 (C16-C34)			<250		ug/L		250	18-MAY-16
F4 (C34-C50)			<250		ug/L		250	18-MAY-16
Surrogate: 2-Bromobenzotrifluoride			103.7		%		60-140	18-MAY-16
FC-MF-WT	Water							
Batch R3460525								
WG2309871-2 DUP		**WG2309871-4**						
Fecal Coliforms		30	20		CFU/100mL	40	65	18-MAY-16
WG2309871-1 MB								
Fecal Coliforms			0		CFU/100mL		1	18-MAY-16
HG-T-CVAA-WT	Water							
Batch R3460185								
WG2310437-4 DUP		**WG2310437-3**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310437-2 LCS								
Mercury (Hg)-Total			109.0		%		80-120	18-MAY-16
WG2310437-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	18-MAY-16
WG2310437-6 MS		**WG2310437-5**						
Mercury (Hg)-Total			103.0		%		70-130	18-MAY-16

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3459647								
WG2310236-4 DUP		**WG2310236-3**						
Arsenic (As)-Total		0.00014	0.00013		mg/L	6.1	20	17-MAY-16
Boron (B)-Total		0.116	0.112		mg/L	3.5	20	17-MAY-16
Cadmium (Cd)-Total		0.000061	0.000063		mg/L	2.4	20	17-MAY-16
Chromium (Cr)-Total		0.00132	0.00135		mg/L	2.1	20	17-MAY-16
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-MAY-16
Copper (Cu)-Total		0.0075	0.0073		mg/L	2.8	20	17-MAY-16
Iron (Fe)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	17-MAY-16
Lead (Pb)-Total		0.00062	0.00061		mg/L	1.4	20	17-MAY-16
Manganese (Mn)-Total		0.00346	0.00336		mg/L	2.8	20	17-MAY-16
Molybdenum (Mo)-Total		0.000340	0.000324		mg/L	4.7	20	17-MAY-16
Nickel (Ni)-Total		0.00225	0.00228		mg/L	1.2	20	17-MAY-16
Zinc (Zn)-Total		0.119	0.116		mg/L	2.5	20	17-MAY-16
WG2310236-2 LCS								
Arsenic (As)-Total			101.9		%		80-120	17-MAY-16
Boron (B)-Total			87.8		%		80-120	17-MAY-16
Cadmium (Cd)-Total			99.4		%		80-120	17-MAY-16
Chromium (Cr)-Total			100.7		%		80-120	17-MAY-16
Cobalt (Co)-Total			100.5		%		80-120	17-MAY-16
Copper (Cu)-Total			99.2		%		80-120	17-MAY-16
Iron (Fe)-Total			94.7		%		80-120	17-MAY-16
Lead (Pb)-Total			101.3		%		80-120	17-MAY-16
Manganese (Mn)-Total			103.1		%		80-120	17-MAY-16
Molybdenum (Mo)-Total			105.4		%		80-120	17-MAY-16
Nickel (Ni)-Total			99.1		%		80-120	17-MAY-16
Zinc (Zn)-Total			95.1		%		80-120	17-MAY-16
WG2310236-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Boron (B)-Total			<0.010		mg/L		0.01	17-MAY-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	17-MAY-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	17-MAY-16
Iron (Fe)-Total			<0.050		mg/L		0.05	17-MAY-16
Lead (Pb)-Total			<0.00010				0.0001	

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3459647								
WG2310236-1 MB								
Lead (Pb)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-MAY-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-MAY-16
WG2310236-5 MS		**WG2310236-3**						
Arsenic (As)-Total			97.6		%		70-130	17-MAY-16
Boron (B)-Total			N/A	MS-B	%		-	17-MAY-16
Cadmium (Cd)-Total			92.5		%		70-130	17-MAY-16
Chromium (Cr)-Total			90.6		%		70-130	18-MAY-16
Cobalt (Co)-Total			93.0		%		70-130	17-MAY-16
Copper (Cu)-Total			87.8		%		70-130	17-MAY-16
Iron (Fe)-Total			119.4		%		70-130	18-MAY-16
Lead (Pb)-Total			94.8		%		70-130	17-MAY-16
Manganese (Mn)-Total			112.5		%		70-130	17-MAY-16
Molybdenum (Mo)-Total			102.4		%		70-130	17-MAY-16
Nickel (Ni)-Total			90.7		%		70-130	17-MAY-16
Zinc (Zn)-Total			N/A	MS-B	%		-	17-MAY-16
NH3-WT	Water							
Batch R3459966								
WG2309656-39 DUP		**L1769313-1**						
Ammonia, Total (as N)		0.026	<0.020	RPD-NA	mg/L	N/A	20	17-MAY-16
WG2309656-38 LCS								
Ammonia, Total (as N)			107.2		%		85-115	17-MAY-16
WG2309656-37 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	17-MAY-16
WG2309656-40 MS		**L1769313-1**						
Ammonia, Total (as N)			101.6		%		75-125	17-MAY-16
NO2-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-MAY-16
WG2310495-7 LCS								
Nitrite (as N)			99.4		%		70-130	18-MAY-16
WG2310495-6 MB								

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3461414								
WG2310495-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Nitrite (as N)			99.9		%		70-130	18-MAY-16
NO3-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Nitrate (as N)		0.063	0.063		mg/L	0.8	25	18-MAY-16
WG2310495-7 LCS								
Nitrate (as N)			97.7		%		70-130	18-MAY-16
WG2310495-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Nitrate (as N)			97.6		%		70-130	18-MAY-16
P-T-COL-WT	Water							
Batch R3460574								
WG2310306-3 DUP		**L1768917-1**						
Phosphorus, Total		0.204	0.208		mg/L	2.2	20	18-MAY-16
WG2310306-2 LCS								
Phosphorus, Total			99.7		%		80-120	18-MAY-16
WG2310306-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-MAY-16
WG2310306-4 MS		**L1768917-1**						
Phosphorus, Total			N/A	MS-B	%		-	18-MAY-16
PAH-CCME-WT	Water							
Batch R3460418								
WG2310260-2 LCS								
Anthracene			85.1		%		50-140	18-MAY-16
Benzo(a)pyrene			107.1		%		60-130	18-MAY-16
WG2310260-3 LCSD		**WG2310260-2**						
Anthracene		85.1	73.8		%	14	50	18-MAY-16
Benzo(a)pyrene		107.1	104.8		%	2.2	50	18-MAY-16
WG2310260-1 MB								
Anthracene			<0.020		ug/L		0.02	18-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	18-MAY-16
Surrogate: d8-Naphthalene			87.5		%		60-140	18-MAY-16
Surrogate: d10-Phenanthrene			92.6		%		60-140	18-MAY-16

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3460418								
WG2310260-1 MB								
Surrogate: d12-Chrysene			102.2		%		60-140	18-MAY-16
Surrogate: d10-Acenaphthene			92.6		%		60-140	18-MAY-16
Surrogate: d9-Acridine (SS)			63.2		%		60-140	18-MAY-16
PH-WT	Water							
Batch R3460078								
WG2309941-6 DUP		**WG2309941-5**						
pH		8.47	8.49	J	pH units	0.02	0.2	17-MAY-16
WG2309941-4 LCS								
pH			7.00		pH units		6.9-7.1	17-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3460913								
WG2310717-11 DUP		**L1769313-1**						
Phenols (4AAP)		0.0022	0.0021		mg/L	0.2	20	18-MAY-16
WG2310717-7 DUP		**L1769295-5**						
Phenols (4AAP)		0.0029	0.0026		mg/L	10	20	18-MAY-16
WG2310717-10 LCS								
Phenols (4AAP)			100.9		%		85-115	18-MAY-16
WG2310717-6 LCS								
Phenols (4AAP)			100.4		%		85-115	18-MAY-16
WG2310717-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-12 MS		**L1769313-1**						
Phenols (4AAP)			104.9		%		75-125	18-MAY-16
WG2310717-8 MS		**L1769295-5**						
Phenols (4AAP)			107.4		%		75-125	18-MAY-16
SO4-IC-N-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Sulfate (SO4)		168	168		mg/L	0.2	20	18-MAY-16
WG2310495-7 LCS								
Sulfate (SO4)			100.3		%		90-110	18-MAY-16
WG2310495-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3461414								
WG2310495-8 MS		**WG2310495-10**						
Sulfate (SO4)			N/A	MS-B	%		-	18-MAY-16
SOLIDS-TDS-WT	Water							
Batch R3462610								
WG2310337-3 DUP		**L1768544-2**						
Total Dissolved Solids		578	584		mg/L	0.9	20	18-MAY-16
WG2310337-2 LCS								
Total Dissolved Solids			99.9		%		85-115	18-MAY-16
WG2310337-1 MB								
Total Dissolved Solids			<10		mg/L		10	18-MAY-16
Batch R3462618								
WG2310338-3 DUP		**L1769295-1**						
Total Dissolved Solids		474	465		mg/L	1.9	20	18-MAY-16
WG2310338-2 LCS								
Total Dissolved Solids			98.1		%		85-115	18-MAY-16
WG2310338-1 MB								
Total Dissolved Solids			<10		mg/L		10	18-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3462515								
WG2311534-3 DUP		**L1769381-1**						
Total Suspended Solids		380	367		mg/L	3.6	20	21-MAY-16
WG2311534-2 LCS								
Total Suspended Solids			99.4		%		85-115	21-MAY-16
WG2311534-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
TC-MF-WT	Water							
Batch R3460522								
WG2309726-2 DUP		**WG2309726-4**						
Total Coliforms		800	600		CFU/100mL	29	65	18-MAY-16
WG2309726-1 MB								
Total Coliforms			0		CFU/100mL		1	18-MAY-16
TKN-WT	Water							
Batch R3460556								
WG2310304-3 DUP		**L1769111-2**						
Total Kjeldahl Nitrogen		0.15	<0.15	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310304-2 LCS								

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3460556								
WG2310304-2 LCS								
Total Kjeldahl Nitrogen			98.3		%		75-125	18-MAY-16
WG2310304-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	18-MAY-16
WG2310304-4 MS		**L1769111-2**						
Total Kjeldahl Nitrogen			101.8		%		70-130	18-MAY-16
TURBIDITY-WT	Water							
Batch R3459431								
WG2309703-3 DUP		**L1769372-2**						
Turbidity		2.32	2.24		NTU	3.5	15	17-MAY-16
WG2309703-2 LCS								
Turbidity			105.0		%		85-115	17-MAY-16
WG2309703-1 MB								
Turbidity			<0.10		NTU		0.1	17-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

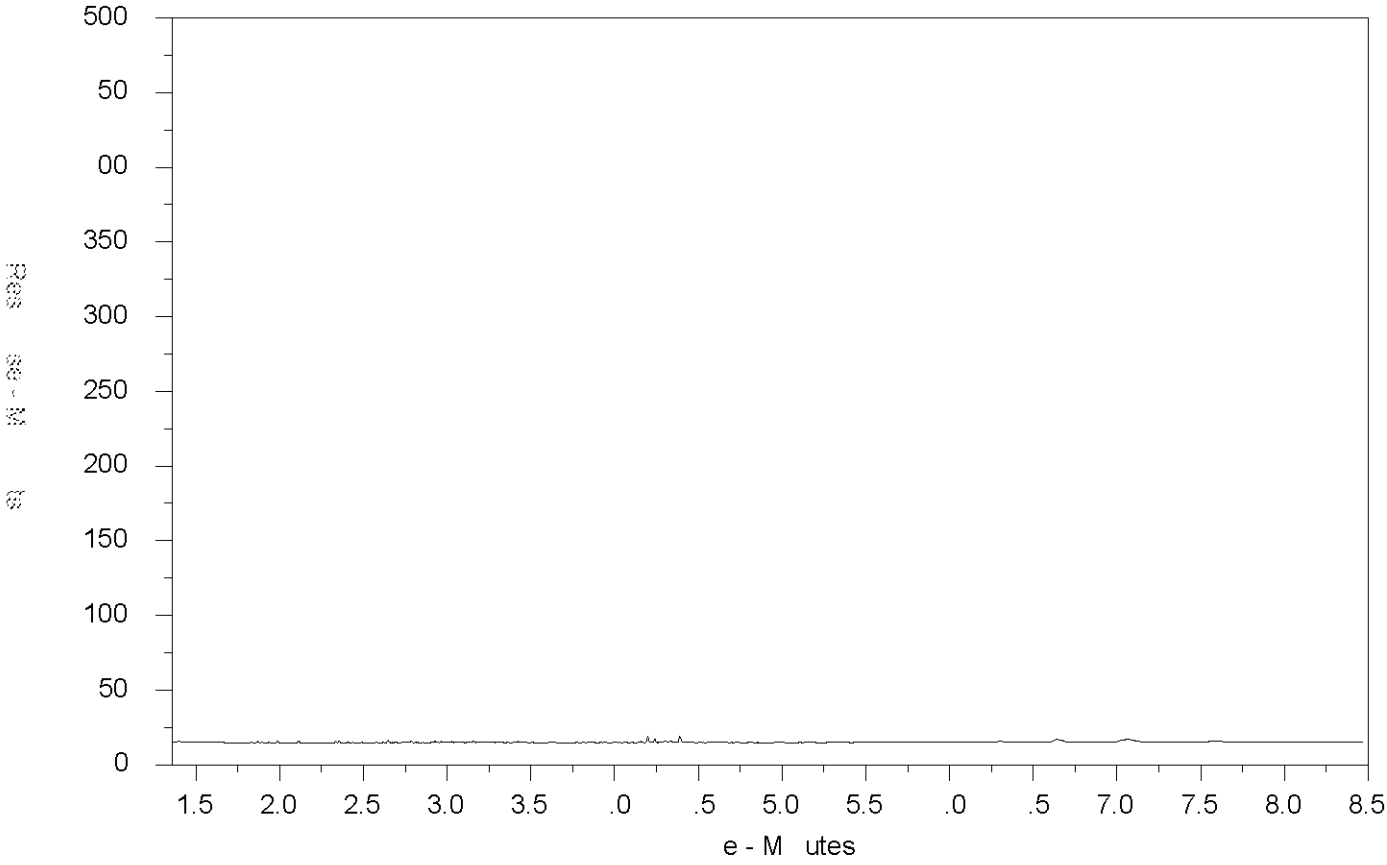
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-1
Client Sample ID: SW-45804-051616-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

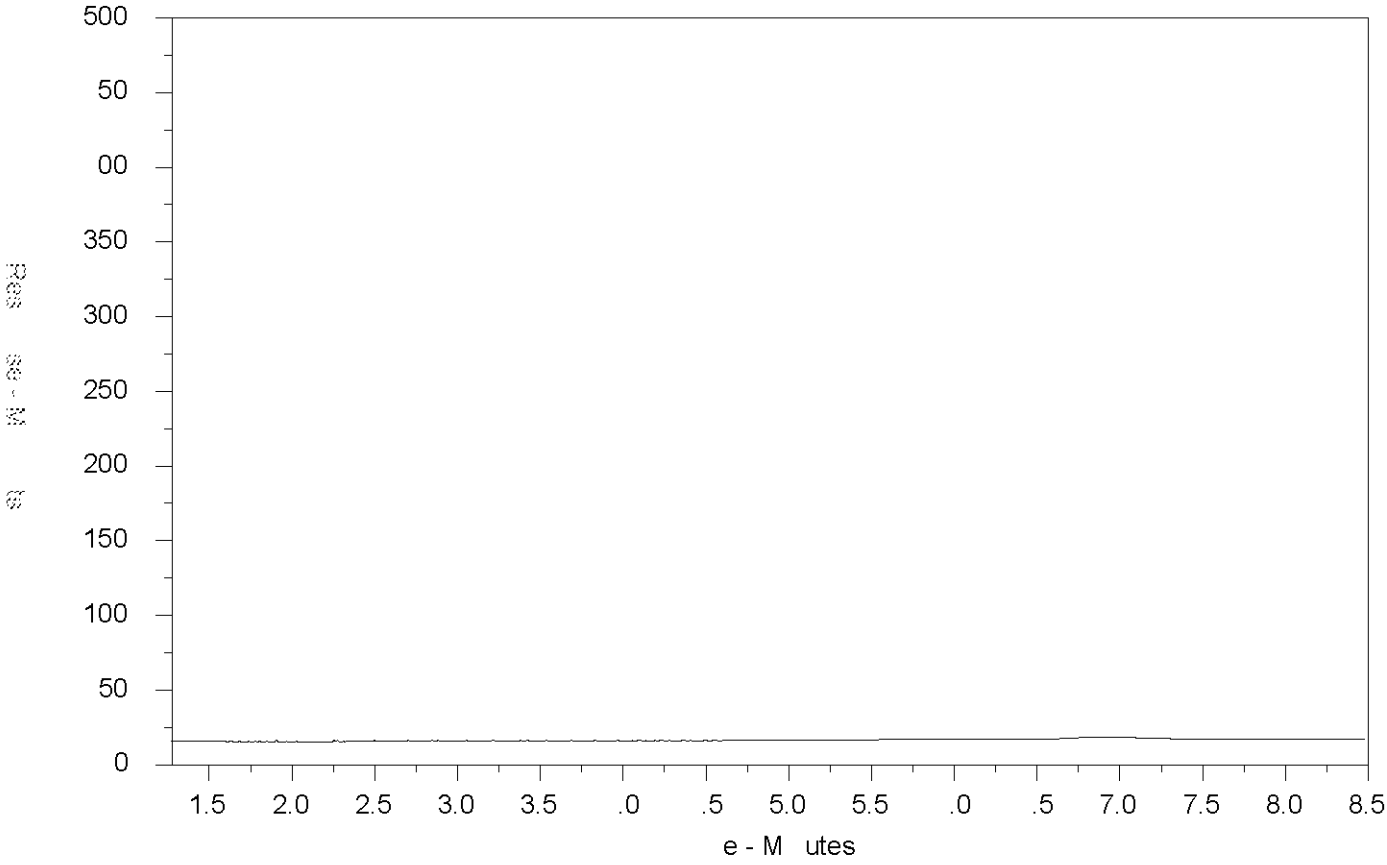
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-2
Client Sample ID: SW-45804-051616-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

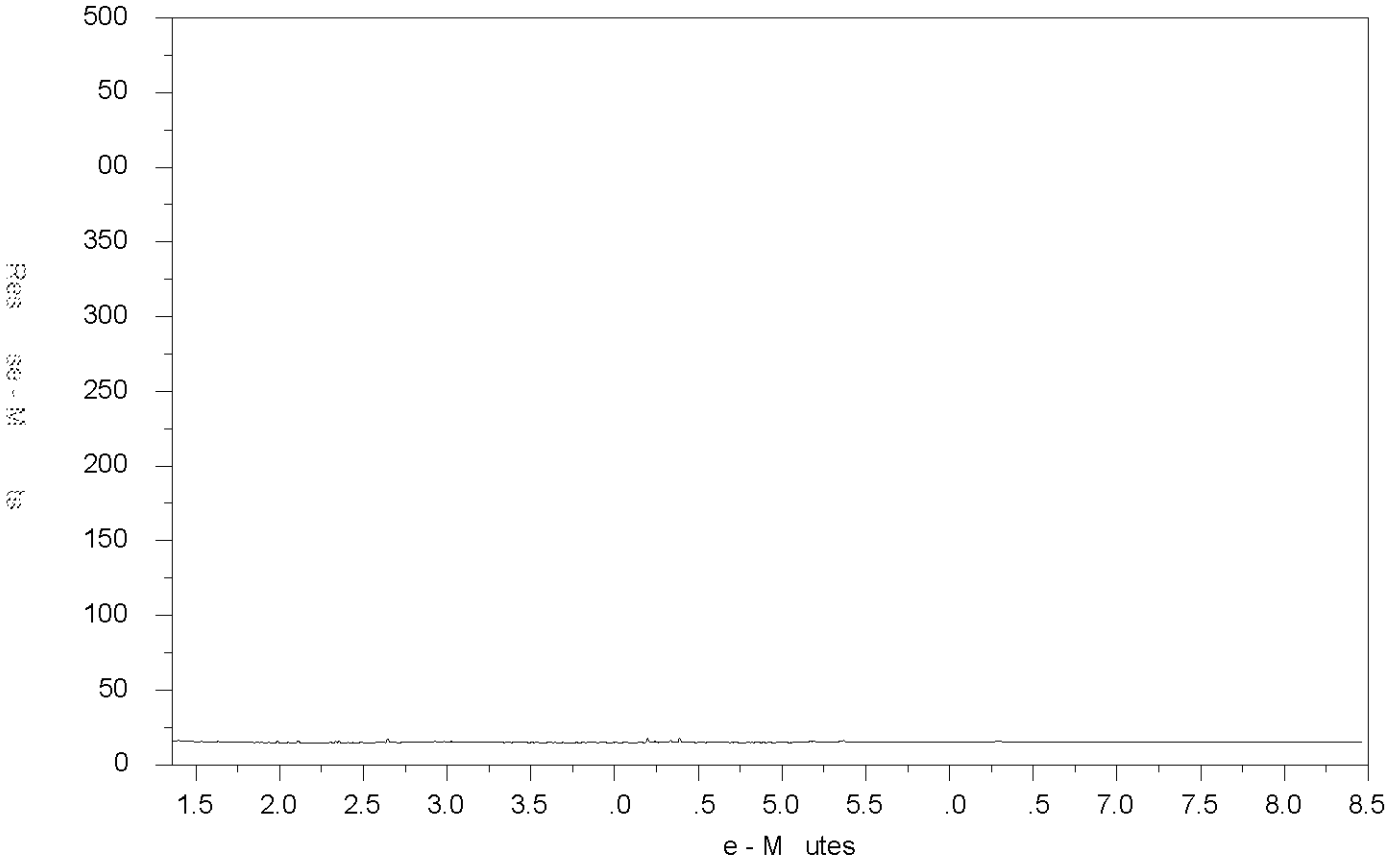
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-3
Client Sample ID: SW-45804-051616-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

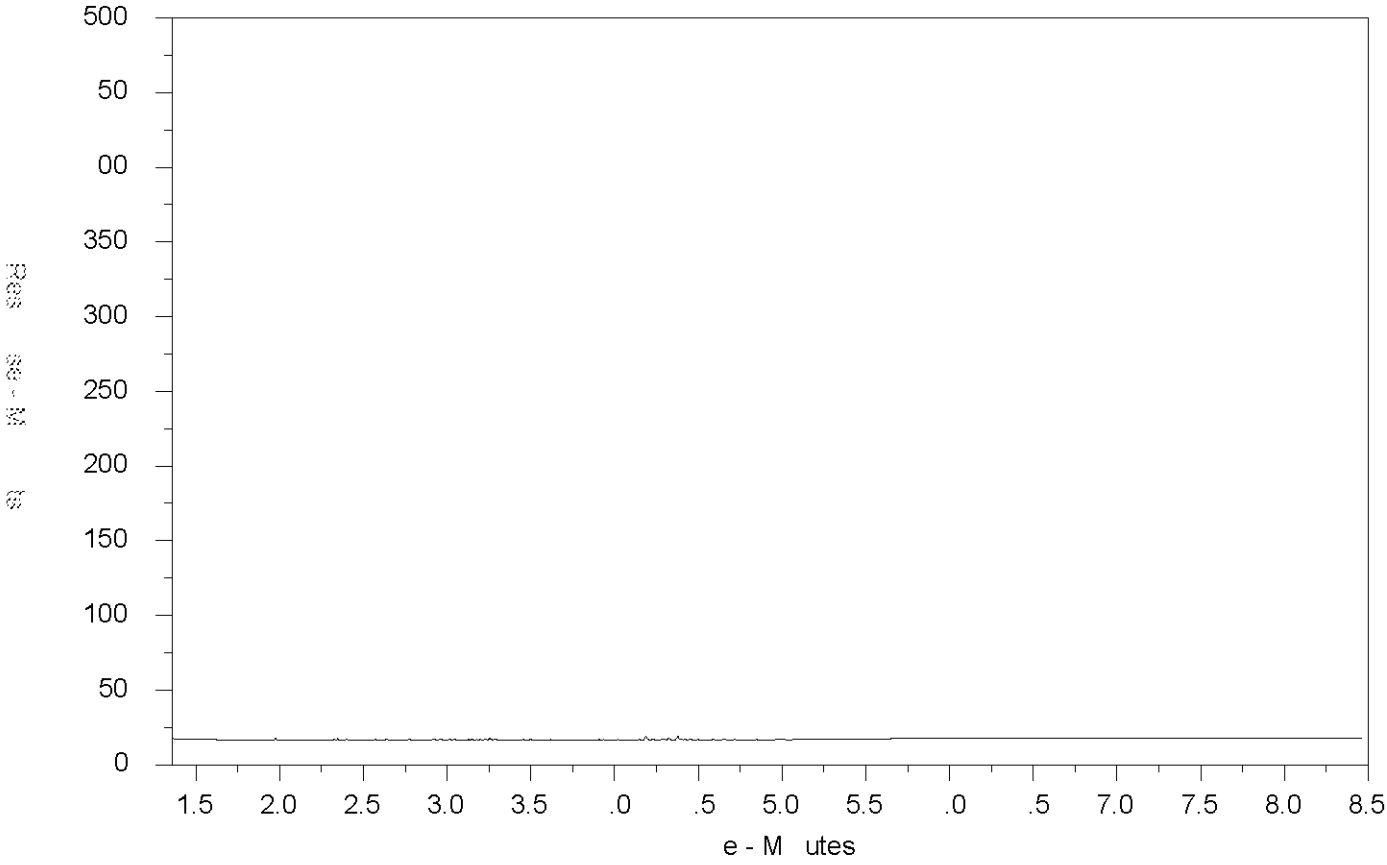
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-4
Client Sample ID: SW-45804-051616-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

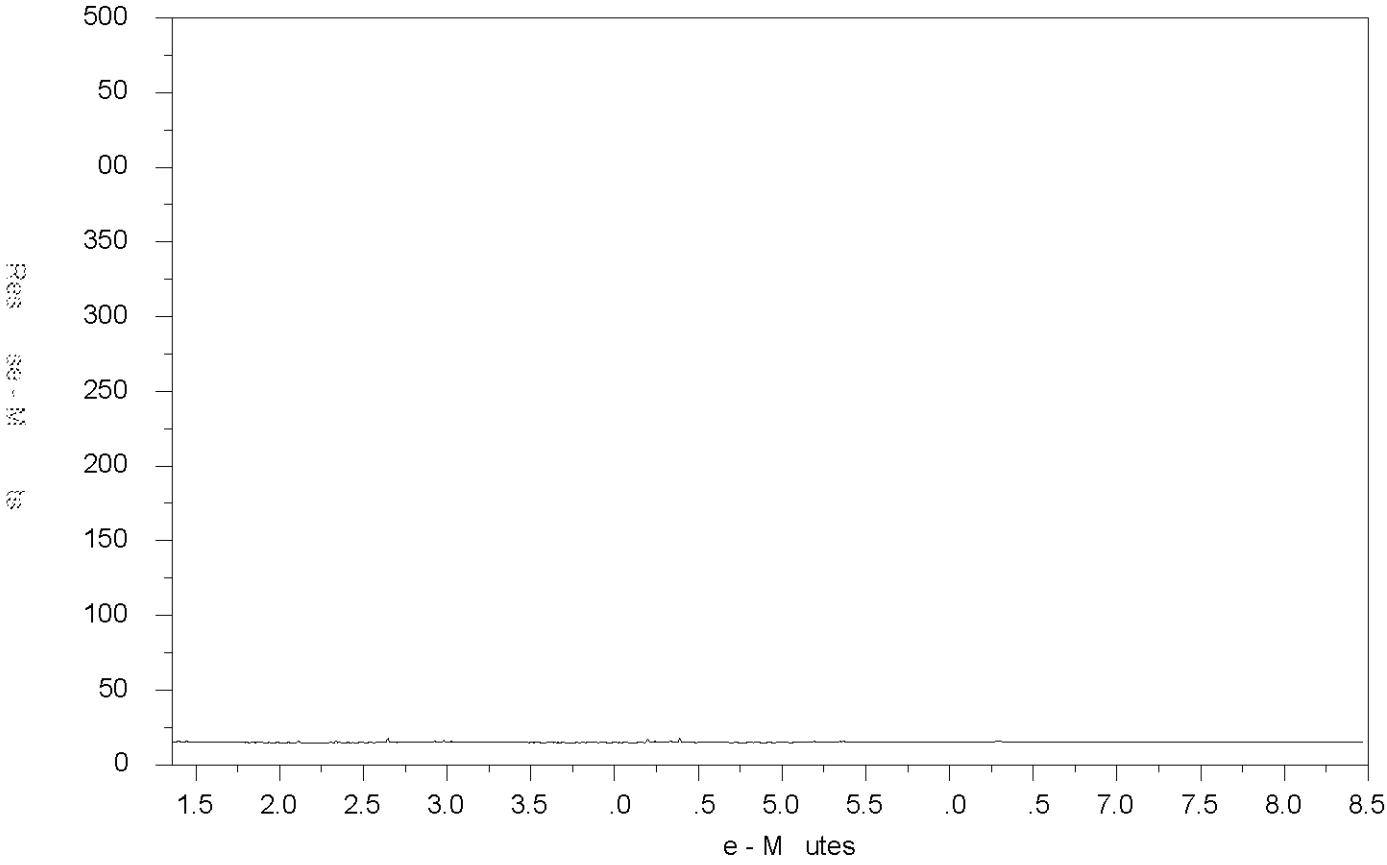
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-5
Client Sample ID: SW-45804-051616-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Criteria on report (y/n) ____
Reg 153/04
Table ____
TCLP ____ MISA ____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ____
EMAIL airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL Wayne.Williams@ghd.com
SELECT: pdf ____ digital ____ both X

SUBMISSION # L1769313
ENTERED BY: S
DATE/TIME ENTERED: 17MAY16
BIN # MAY 17A

SAMPLING INFORMATION

Sample Date/Time Date (yy/mm/dd)	Time (24 hr)	TYPE COMP	TYPE GRAB	MATRIX WATER	MATRIX SOIL	MATRIX OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
5/16/16	1000			X			SW-45804-051616 -TS-001	15		X	9.11	13.38		1
	1030			X			SW-45804-051616 -TS-002	15		X	8.62	12.51		2
	1100			X			SW-45804-051616 -TS-003	15		X	9.19	10.91		3
	1200			X			SW-45804-051616 -TS-004	15		X	9.65	11.34		4
	1200			X			SW-45804-051616 -TS-005	15		X	9.65	11.34		5
				X			SW-45804- -TS-006	15		X				
				X			SW-45804- -TS-007	15		X				
				X			SW-45804- -TS-008	15		X				
				X			SW-45804- -TS-009	15		X				

L1769313-COFC

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	11.4
COOLING INITIATED	
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT

SAMPLED BY:	DATE & TIME	RECEIVED BY	DATE & TIME
Trevor Saunders	5/16/16		5/16/16 1:15
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
	5/16/16		17MAY16 8:50 10.0°C

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

000862

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 17-MAY-16
Report Date: 26-MAY-16 13:52 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1770123
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-1 GW-45804-051716-TS-001 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.54		0.10	pH		19-MAY-16	R3460716
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	47.7		1.0	C.U.		18-MAY-16	R3462448
pH	7.89		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	23.3		2.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	728	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	29.4		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	259		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0571		0.0019	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.591		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	92.7		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.70		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0408		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	213		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.4		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	40	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Boron (B)-Dissolved	0.13	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	18-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	18-MAY-16	18-MAY-16	R3460618
Iron (Fe)-Dissolved	1.49	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.425	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.242	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	18-MAY-16	18-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-1 GW-45804-051716-TS-001 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Aggregate Organics							
COD	69		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0023		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	99.8		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	87.5		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	71.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	95.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	130.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	74.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	120.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.54		0.10	pH		19-MAY-16	R3460716
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	66.3		1.0	C.U.		18-MAY-16	R3462448
pH	7.90		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	86.0	DLHC	4.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	712	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	28.6		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	257		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0543		0.0019	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.561		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	91.6		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.68		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0390		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	211		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.9		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	40	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Boron (B)-Dissolved	0.14	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	18-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	18-MAY-16	18-MAY-16	R3460618
Iron (Fe)-Dissolved	1.55	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.434	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.247	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	18-MAY-16	18-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	19		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0034		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	87.5		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	77.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	99.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	132.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	71.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	131.8		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1770123-3 GW-45804-051716-TS-003 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:20 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.74		0.10	pH		19-MAY-16	R3460716
Temperature, Client	10.6		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	86.6		1.0	C.U.		18-MAY-16	R3462448
pH	7.89		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	567	DLHC	20	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	502	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	64.5		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	284		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0064		0.0023	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.054		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	0.88		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.27		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0991		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	118		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.1		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	20	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00024		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.011		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000035		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00369		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	0.000129		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.00171		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00905		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-3 GW-45804-051716-TS-003 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:20 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	0.00434		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0139		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	18		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0024		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	85.0		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	79.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	71.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	120.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	70.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	100.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.38		0.10	pH		19-MAY-16	R3460716
Temperature, Client	10.5		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	48.2		1.0	C.U.		18-MAY-16	R3462448
pH	8.33		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	45.2	DLHC	4.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	349	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	161		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	173		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0318		0.0077	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.083		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	75.0		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0096		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	42.1		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.8		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	2		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.022		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00056		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00047		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	1.08		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.218		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.000422		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0031		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	13		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0035		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	103.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.7		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	77.3		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	113.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	132.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	76.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-5 GW-45804-051716-TS-005 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:10 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.70		0.10	pH		19-MAY-16	R3460716
Temperature, Client	9.6		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	233		1.0	C.U.		18-MAY-16	R3462448
pH	7.90		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	20.1		2.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	711	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	61.1		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	292		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0130		0.00044	mg/L		19-MAY-16	
Ammonia, Total (as N)	1.19	DLHC	0.040	mg/L		18-MAY-16	R3461000
Chloride (Cl)	80.4		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.83		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0261		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	144		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.6		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	10	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00631		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.030		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00069		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	5.32		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-5 GW-45804-051716-TS-005 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:10 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	2.95	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00372		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00142		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	32		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0021		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.1		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	85.6		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	68.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	98.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	134.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	67.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	129.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.67		0.10	pH		19-MAY-16	R3460716
Temperature, Client	11.5		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	260	DLHC	2.0	C.U.		18-MAY-16	R3462448
pH	7.85		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	11.3		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	727	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	78.1		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	322		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00945		0.00024	mg/L		19-MAY-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	0.803		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	97.1		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.62		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.118		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	149		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.7		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00186		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.032		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00066		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00011		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	6.28		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	1.26		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00113		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00084		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0010		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	35		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0022		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	97.2		60-140	%		19-MAY-16	R3460654

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Hydrocarbons							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	72.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	100.0		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	138.7		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	68.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-7 GW-45804-051716-TS-007 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.58		0.10	pH		19-MAY-16	R3460716
Temperature, Client	11.9		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		18-MAY-16	R3462448
pH	7.79		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	<2.0		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1500	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	0.16		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	338		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00029		0.00020	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.030		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	70.8	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	0.18	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	<0.0030		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	680	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.5		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.054		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000049		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-7 GW-45804-051716-TS-007 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:25 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	0.00068		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00021		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00050		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.207		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.0188		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00675		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	<10		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	92.7		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	72.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	96.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	131.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	64.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.66		0.10	pH		19-MAY-16	R3460716
Temperature, Client	15.7		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	3.8		1.0	C.U.		18-MAY-16	R3462448
pH	7.84		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	2.8		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1420	DLDS	20	mg/L		24-MAY-16	R3464113

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Physical Tests							
Turbidity	1.41		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	314		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00058		0.00032	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.037		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	64.4	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.10	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0046		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	683	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.8		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.056		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000012		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00023		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00035		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	0.045		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.160		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.0268		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00136		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	<10		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	98.1		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	73.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	101.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	134.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	60.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	125.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-9 GW-45804-051716-TS-009 Sampled By: T. SAUNDERS on 17-MAY-16 @ 14:35 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.70		0.10	pH		19-MAY-16	R3460716
Temperature, Client	12.4		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	34.2		1.0	C.U.		18-MAY-16	R3462448
pH	7.71		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	5.5		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1680	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	9.20		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	580	DLHC	20	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0107		0.00027	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.795		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	506	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.10	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.08		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0037		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	312	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.6		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-9 GW-45804-051716-TS-009 Sampled By: T. SAUNDERS on 17-MAY-16 @ 14:35 Matrix: WATER							
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.0147	DLHC	0.0020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	0.67	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	1.55	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00438	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.0075	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.013	DLHC	0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	28		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0025		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.4		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	82.3		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	73.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	86.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	131.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	66.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	120.6		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Total Suspended Solids	DLHC	L1770123-1, -2, -3, -4, -5
Duplicate	Total Suspended Solids	DLHC	L1770123-6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nitrate (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nitrate (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	COD	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT | Water | Dissolved Organic Carbon | APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT | Water | Chloride by IC | EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT | Water | Chemical Oxygen Demand | APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT | Water | Colour | APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT | Water | E. coli | SM 9222D

Reference Information

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h. Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION

F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT	Water	Fecal Coliforms	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P B E

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT	Water	CCME PAHs	SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3462034								
WG2312012-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			87.0		%		80-120	19-MAY-16
WG2312012-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			90.6		%		80-120	19-MAY-16
WG2312012-4 DUP		**L1769474-1**						
Alkalinity, Total (as CaCO3)		289	291		mg/L	0.8	20	19-MAY-16
WG2312012-8 DUP		**L1770123-7**						
Alkalinity, Total (as CaCO3)		338	332		mg/L	1.8	20	19-MAY-16
WG2312012-2 LCS								
Alkalinity, Total (as CaCO3)			104.2		%		85-115	19-MAY-16
WG2312012-6 LCS								
Alkalinity, Total (as CaCO3)			110.6		%		85-115	19-MAY-16
WG2312012-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-MAY-16
WG2312012-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-MAY-16
BOD-C-WT	Water							
Batch R3463279								
WG2310868-2 DUP		**L1769918-1**						
BOD Carbonaceous		141	131		mg/L	7.4	20	23-MAY-16
WG2310868-6 DUP		**L1769972-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	23-MAY-16
WG2310868-3 LCS								
BOD Carbonaceous			96.0		%		85-115	23-MAY-16
WG2310868-7 LCS								
BOD Carbonaceous			93.9		%		85-115	23-MAY-16
WG2310868-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	23-MAY-16
WG2310868-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	23-MAY-16
C-DIS-ORG-WT	Water							
Batch R3461755								
WG2311266-3 DUP		**L1770123-9**						
Dissolved Organic Carbon		7.6	6.4		mg/L	18	20	19-MAY-16
WG2311266-2 LCS								
Dissolved Organic Carbon			97.1		%		80-120	19-MAY-16
WG2311266-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	19-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R3461755								
WG2311266-4 MS		**L1770123-9**						
Dissolved Organic Carbon			85.6		%		70-130	19-MAY-16
CL-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Chloride (Cl)		91.8	91.9		mg/L	0.1	25	19-MAY-16
WG2311494-7 LCS								
Chloride (Cl)			100.8		%		70-130	19-MAY-16
WG2311494-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Chloride (Cl)			92.9		%		70-130	19-MAY-16
COD-T-WT	Water							
Batch R3462990								
WG2313322-8 DUP		**L1771411-6**						
COD		<10	<10	RPD-NA	mg/L	N/A	25	23-MAY-16
WG2313322-6 LCS								
COD			101.4		%		70-130	23-MAY-16
WG2313322-5 MB								
COD			<10		mg/L		10	23-MAY-16
WG2313322-7 MS		**L1771411-6**						
COD			103.7		%		70-130	23-MAY-16
COLOUR-WT	Water							
Batch R3462448								
WG2311172-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			96.4		%		80-120	18-MAY-16
WG2311172-4 DUP		**L1770123-1**						
Color, Apparent		47.7	45.5		C.U.	4.8	20	18-MAY-16
WG2311172-1 MB								
Color, Apparent			<1.0		C.U.		1	18-MAY-16
EC-MF-WT	Water							
Batch R3461721								
WG2310701-2 DUP		**WG2310701-4**						
E. Coli		17	14		CFU/100mL	19	65	19-MAY-16
WG2310701-1 MB								
E. Coli			0		CFU/100mL		1	19-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3460654								
WG2309892-4 DUP		**WG2309892-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-MAY-16
WG2309892-1 LCS								
F1 (C6-C10)			103.7		%		80-120	19-MAY-16
WG2309892-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-MAY-16
Surrogate: 3,4-Dichlorotoluene			113.2		%		60-140	19-MAY-16
Batch R3461178								
WG2307329-4 DUP		**WG2307329-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-MAY-16
WG2307329-1 LCS								
F1 (C6-C10)			94.9		%		80-120	19-MAY-16
WG2307329-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-MAY-16
Surrogate: 3,4-Dichlorotoluene			101.8		%		60-140	19-MAY-16
F2-F4-WT	Water							
Batch R3463404								
WG2312128-2 LCS								
F2 (C10-C16)			90.9		%		65-135	20-MAY-16
F3 (C16-C34)			93.9		%		65-135	20-MAY-16
F4 (C34-C50)			82.3		%		65-135	20-MAY-16
WG2312128-3 LCSD		**WG2312128-2**						
F2 (C10-C16)		90.9	90.7		%	0.2	50	20-MAY-16
F3 (C16-C34)		93.9	84.9		%	10	50	20-MAY-16
F4 (C34-C50)		82.3	72.6		%	13	50	20-MAY-16
WG2312128-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			105.3		%		60-140	20-MAY-16
FC-MF-WT	Water							
Batch R3461715								
WG2310709-1 MB								
Fecal Coliforms			0		CFU/100mL		1	19-MAY-16
HG-D-CVAA-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	Water							
Batch R3460194								
WG2310702-3 DUP		**L1770123-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310702-2 LCS								
Mercury (Hg)-Dissolved			108.0		%		80-120	18-MAY-16
WG2310702-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-16
WG2310702-4 MS		**L1770123-2**						
Mercury (Hg)-Dissolved			104.0		%		70-130	18-MAY-16
MET-D-CCMS-WT	Water							
Batch R3460618								
WG2310628-4 DUP		**WG2310628-3**						
Arsenic (As)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-MAY-16
Boron (B)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-MAY-16
Cadmium (Cd)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-MAY-16
Chromium (Cr)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-MAY-16
Cobalt (Co)-Dissolved		0.700	0.707		mg/L	1.0	20	18-MAY-16
Copper (Cu)-Dissolved		9.58	9.72		mg/L	1.5	20	18-MAY-16
Iron (Fe)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-MAY-16
Lead (Pb)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-MAY-16
Manganese (Mn)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-MAY-16
Molybdenum (Mo)-Dissolved		0.0520	0.0544		mg/L	4.6	20	18-MAY-16
Nickel (Ni)-Dissolved		0.439	0.443		mg/L	0.8	20	18-MAY-16
Zinc (Zn)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310628-2 LCS								
Arsenic (As)-Dissolved			99.9		%		80-120	18-MAY-16
Boron (B)-Dissolved			94.1		%		80-120	18-MAY-16
Cadmium (Cd)-Dissolved			98.8		%		80-120	18-MAY-16
Chromium (Cr)-Dissolved			98.9		%		80-120	18-MAY-16
Cobalt (Co)-Dissolved			98.2		%		80-120	18-MAY-16
Copper (Cu)-Dissolved			98.3		%		80-120	18-MAY-16
Iron (Fe)-Dissolved			98.6		%		80-120	18-MAY-16
Lead (Pb)-Dissolved			97.1		%		80-120	18-MAY-16
Manganese (Mn)-Dissolved			98.4		%		80-120	18-MAY-16
Molybdenum (Mo)-Dissolved			97.5		%		80-120	18-MAY-16
Nickel (Ni)-Dissolved			97.3		%		80-120	18-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3460618								
WG2310628-2 LCS								
Zinc (Zn)-Dissolved			91.8		%		80-120	18-MAY-16
WG2310628-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-MAY-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-MAY-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-MAY-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-MAY-16
WG2310628-5 MS		**WG2310628-3**						
Arsenic (As)-Dissolved			97.1		%		70-130	18-MAY-16
Boron (B)-Dissolved			92.9		%		70-130	18-MAY-16
Cadmium (Cd)-Dissolved			94.6		%		70-130	18-MAY-16
Chromium (Cr)-Dissolved			97.1		%		70-130	18-MAY-16
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Copper (Cu)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Iron (Fe)-Dissolved			102.4		%		70-130	18-MAY-16
Lead (Pb)-Dissolved			95.0		%		70-130	18-MAY-16
Manganese (Mn)-Dissolved			102.6		%		70-130	18-MAY-16
Molybdenum (Mo)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Nickel (Ni)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Zinc (Zn)-Dissolved			91.8		%		70-130	18-MAY-16
NH3-WT	Water							
Batch R3461000								
WG2310488-20 DUP		**L1770123-5**						
Ammonia, Total (as N)		1.19	1.16		mg/L	2.2	20	18-MAY-16
WG2310488-19 MS		**L1770123-5**						
Ammonia, Total (as N)			N/A	MS-B	%		-	18-MAY-16
NO2-IC-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	19-MAY-16
WG2311494-7 LCS								
Nitrite (as N)			102.6		%		70-130	19-MAY-16
WG2311494-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Nitrite (as N)			101.7		%		70-130	19-MAY-16
NO3-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	19-MAY-16
WG2311494-7 LCS								
Nitrate (as N)			99.7		%		70-130	19-MAY-16
WG2311494-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Nitrate (as N)			99.2		%		70-130	19-MAY-16
P-T-COL-WT	Water							
Batch R3461786								
WG2311270-3 DUP		**L1770123-1**						
Phosphorus, Total		0.0408	0.0403		mg/L	1.1	20	19-MAY-16
WG2311270-2 LCS								
Phosphorus, Total			103.5		%		80-120	19-MAY-16
WG2311270-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	20-MAY-16
WG2311270-4 MS		**L1770123-1**						
Phosphorus, Total			93.2		%		70-130	19-MAY-16
PAH-CCME-WT	Water							
Batch R3463063								
WG2311216-2 LCS								
Anthracene			111.5		%		50-140	24-MAY-16
Benzo(a)pyrene			92.4		%		60-130	24-MAY-16
WG2311216-3 LCSD		**WG2311216-2**						
Anthracene		111.5	114.0		%	2.2	50	24-MAY-16
Benzo(a)pyrene		92.4	93.5		%	1.2	50	24-MAY-16
WG2311216-1 MB								

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3463063								
WG2311216-1 MB								
Anthracene			<0.020		ug/L		0.02	24-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	24-MAY-16
Surrogate: d8-Naphthalene			66.9		%		60-140	24-MAY-16
Surrogate: d10-Phenanthrene			112.2		%		60-140	24-MAY-16
Surrogate: d12-Chrysene			125.3		%		60-140	24-MAY-16
Surrogate: d10-Acenaphthene			68.0		%		60-140	24-MAY-16
Surrogate: d9-Acridine (SS)			102.8		%		60-140	24-MAY-16
PH-WT	Water							
Batch R3461415								
WG2310796-9 DUP		**WG2310796-8**						
pH		7.32	7.33	J	pH units	0.01	0.2	18-MAY-16
WG2310796-7 LCS								
pH			7.00		pH units		6.9-7.1	18-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3460913								
WG2310717-11 DUP		**L1769313-1**						
Phenols (4AAP)		0.0022	0.0021		mg/L	0.2	20	18-MAY-16
WG2310717-10 LCS								
Phenols (4AAP)			100.9		%		85-115	18-MAY-16
WG2310717-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-12 MS		**L1769313-1**						
Phenols (4AAP)			104.9		%		75-125	18-MAY-16
SO4-IC-N-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Sulfate (SO4)		212	212		mg/L	0.2	20	19-MAY-16
WG2311494-7 LCS								
Sulfate (SO4)			100.3		%		90-110	19-MAY-16
WG2311494-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Sulfate (SO4)			N/A	MS-B	%		-	19-MAY-16
SOLIDS-TDS-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R3464077								
WG2313363-3 DUP		**L1770123-1**						
Total Dissolved Solids		728	709		mg/L	2.6	20	24-MAY-16
WG2313363-2 LCS								
Total Dissolved Solids			100.6		%		85-115	24-MAY-16
WG2313363-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
Batch R3464113								
WG2313364-3 DUP		**L1770123-6**						
Total Dissolved Solids		727	723		mg/L	0.6	20	24-MAY-16
WG2313364-2 LCS								
Total Dissolved Solids			100.9		%		85-115	24-MAY-16
WG2313364-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3462565								
WG2312767-3 DUP		**WG2312767-4**						
Total Suspended Solids		16200	17000		mg/L	4.8	20	21-MAY-16
WG2312767-2 LCS								
Total Suspended Solids			100.0		%		85-115	21-MAY-16
WG2312767-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
Batch R3463170								
WG2312772-3 DUP		**L1771985-1**						
Total Suspended Solids		374	319		mg/L	16	20	21-MAY-16
WG2312772-2 LCS								
Total Suspended Solids			100.2		%		85-115	21-MAY-16
WG2312772-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
TC-MF-WT	Water							
Batch R3461712								
WG2310691-1 MB								
Total Coliforms			0		CFU/100mL		1	19-MAY-16
TKN-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3461730								
WG2311267-3 DUP		**L1770067-3**						
Total Kjeldahl Nitrogen		1.63	1.62		mg/L	0.6	20	19-MAY-16
WG2311267-2 LCS								
Total Kjeldahl Nitrogen			106.0		%		75-125	19-MAY-16
WG2311267-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	19-MAY-16
WG2311267-4 MS		**L1770067-3**						
Total Kjeldahl Nitrogen			110.8		%		70-130	19-MAY-16
Batch R3463334								
WG2312115-3 DUP		**L1770256-22**						
Total Kjeldahl Nitrogen		1.21	1.06		mg/L	13	20	20-MAY-16
WG2312115-2 LCS								
Total Kjeldahl Nitrogen			101.4		%		75-125	20-MAY-16
WG2312115-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-MAY-16
WG2312115-4 MS		**L1770256-22**						
Total Kjeldahl Nitrogen			110.5		%		70-130	20-MAY-16
TURBIDITY-WT	Water							
Batch R3460619								
WG2310686-3 DUP		**L1770123-6**						
Turbidity		78.1	77.7		NTU	0.5	15	19-MAY-16
WG2310686-2 LCS								
Turbidity			101.0		%		85-115	19-MAY-16
WG2310686-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

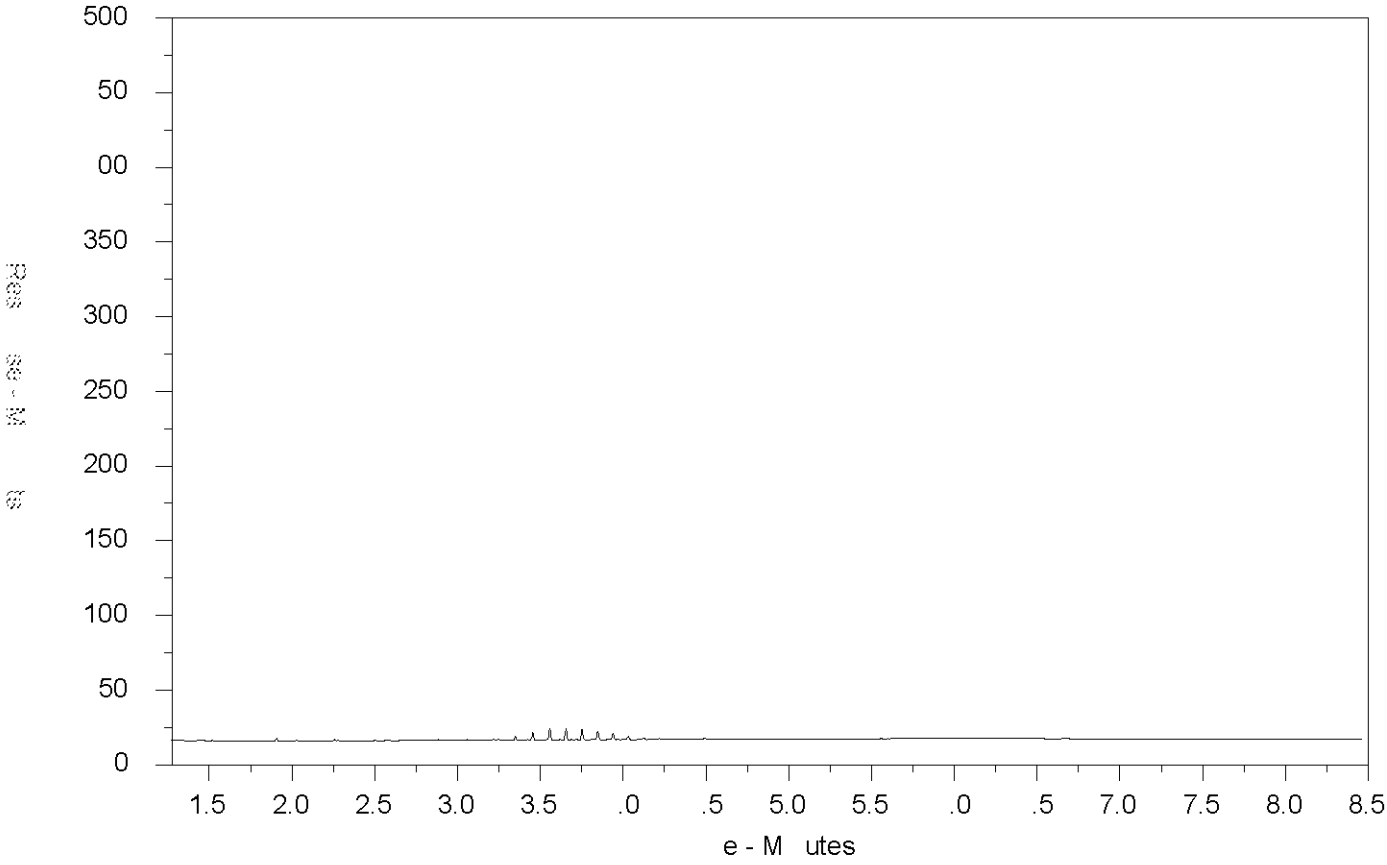
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-1
Client Sample ID: GW-45804-051716-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

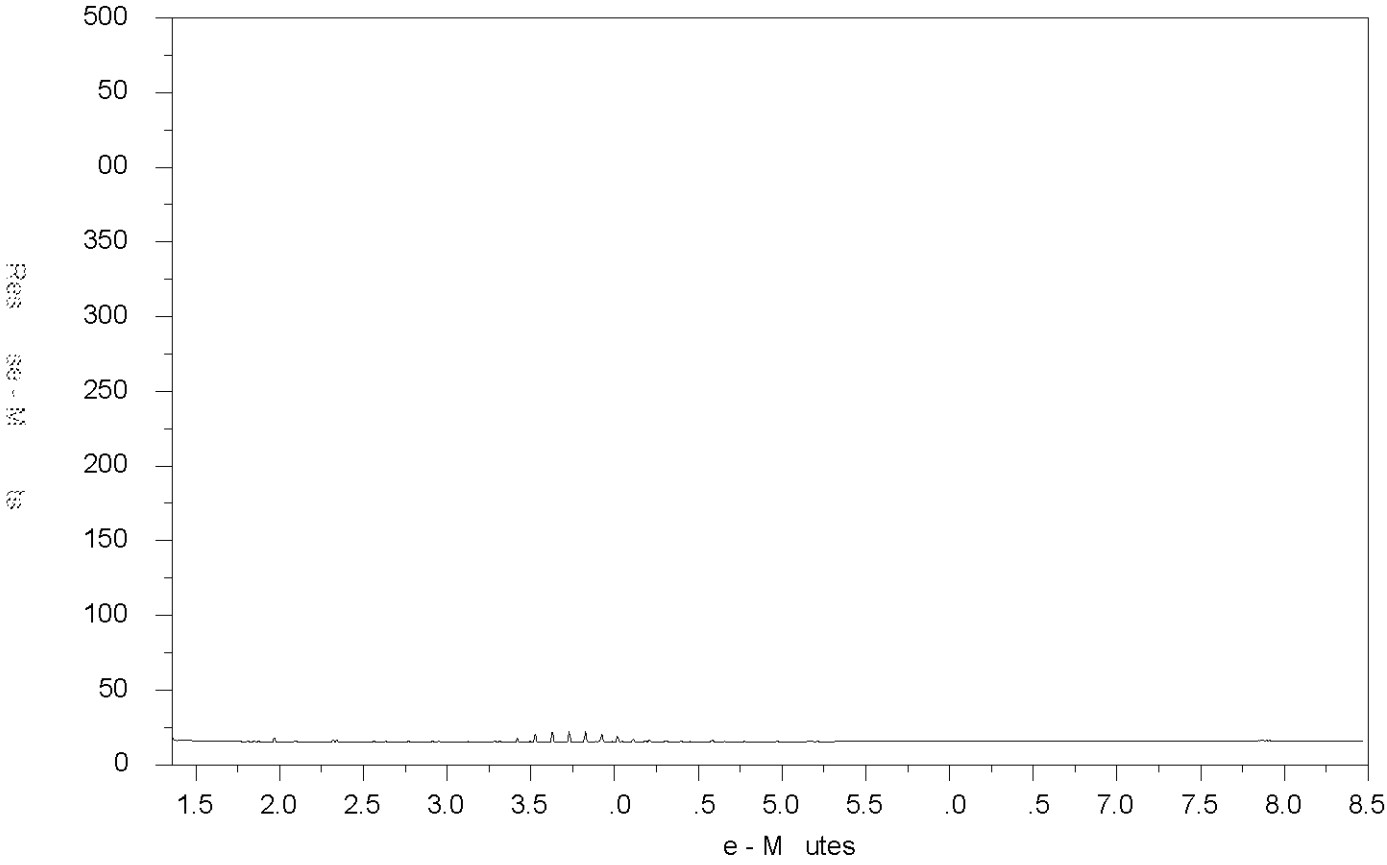
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-2
Client Sample ID: GW-45804-051716-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

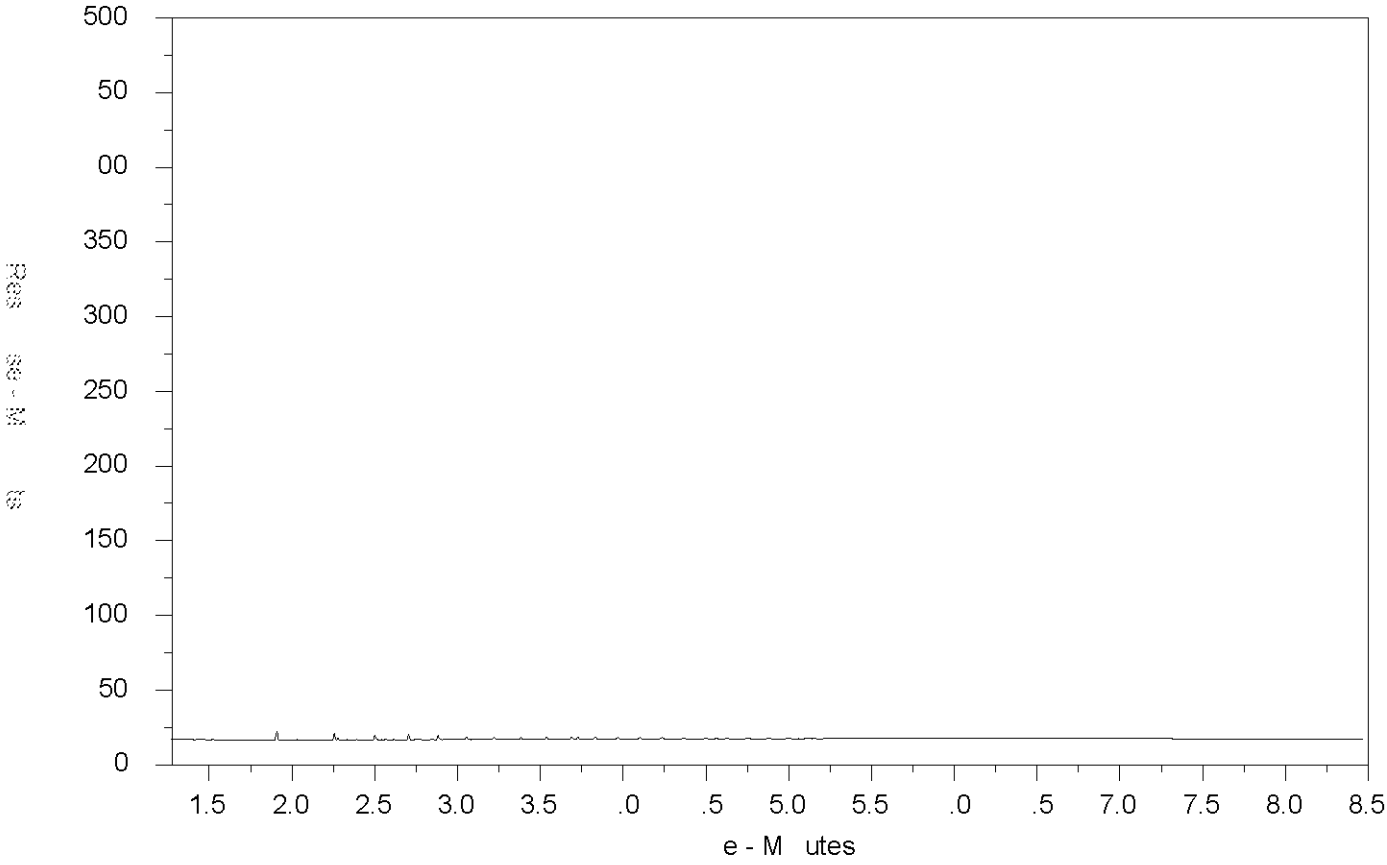
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-3
Client Sample ID: GW-45804-051716-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

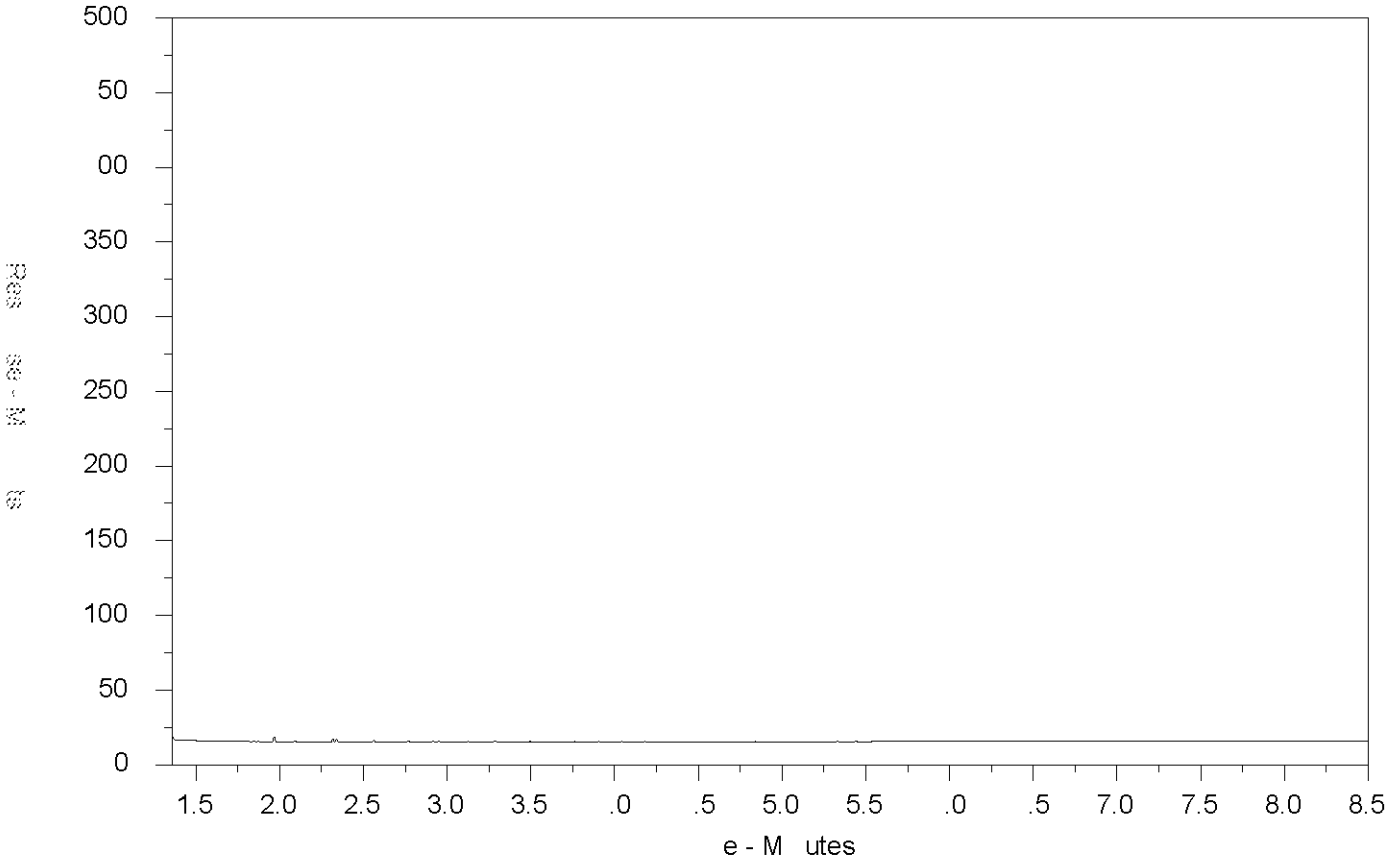
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-4
Client Sample ID: GW-45804-051716-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

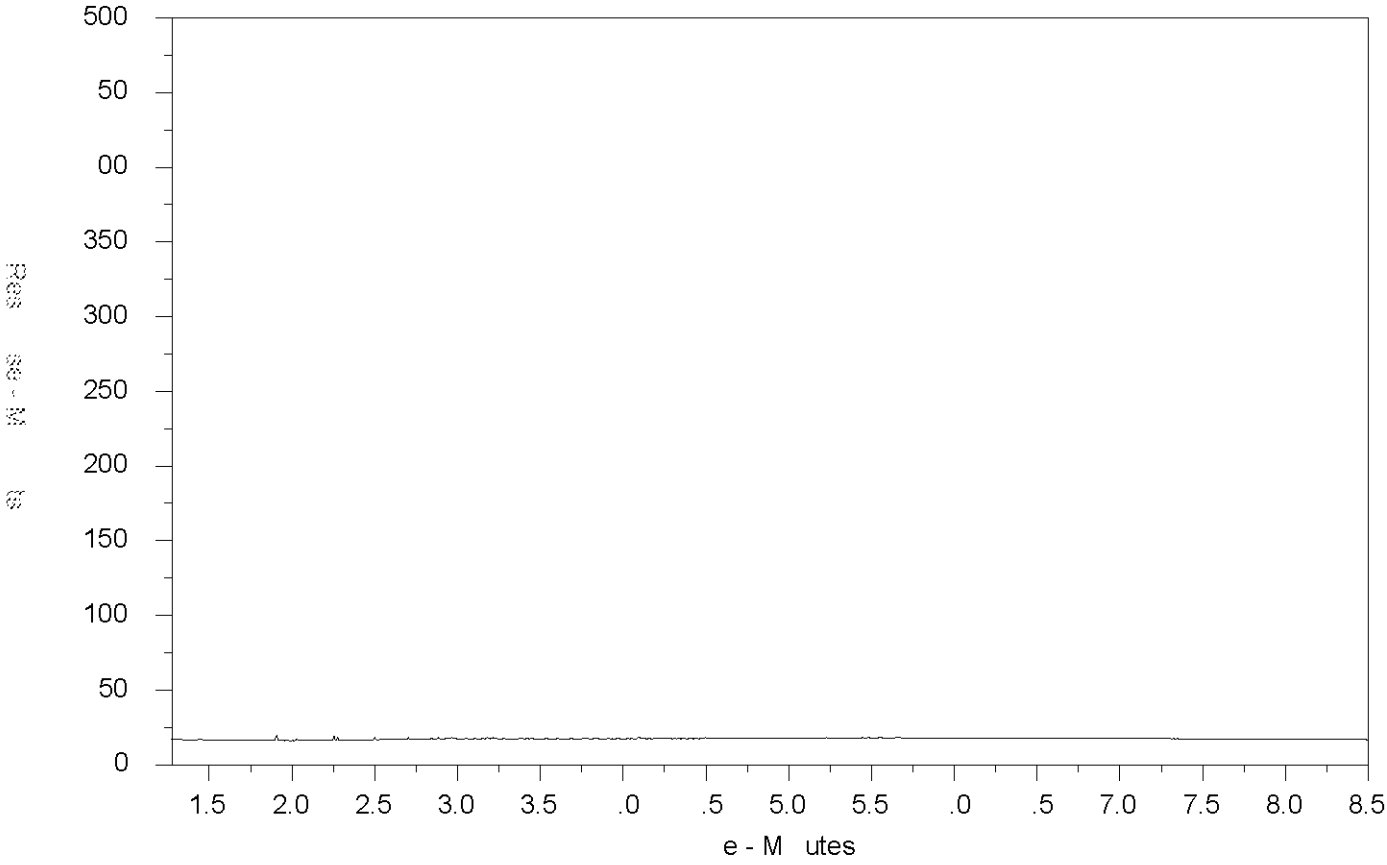
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-5
Client Sample ID: GW-45804-051716-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

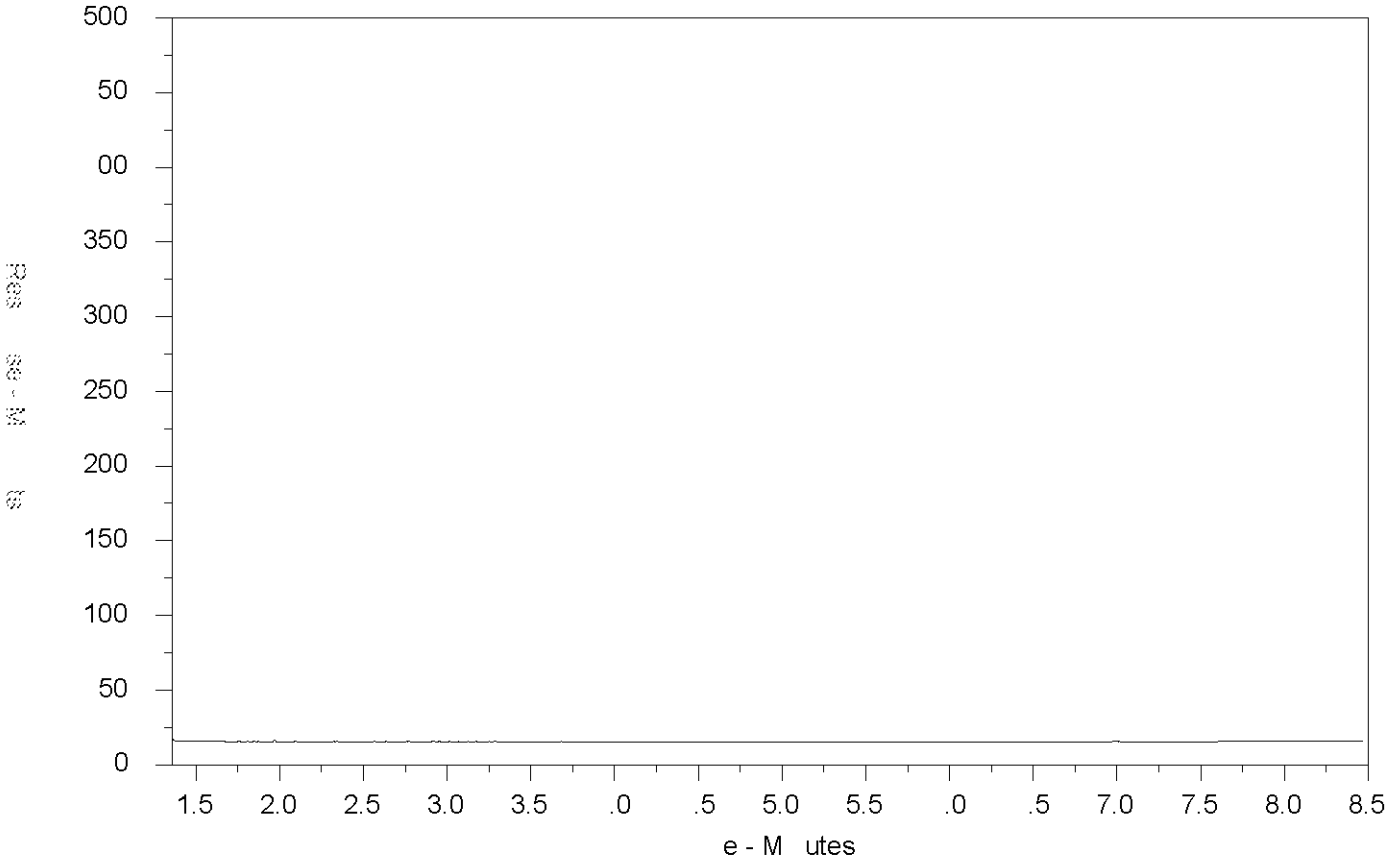
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-6
Client Sample ID: GW-45804-051716-TS-006



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

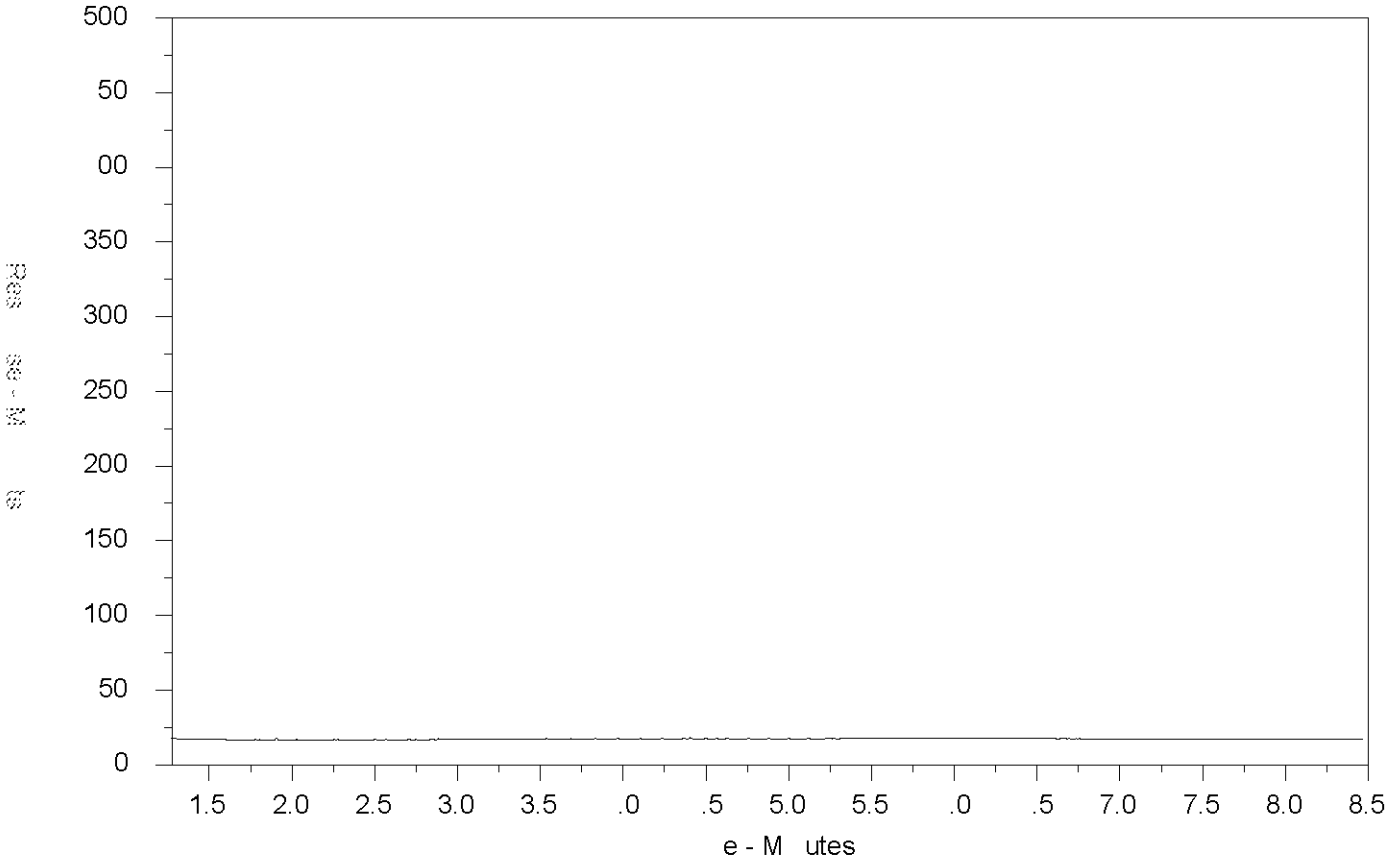
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-7
Client Sample ID: GW-45804-051716-TS-007



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

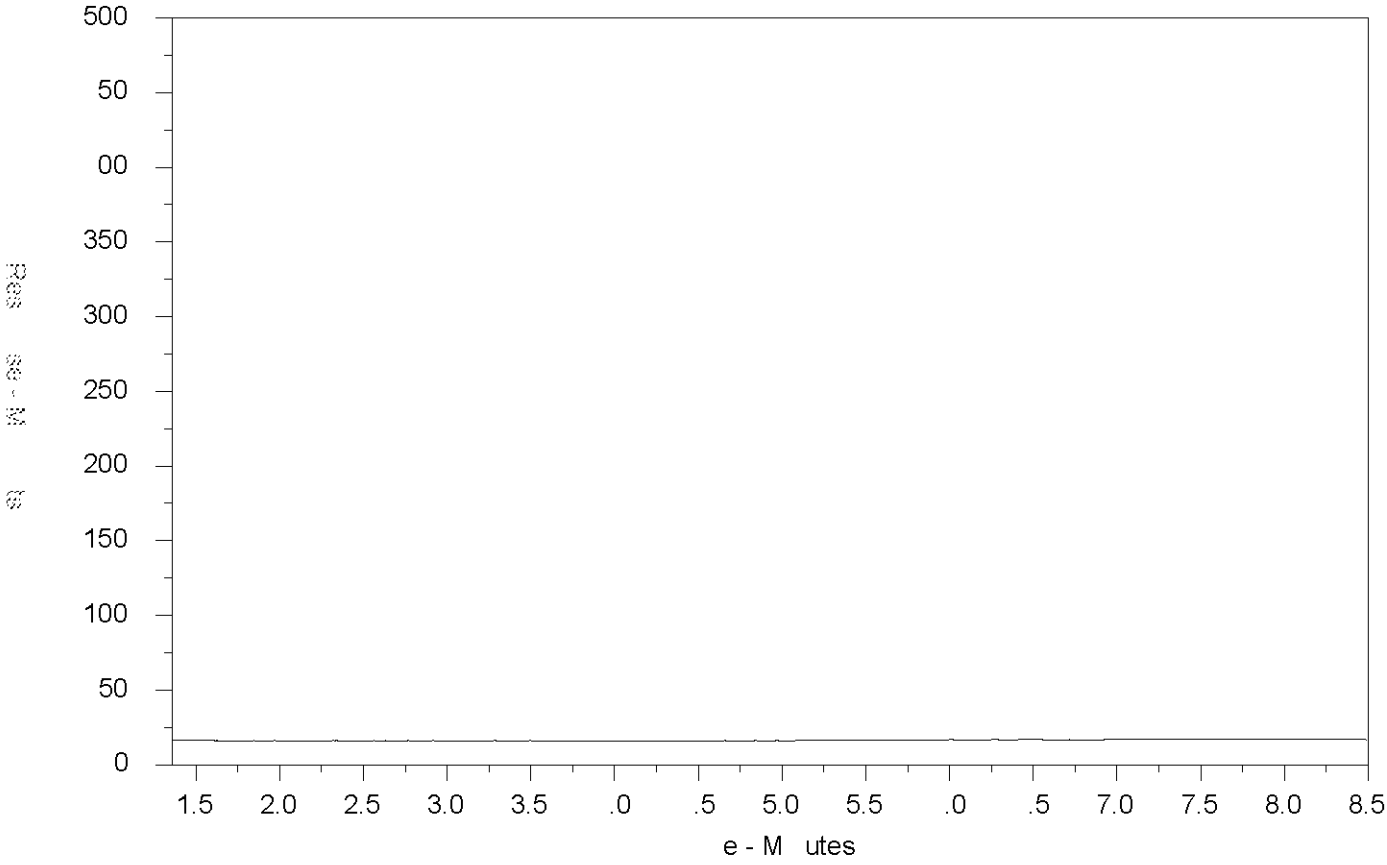
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-8
Client Sample ID: GW-45804-051716-TS-008



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

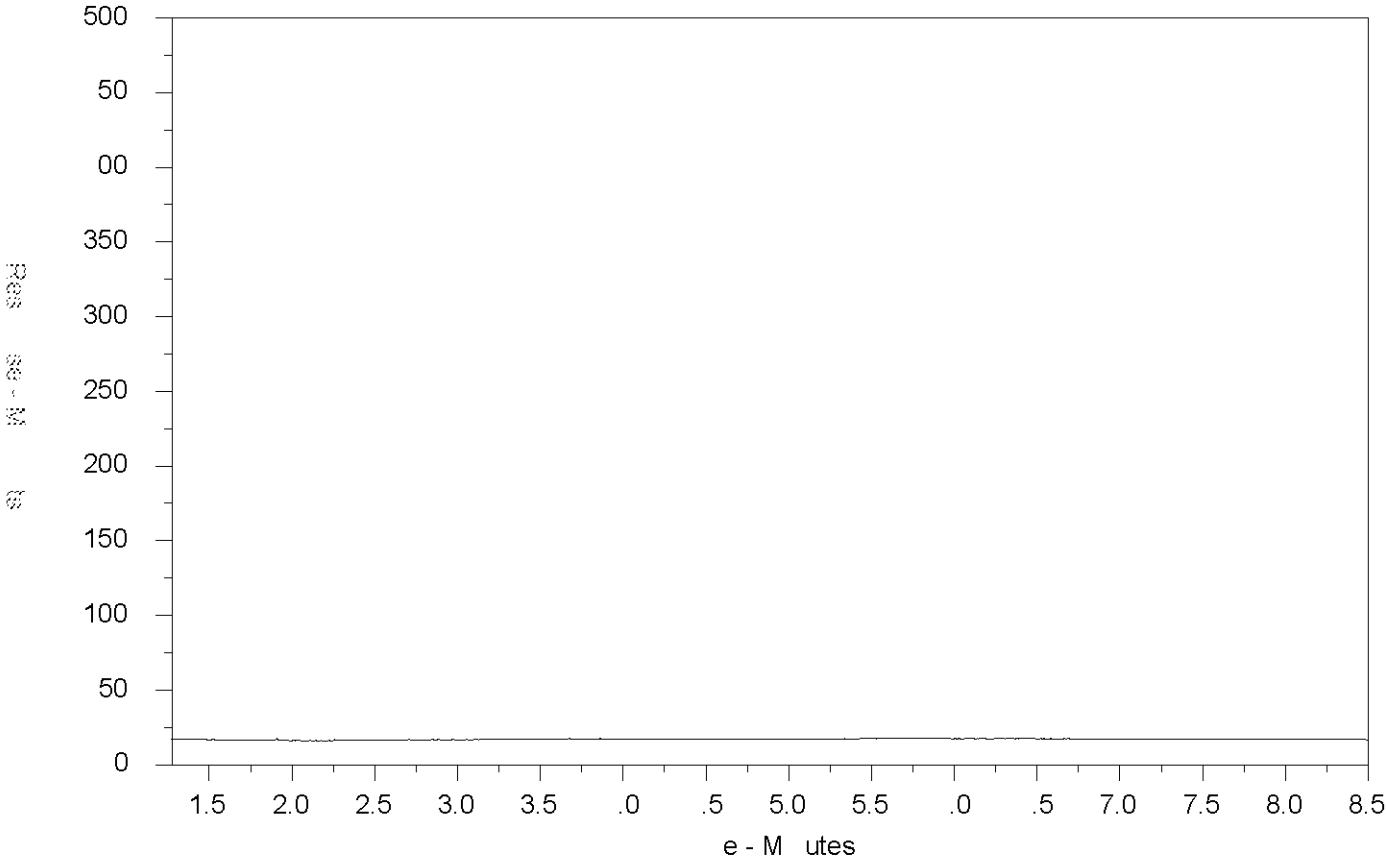
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-9
Client Sample ID: GW-45804-051716-TS-009



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAI

L1770123-COFC

REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME 13791
GHD LIMITED

PROJECT MANAGER
AIRESSE MACPHEE

JOB #
45804-58

PO #
73502328

DUE DATE

CRITERIA | Criteria on report (y/n) ___
Reg 153/04
Table ___
TCLP ___ MISA ___ PWQO ___
OTHER _CLASSDETAILQCPLUS_ALS___
REPORT DISTRIBUTION | ALL FINAL RESULTS WILL BE MAILED
EMAIL__X__ FAX_____
EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com___
EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL_Wayne.Williams@ghd.com___
SELECT: pdf____ digital____ both__X___

ANALYSIS REQUEST

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION # L1770123
ENTERED BY: KS
DATE/TIME ENTERED: MAY 18/16
BIN # 18A

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX												
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT					FIELD PH	FIELD TEMP	COMMENTS	LAB ID
	1030			X			GW-45804-160517/16 -TS-001	15	X						8.54	13.80		1
	1030			X			GW-45804- -TS-002	15	X						8.54	13.80		2
	1120			X			GW-45804- -TS-003	15	X						8.74	10.58		3
	1150			X			GW-45804- -TS-004	15	X						9.38	10.47		4
	1210			X			GW-45804- -TS-005	15	X						7.70	9.63		5
	1245			X			GW-45804- -TS-006	15	X						7.67	11.51		6
	1325			X			GW-45804- -TS-007	15	X						7.58	11.88		7
	1355			X			GW-45804- -TS-008	15	X						7.66	15.72		8
	1435			X			GW-45804- -TS-009	15	X						7.70	12.35		9
				X			GW-45804- -TS-010	15	X									
				X			GW-45804- -TS-011	15	X									
				X			GW-45804- -TS-012	15	X									
				X			GW-45804- -TS-013	15	X									

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	
COOLING INITIATED	11.1 12.1
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT KS

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	5/17/16		5/17/16 3:20
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME:
Trevor Saunders	5/17/16 1520		MAY 18/16 900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

000901

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 18-MAY-16
Report Date: 27-MAY-16 13:14 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1771020
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-1 GW-45804-051816-TS-010 Sampled By: T. SAUNDERS on 18-MAY-16 @ 08:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.22		0.10	pH		19-MAY-16	R3461224
Temperature, Client	18.1		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	79.3		1.0	C.U.		19-MAY-16	R3462458
pH	7.88		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	22.7		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1840	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	50.0		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	376		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.321		0.0066	mg/L		24-MAY-16	
Ammonia, Total (as N)	4.88	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	141	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	5.35		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0234		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	965	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.2		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	4.45	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.637	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0101	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-1 GW-45804-051816-TS-010 Sampled By: T. SAUNDERS on 18-MAY-16 @ 08:25 Matrix: WATER							
Aggregate Organics							
COD	16		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0015		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	89.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	105.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	84.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	114.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	107.8		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	131.8		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.22		0.10	pH		19-MAY-16	R3461224
Temperature, Client	10.6		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	132		1.0	C.U.		19-MAY-16	R3462458
pH	7.89		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	30.0	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1390	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	84.5		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	443		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.159		0.0038	mg/L		24-MAY-16	
Ammonia, Total (as N)	4.18	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	101	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	4.12		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.101		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	542	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.9		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00107		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.129		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00068		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00025		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	4.66		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	1.96		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0108		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00124		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	36		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0010		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	290		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	103.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	92.2		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	106.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	76.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	105.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	106.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	112.4		60-140	%	19-MAY-16	26-MAY-16	R3465515

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1771020-3 GW-45804-051816-TS-012 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.88		0.10	pH		19-MAY-16	R3461224
Temperature, Client	15.9		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	18.0		1.0	C.U.		19-MAY-16	R3462458
pH	7.86		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	9.2		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1460	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	11.8		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	417		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.321		0.011	mg/L		24-MAY-16	
Ammonia, Total (as N)	12.2	DLHC	0.40	mg/L		20-MAY-16	R3462139
Chloride (Cl)	81.3	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	12.6	DLHC	0.30	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0116		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	710	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.8		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.0130		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.073		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	0.000012		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00058		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00053		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00068		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	1.60		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	1.09		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0201		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-3 GW-45804-051816-TS-012 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:45 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	0.00282		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0049		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	15		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0024		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.3		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.0		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	0.0144		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	106.6		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	91.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	100.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	120.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.80		0.10	pH		19-MAY-16	R3461224
Temperature, Client	16.4		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	102		1.0	C.U.		19-MAY-16	R3462458
pH	7.86		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	40.3		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1760	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	77.5		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	380		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0906		0.0023	mg/L		24-MAY-16	
Ammonia, Total (as N)	3.97	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	134	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	4.56		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0291		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	968	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.7		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.0014	DLHC	0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Boron (B)-Dissolved	0.11	DLHC	0.10	mg/L	19-MAY-16	20-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	20-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.0020	DLHC	0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	20-MAY-16	R3461833
Iron (Fe)-Dissolved	6.27	DLHC	0.10	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Manganese (Mn)-Dissolved	6.02	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0146	DLHC	0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	27		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0012		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	95.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	0.0127		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	90.1		60-140	%	19-MAY-16	26-MAY-16	R3465515

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	88.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	103.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	103.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	121.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-5 GW-45804-051816-TS-014 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:50 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.65		0.10	pH		19-MAY-16	R3461224
Temperature, Client	19.8		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	27.3		1.0	C.U.		19-MAY-16	R3462458
pH	8.34		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	27.0	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	673	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	47.9		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	153		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0223		0.0036	mg/L		24-MAY-16	
Ammonia, Total (as N)	0.123		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	45.3		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	0.112		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	0.015		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	0.26		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0099		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	304		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.2		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	4		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	5		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	50	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.070		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00069		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	0.022		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-5 GW-45804-051816-TS-014 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:50 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.0650		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0150		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00084		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	16		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0020		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	100.2		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	114.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	84.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	138.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	113.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.64		0.10	pH		19-MAY-16	R3461224
Temperature, Client	10.3		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	115		1.0	C.U.		19-MAY-16	R3462458
pH	7.88		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	20.4	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1700	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	76.2		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	463		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.159		0.0040	mg/L		24-MAY-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	15.9	DLHC	0.40	mg/L		20-MAY-16	R3462139
Chloride (Cl)	128	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	16.2	DLHC	0.75	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.126		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	749	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.7		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.069		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	0.000015		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00014		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00034		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	6.66		0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	3.06	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.00825		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00154		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0040		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	27		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0019		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.1		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.3		60-140	%		20-MAY-16	R3462029

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Hydrocarbons							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	112.6		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	63.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	105.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	113.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-7 GW-45804-051816-TS-016 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.16		0.10	pH		19-MAY-16	R3461224
Temperature, Client	12.0		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	200		1.0	C.U.		19-MAY-16	R3462458
pH	7.91		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	27.6	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1690	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	101		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	398		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.244		0.0074	mg/L		24-MAY-16	
Ammonia, Total (as N)	6.61	DLHC	0.20	mg/L		20-MAY-16	R3462139
Chloride (Cl)	155		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.020		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	7.50		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0653		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	726		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.8		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00116		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.065		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-7 GW-45804-051816-TS-016 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:15 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	7.89		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	4.72	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.00789		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00161		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0012		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	33		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0021		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	100.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	88.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	120.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	76.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	115.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	113.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	120.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.32		0.10	pH		19-MAY-16	R3461224
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	17.1		1.0	C.U.		19-MAY-16	R3462458
pH	7.93		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	101		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1080	DLDS	20	mg/L		24-MAY-16	R3464142

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Physical Tests							
Turbidity	70.5		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	239		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0021		0.0012	mg/L		24-MAY-16	
Ammonia, Total (as N)	0.036		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	64.3		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	0.032		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	0.25		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0779		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	506		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.9		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.0386	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.191	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.0083	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	14		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	<0.0010		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3464563
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3464563
Surrogate: 2-Bromobenzotrifluoride	102.4		60-140	%	20-MAY-16	20-MAY-16	R3464563
Surrogate: 3,4-Dichlorotoluene	92.7		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	97.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	55.4	SURR-ND	60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	99.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	99.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	117.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-9 GW-45804-051816-TS-018 Sampled By: T. SAUNDERS on 18-MAY-16 @ 13:00 Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		19-MAY-16	R3462458
pH	7.09		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	3.6		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	<10		10	mg/L		24-MAY-16	R3464142
Turbidity	0.19		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		25-MAY-16	R3465068
Ammonia, Total (as N)	0.051		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	<0.50		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.020		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	<0.0030		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	<0.30		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	20-MAY-16	R3461833
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-9 GW-45804-051816-TS-018 Sampled By: T. SAUNDERS on 18-MAY-16 @ 13:00 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	0.00075		0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	<10		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0017		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3464563
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3464563
Surrogate: 2-Bromobenzotrifluoride	112.3		60-140	%	20-MAY-16	20-MAY-16	R3464563
Surrogate: 3,4-Dichlorotoluene	99.3		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	26-MAY-16	27-MAY-16	R3466103
Benzo(a)pyrene	<0.0050		0.0050	ug/L	26-MAY-16	27-MAY-16	R3466103
Surrogate: d10-Acenaphthene	105.1		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d9-Acridine (SS)	72.3		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d12-Chrysene	121.8		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d8-Naphthalene	131.1		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d10-Phenanthrene	74.7		60-140	%	26-MAY-16	27-MAY-16	R3466103

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLHC	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	COD	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.

Reference Information

2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P B E

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066

Reference Information

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3465068								
WG2314906-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			92.2		%		80-120	25-MAY-16
WG2314906-8 DUP		**L1771213-1**						
Alkalinity, Total (as CaCO3)		141	143		mg/L	1.0	20	25-MAY-16
WG2314906-6 LCS								
Alkalinity, Total (as CaCO3)			107.5		%		85-115	25-MAY-16
WG2314906-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	25-MAY-16
BOD-C-WT	Water							
Batch R3464896								
WG2312373-2 DUP		**L1771020-9**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	25-MAY-16
WG2312373-3 LCS								
BOD Carbonaceous			91.9		%		85-115	25-MAY-16
WG2312373-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	25-MAY-16
C-DIS-ORG-WT	Water							
Batch R3463741								
WG2313335-3 DUP		**L1767411-1**						
Dissolved Organic Carbon		8.1	7.5		mg/L	6.9	20	23-MAY-16
WG2313335-2 LCS								
Dissolved Organic Carbon			94.1		%		80-120	23-MAY-16
WG2313335-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	23-MAY-16
WG2313335-4 MS		**L1767411-1**						
Dissolved Organic Carbon			89.4		%		70-130	23-MAY-16
CL-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Chloride (Cl)			101.5		%		70-130	20-MAY-16
WG2312426-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Chloride (Cl)			104.7		%		70-130	20-MAY-16
COD-T-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3463756								
WG2313346-8 DUP		**L1771020-9**						
COD		<10	<10	RPD-NA	mg/L	N/A	25	23-MAY-16
WG2313346-6 LCS								
COD			96.2		%		70-130	23-MAY-16
WG2313346-5 MB								
COD			<10		mg/L		10	23-MAY-16
WG2313346-7 MS		**L1771020-9**						
COD			111.2		%		70-130	23-MAY-16
COLOUR-WT	Water							
Batch R3462458								
WG2312036-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			92.2		%		80-120	19-MAY-16
WG2312036-4 DUP		**L1770928-1**						
Color, Apparent		33.5	32.3		C.U.	3.9	20	19-MAY-16
WG2312036-1 MB								
Color, Apparent			<1.0		C.U.		1	19-MAY-16
EC-MF-WT	Water							
Batch R3462556								
WG2311613-2 DUP		**WG2311613-4**						
E. Coli		0	0		CFU/100mL	0.0	65	20-MAY-16
WG2311613-1 MB								
E. Coli			0		CFU/100mL		1	20-MAY-16
F1-HS-WT	Water							
Batch R3462029								
WG2311614-4 DUP		**WG2311614-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	20-MAY-16
WG2311614-1 LCS								
F1 (C6-C10)			114.9		%		80-120	20-MAY-16
WG2311614-2 MB								
F1 (C6-C10)			<100		ug/L		100	20-MAY-16
Surrogate: 3,4-Dichlorotoluene			107.0		%		60-140	20-MAY-16
WG2311614-5 MS		**WG2311614-3**						
F1 (C6-C10)			85.1		%		50-150	20-MAY-16
F2-F4-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3463404								
WG2312128-2 LCS								
F2 (C10-C16)			90.9		%		65-135	20-MAY-16
F3 (C16-C34)			93.9		%		65-135	20-MAY-16
F4 (C34-C50)			82.3		%		65-135	20-MAY-16
WG2312128-3 LCSD		**WG2312128-2**						
F2 (C10-C16)		90.9	90.7		%	0.2	50	20-MAY-16
F3 (C16-C34)		93.9	84.9		%	10	50	20-MAY-16
F4 (C34-C50)		82.3	72.6		%	13	50	20-MAY-16
WG2312128-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			105.3		%		60-140	20-MAY-16
Batch R3464563								
WG2312129-2 LCS								
F2 (C10-C16)			91.4		%		65-135	20-MAY-16
F3 (C16-C34)			93.7		%		65-135	20-MAY-16
F4 (C34-C50)			82.7		%		65-135	20-MAY-16
WG2312129-3 LCSD		**WG2312129-2**						
F2 (C10-C16)		91.4	94.0		%	2.8	50	20-MAY-16
F3 (C16-C34)		93.7	88.4		%	5.9	50	20-MAY-16
F4 (C34-C50)		82.7	78.2		%	5.6	50	20-MAY-16
WG2312129-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			107.2		%		60-140	20-MAY-16
FC-MF-WT	Water							
Batch R3462550								
WG2311619-1 MB								
Fecal Coliforms			0		CFU/100mL		1	20-MAY-16
HG-D-CVAA-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	Water							
Batch R3461910								
WG2311743-4 DUP		**WG2311743-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-MAY-16
WG2311743-2 LCS								
Mercury (Hg)-Dissolved			102.0		%		80-120	20-MAY-16
WG2311743-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-MAY-16
WG2311743-6 MS		**WG2311743-5**						
Mercury (Hg)-Dissolved			89.5		%		70-130	20-MAY-16
MET-D-CCMS-WT	Water							
Batch R3461833								
WG2311767-4 DUP		**WG2311767-3**						
Arsenic (As)-Dissolved		0.00012	0.00010		mg/L	14	20	19-MAY-16
Boron (B)-Dissolved		0.019	0.020		mg/L	2.6	20	20-MAY-16
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-MAY-16
Chromium (Cr)-Dissolved		0.00065	0.00068		mg/L	4.2	20	19-MAY-16
Cobalt (Co)-Dissolved		0.00016	0.00016		mg/L	0.1	20	19-MAY-16
Copper (Cu)-Dissolved		0.00192	0.00193		mg/L	0.3	20	19-MAY-16
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-MAY-16
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-MAY-16
Manganese (Mn)-Dissolved		0.00824	0.00825		mg/L	0.1	20	19-MAY-16
Molybdenum (Mo)-Dissolved		0.00107	0.00106		mg/L	1.3	20	20-MAY-16
Nickel (Ni)-Dissolved		0.00073	0.00075		mg/L	2.0	20	19-MAY-16
Zinc (Zn)-Dissolved		0.0012	0.0013		mg/L	10	20	19-MAY-16
WG2311767-2 LCS								
Arsenic (As)-Dissolved			99.9		%		80-120	19-MAY-16
Boron (B)-Dissolved			93.5		%		80-120	19-MAY-16
Cadmium (Cd)-Dissolved			97.9		%		80-120	19-MAY-16
Chromium (Cr)-Dissolved			99.4		%		80-120	19-MAY-16
Cobalt (Co)-Dissolved			99.1		%		80-120	19-MAY-16
Copper (Cu)-Dissolved			98.0		%		80-120	19-MAY-16
Iron (Fe)-Dissolved			104.1		%		80-120	19-MAY-16
Lead (Pb)-Dissolved			98.6		%		80-120	19-MAY-16
Manganese (Mn)-Dissolved			99.9		%		80-120	19-MAY-16
Molybdenum (Mo)-Dissolved			99.96		%		80-120	19-MAY-16
Nickel (Ni)-Dissolved			98.2		%		80-120	19-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3461833								
WG2311767-2 LCS								
Zinc (Zn)-Dissolved			94.9		%		80-120	19-MAY-16
WG2311767-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-MAY-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-MAY-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-MAY-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-MAY-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-MAY-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-MAY-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-MAY-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-MAY-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-MAY-16
WG2311767-5 MS		**WG2311767-3**						
Arsenic (As)-Dissolved			103.4		%		70-130	19-MAY-16
Boron (B)-Dissolved			91.1		%		70-130	19-MAY-16
Cadmium (Cd)-Dissolved			97.4		%		70-130	19-MAY-16
Chromium (Cr)-Dissolved			96.7		%		70-130	19-MAY-16
Cobalt (Co)-Dissolved			94.5		%		70-130	19-MAY-16
Copper (Cu)-Dissolved			91.4		%		70-130	19-MAY-16
Iron (Fe)-Dissolved			95.8		%		70-130	19-MAY-16
Lead (Pb)-Dissolved			93.1		%		70-130	19-MAY-16
Manganese (Mn)-Dissolved			93.6		%		70-130	19-MAY-16
Molybdenum (Mo)-Dissolved			95.5		%		70-130	19-MAY-16
Nickel (Ni)-Dissolved			92.1		%		70-130	19-MAY-16
Zinc (Zn)-Dissolved			97.4		%		70-130	19-MAY-16
NH3-WT	Water							
Batch R3462139								
WG2312146-3 DUP		**L1771411-4**						
Ammonia, Total (as N)		0.121	0.107		mg/L	12	20	20-MAY-16
WG2312146-7 DUP		**L1771084-1**						
Ammonia, Total (as N)		0.38	0.39		mg/L	3.7	20	20-MAY-16
WG2312146-2 LCS								

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3462139								
WG2312146-2 LCS								
Ammonia, Total (as N)			97.7		%		85-115	20-MAY-16
WG2312146-6 LCS								
Ammonia, Total (as N)			97.7		%		85-115	20-MAY-16
WG2312146-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312146-5 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312146-4 MS		**L1771411-4**						
Ammonia, Total (as N)			107.9		%		75-125	20-MAY-16
WG2312146-8 MS		**L1771084-1**						
Ammonia, Total (as N)			107.3		%		75-125	20-MAY-16
NO2-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Nitrite (as N)			103.3		%		70-130	20-MAY-16
WG2312426-16 MB								
Nitrite (as N)			<0.010		mg/L		0.01	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Nitrite (as N)			107.2		%		70-130	20-MAY-16
NO3-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Nitrate (as N)			100.6		%		70-130	20-MAY-16
WG2312426-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Nitrate (as N)			104.7		%		70-130	20-MAY-16
P-T-COL-WT	Water							
Batch R3463796								
WG2313351-3 DUP		**L1771020-1**						
Phosphorus, Total		0.0234	0.0247		mg/L	5.2	20	24-MAY-16
WG2313351-2 LCS								

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3463796								
WG2313351-2 LCS								
Phosphorus, Total			99.99		%		80-120	24-MAY-16
WG2313351-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	24-MAY-16
WG2313351-4 MS		**L1771020-1**						
Phosphorus, Total			93.8		%		70-130	24-MAY-16
PAH-CCME-WT	Water							
Batch R3465515								
WG2312064-2 LCS								
Anthracene			104.4		%		50-140	26-MAY-16
Benzo(a)pyrene			114.3		%		60-130	26-MAY-16
WG2312064-3 LCSD		**WG2312064-2**						
Anthracene		104.4	107.0		%	2.4	50	26-MAY-16
Benzo(a)pyrene		114.3	116.7		%	2.1	50	26-MAY-16
WG2312064-1 MB								
Anthracene			<0.020		ug/L		0.02	26-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	26-MAY-16
Surrogate: d8-Naphthalene			106.9		%		60-140	26-MAY-16
Surrogate: d10-Phenanthrene			109.1		%		60-140	26-MAY-16
Surrogate: d12-Chrysene			108.2		%		60-140	26-MAY-16
Surrogate: d10-Acenaphthene			117.4		%		60-140	26-MAY-16
Surrogate: d9-Acridine (SS)			85.2		%		60-140	26-MAY-16
Batch R3466103								
WG2315754-2 LCS								
Anthracene			81.7		%		50-140	27-MAY-16
Benzo(a)pyrene			98.4		%		60-130	27-MAY-16
WG2315754-3 LCSD		**WG2315754-2**						
Anthracene		81.7	97.0		%	17	50	27-MAY-16
Benzo(a)pyrene		98.4	103.5		%	5.0	50	27-MAY-16
WG2315754-1 MB								
Anthracene			<0.020		ug/L		0.02	27-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	27-MAY-16
Surrogate: d8-Naphthalene			130.4		%		60-140	27-MAY-16
Surrogate: d10-Phenanthrene			113.7		%		60-140	27-MAY-16
Surrogate: d12-Chrysene			121.8		%		60-140	27-MAY-16
Surrogate: d10-Acenaphthene			107.4		%		60-140	27-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3466103								
WG2315754-1 MB								
Surrogate: d9-Acridine (SS)			94.9		%		60-140	27-MAY-16
PH-WT	Water							
Batch R3462141								
WG2311682-12 DUP		**WG2311682-11**						
pH		7.87	7.87	J	pH units	0.00	0.2	19-MAY-16
WG2311682-10 LCS								
pH			7.02		pH units		6.9-7.1	19-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3463923								
WG2313542-11 DUP		**L1771020-2**						
Phenols (4AAP)		0.0010	0.0010		mg/L	1.0	20	24-MAY-16
WG2313542-7 DUP		**L1770809-6**						
Phenols (4AAP)		0.0036	0.0034		mg/L	4.9	20	24-MAY-16
WG2313542-10 LCS								
Phenols (4AAP)			106.7		%		85-115	24-MAY-16
WG2313542-6 LCS								
Phenols (4AAP)			106.5		%		85-115	24-MAY-16
WG2313542-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	24-MAY-16
WG2313542-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	24-MAY-16
WG2313542-12 MS		**L1771020-2**						
Phenols (4AAP)			106.0		%		75-125	24-MAY-16
WG2313542-8 MS		**L1770809-6**						
Phenols (4AAP)			100.9		%		75-125	24-MAY-16
SO4-IC-N-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	20-MAY-16
WG2312426-17 LCS								
Sulfate (SO4)			100.8		%		90-110	20-MAY-16
WG2312426-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Sulfate (SO4)			104.9		%		75-125	20-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R3464142								
WG2313365-3 DUP		**L1770279-7**						
Total Dissolved Solids		735	731		mg/L	0.6	20	24-MAY-16
WG2313365-2 LCS								
Total Dissolved Solids			98.4		%		85-115	24-MAY-16
WG2313365-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3463190								
WG2313029-3 DUP		**L1771020-5**						
Total Suspended Solids		27.0	26.0		mg/L	3.8	20	24-MAY-16
WG2313029-2 LCS								
Total Suspended Solids			100.6		%		85-115	24-MAY-16
WG2313029-1 MB								
Total Suspended Solids			<2.0		mg/L		2	24-MAY-16
TC-MF-WT	Water							
Batch R3462538								
WG2311623-1 MB								
Total Coliforms			0		CFU/100mL		1	20-MAY-16
TKN-WT	Water							
Batch R3463334								
WG2312118-3 DUP		**L1771020-6**						
Total Kjeldahl Nitrogen		16.2	15.0		mg/L	7.8	20	20-MAY-16
WG2312118-2 LCS								
Total Kjeldahl Nitrogen			97.1		%		75-125	20-MAY-16
WG2312118-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-MAY-16
WG2312118-4 MS		**L1771020-6**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	20-MAY-16
TURBIDITY-WT	Water							
Batch R3461370								
WG2311521-3 DUP		**L1770326-2**						
Turbidity		0.34	0.29	J	NTU	0.050	0.2	19-MAY-16
WG2311521-2 LCS								
Turbidity			101.0		%		85-115	19-MAY-16
WG2311521-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	Water							
Batch R3461717								
WG2311942-3 DUP		**L1770887-1**						
Turbidity		71.2	73.0		NTU	2.5	15	19-MAY-16
WG2311942-2 LCS								
Turbidity			99.5		%		85-115	19-MAY-16
WG2311942-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

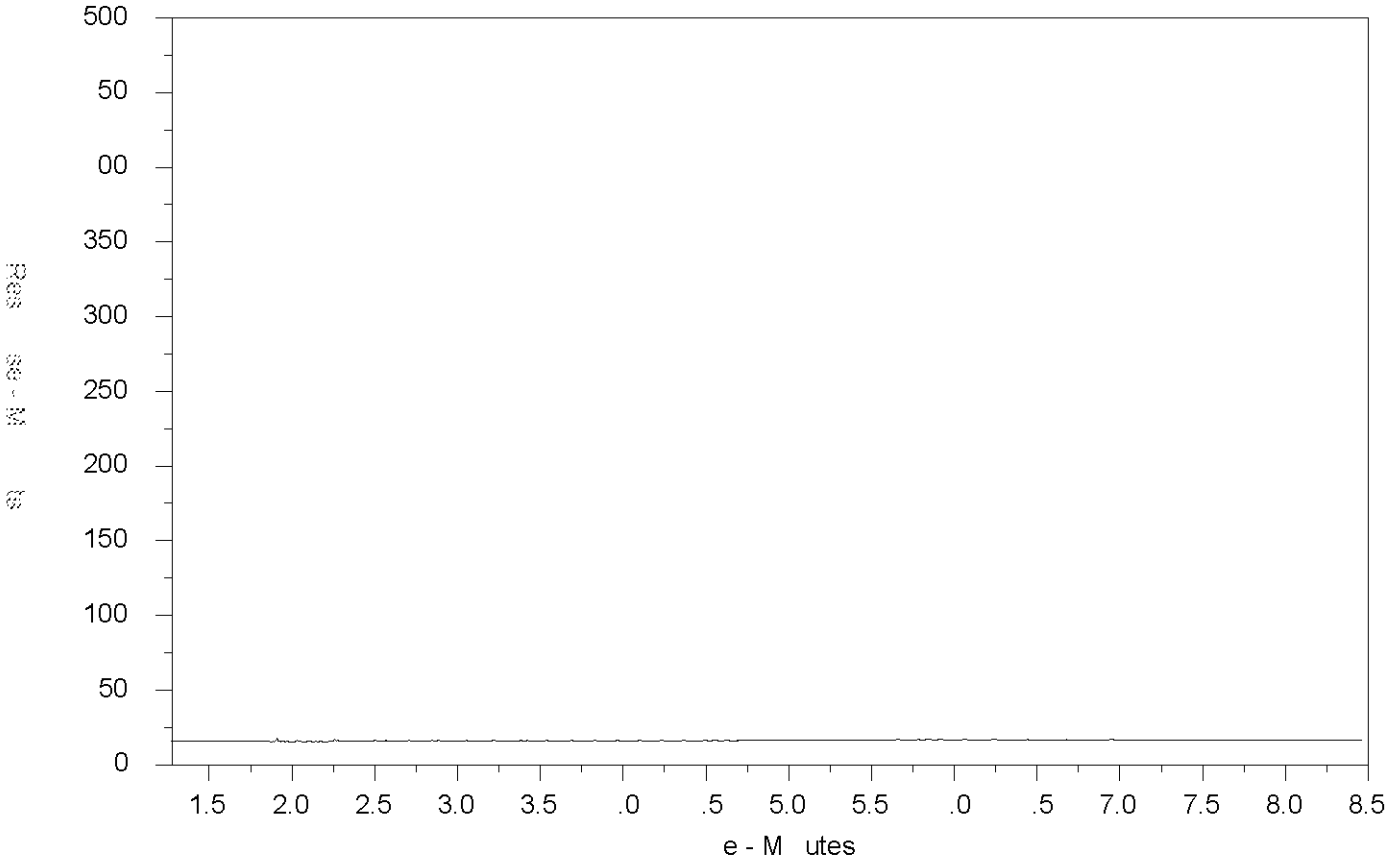
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-1
Client Sample ID: GW-45804-051816-TS-010



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

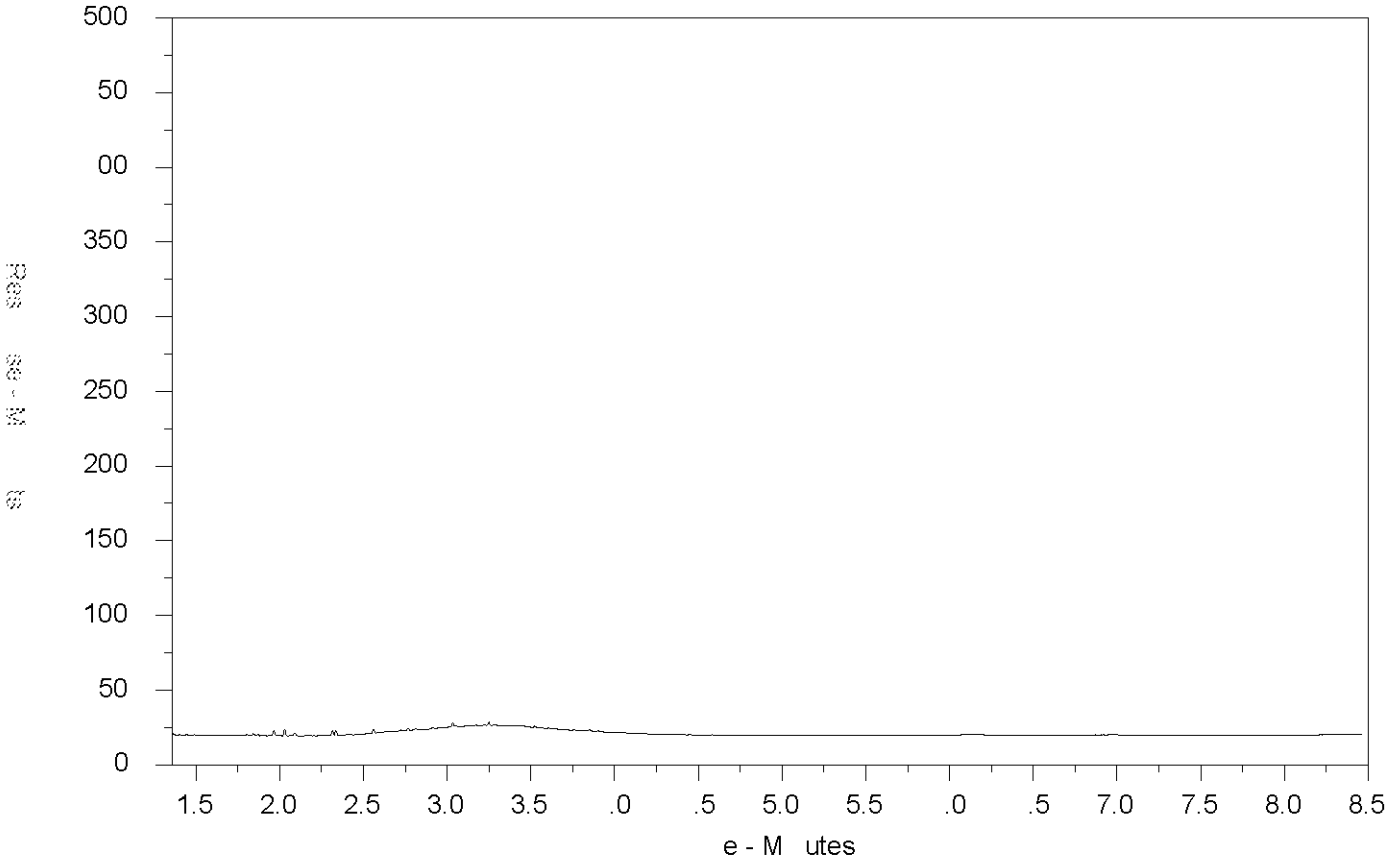
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-2
Client Sample ID: GW-45804-051816-TS-011



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

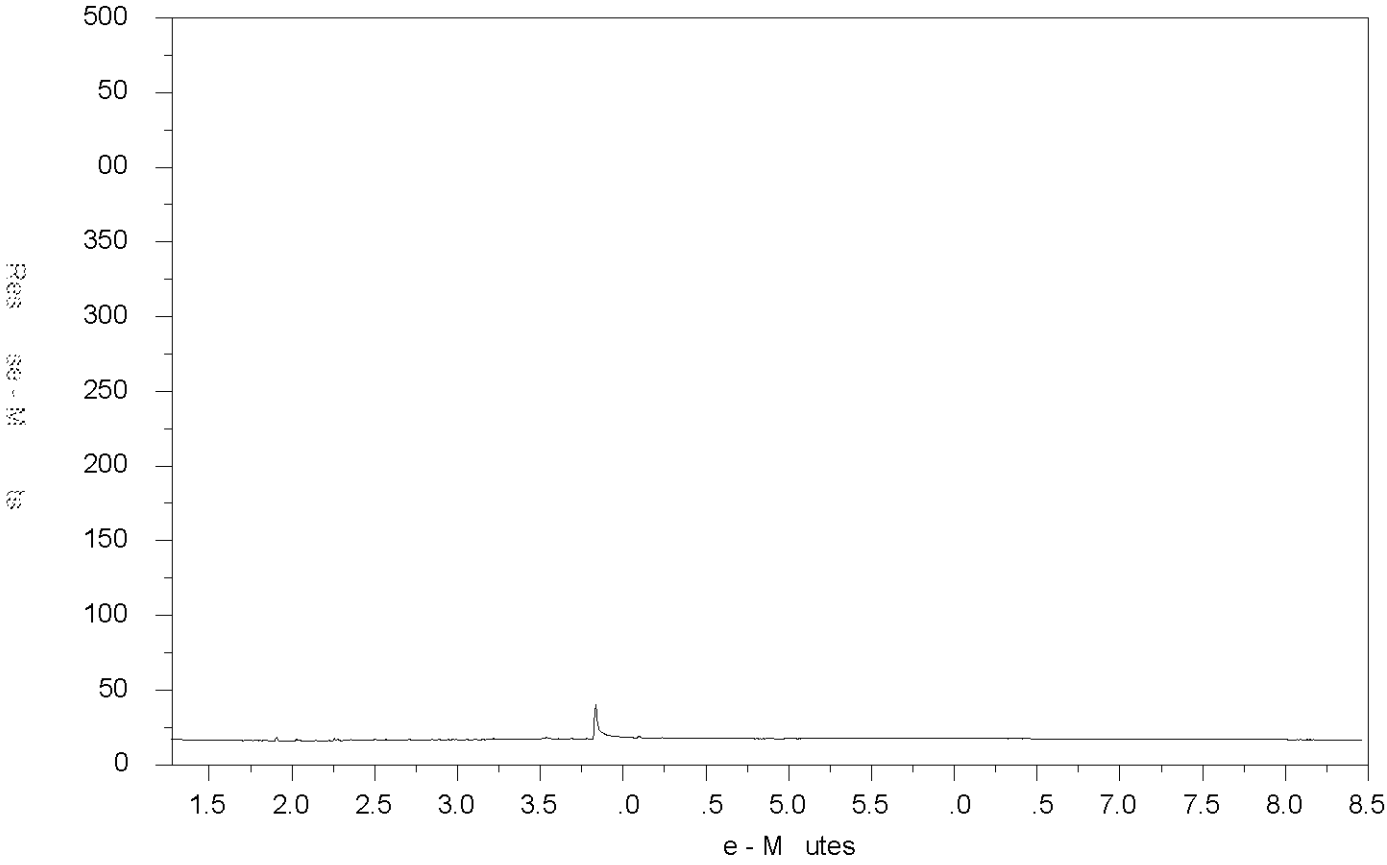
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-3
Client Sample ID: GW-45804-051816-TS-012



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

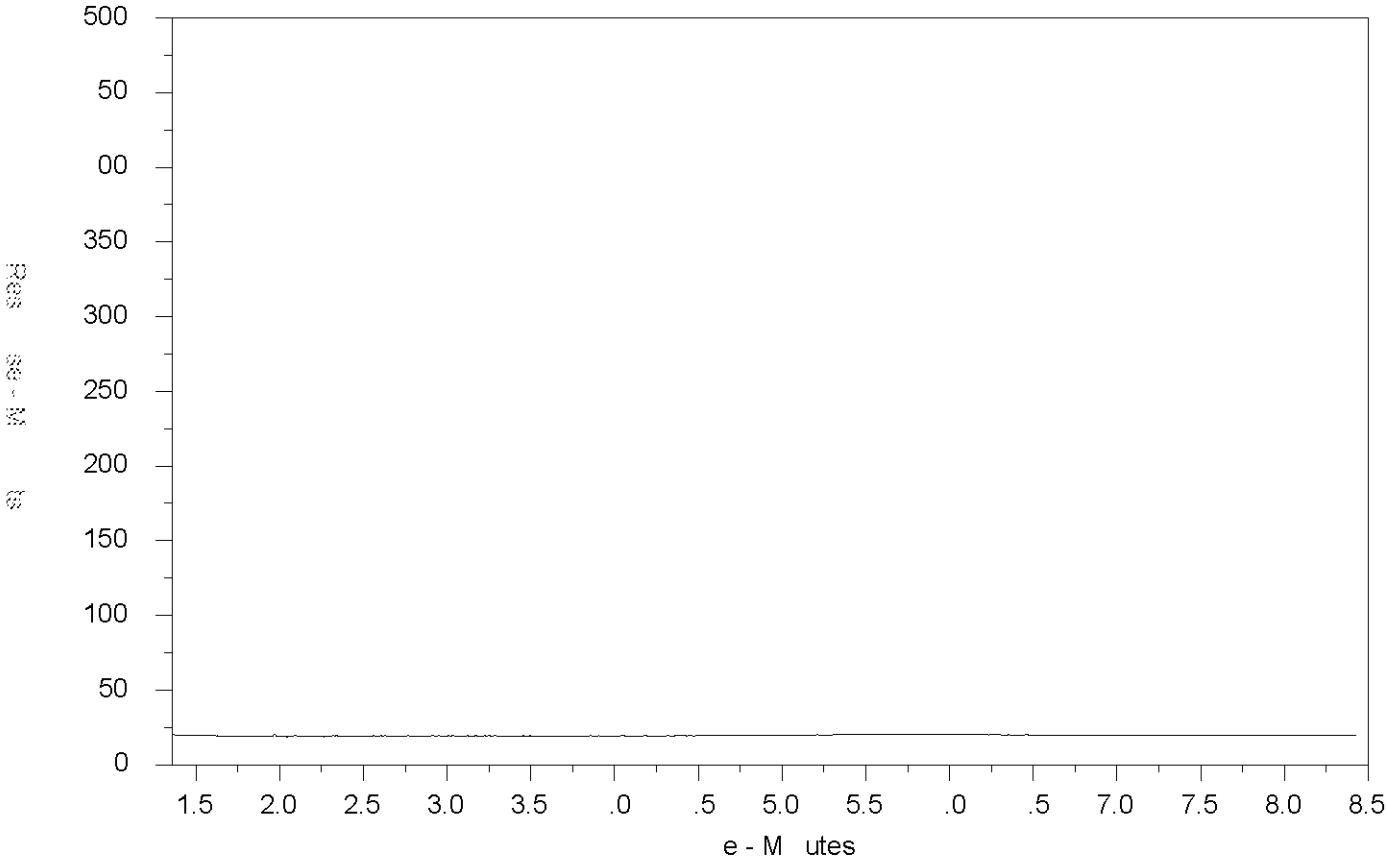
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-4
Client Sample ID: GW-45804-051816-TS-013



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

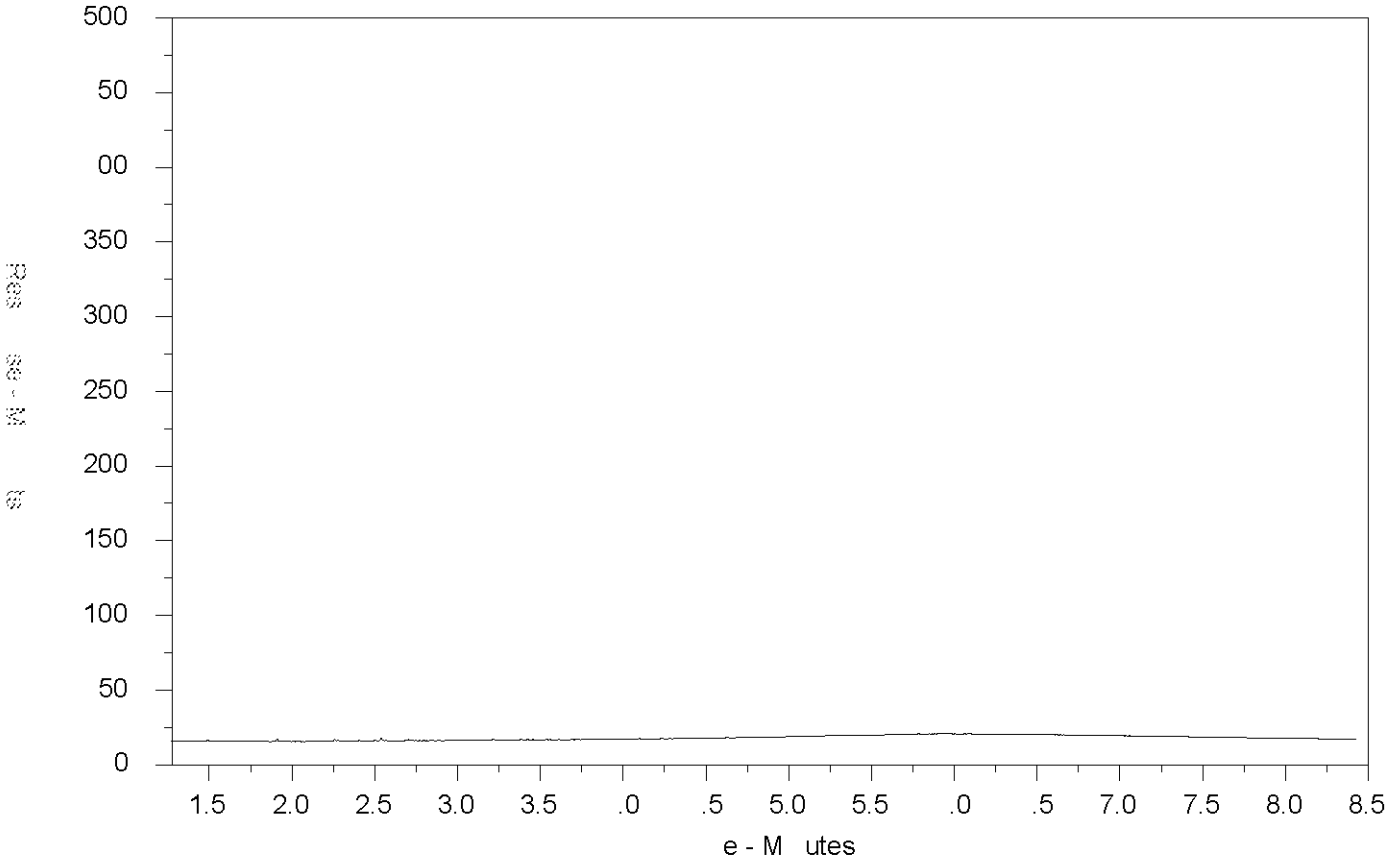
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-5
Client Sample ID: GW-45804-051816-TS-014



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

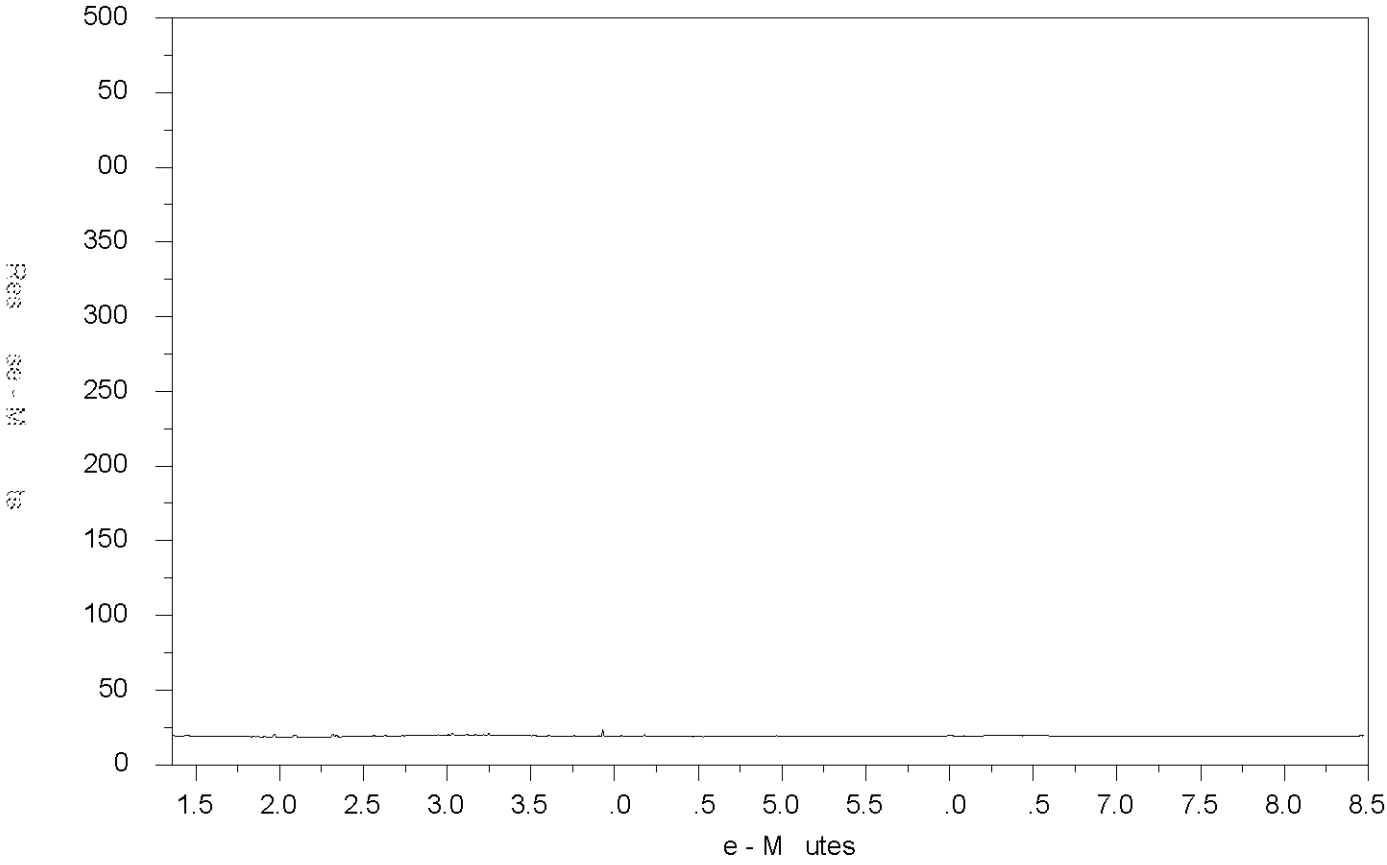
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-6
Client Sample ID: GW-45804-051816-TS-015



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

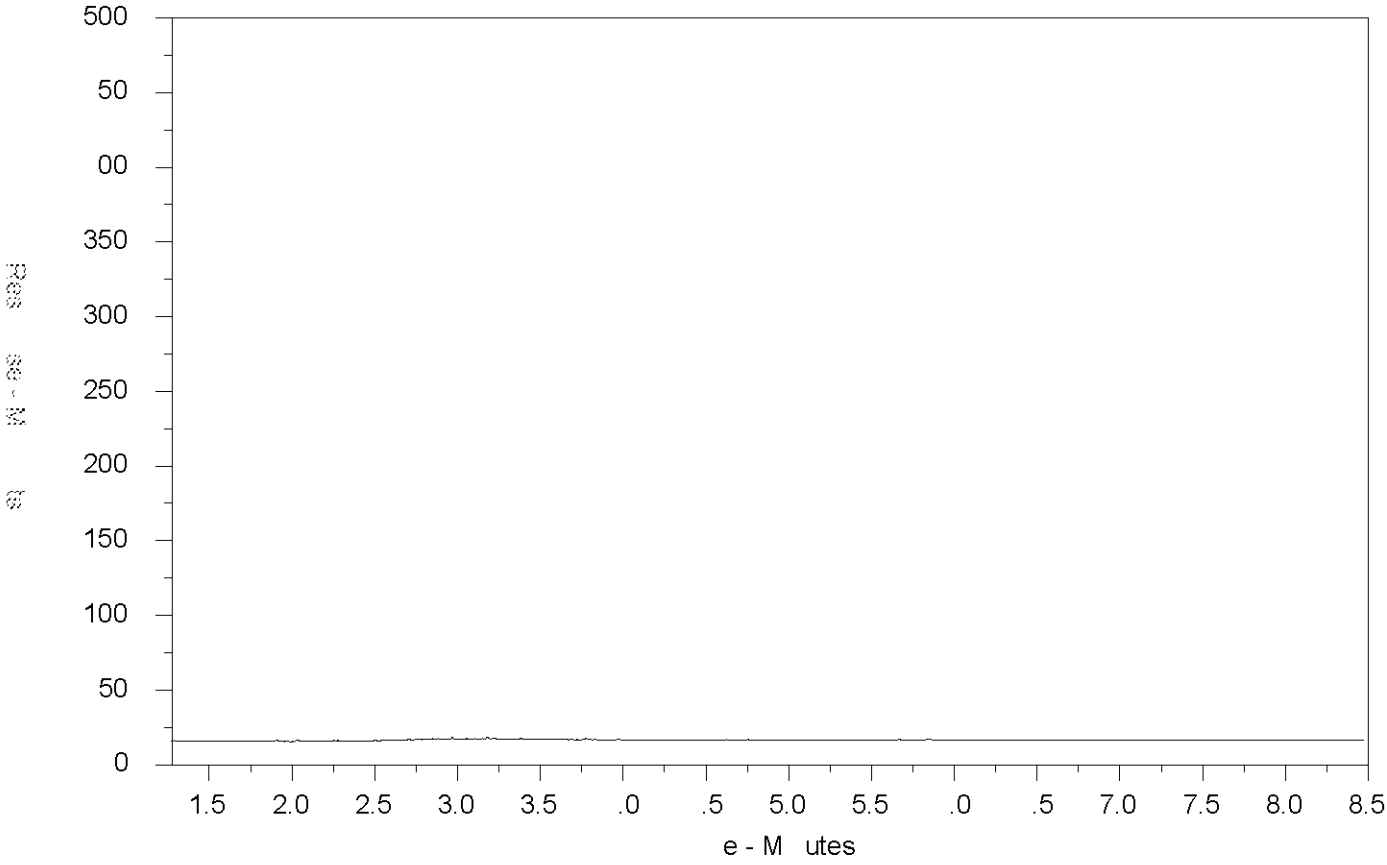
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-7
Client Sample ID: GW-45804-051816-TS-016



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

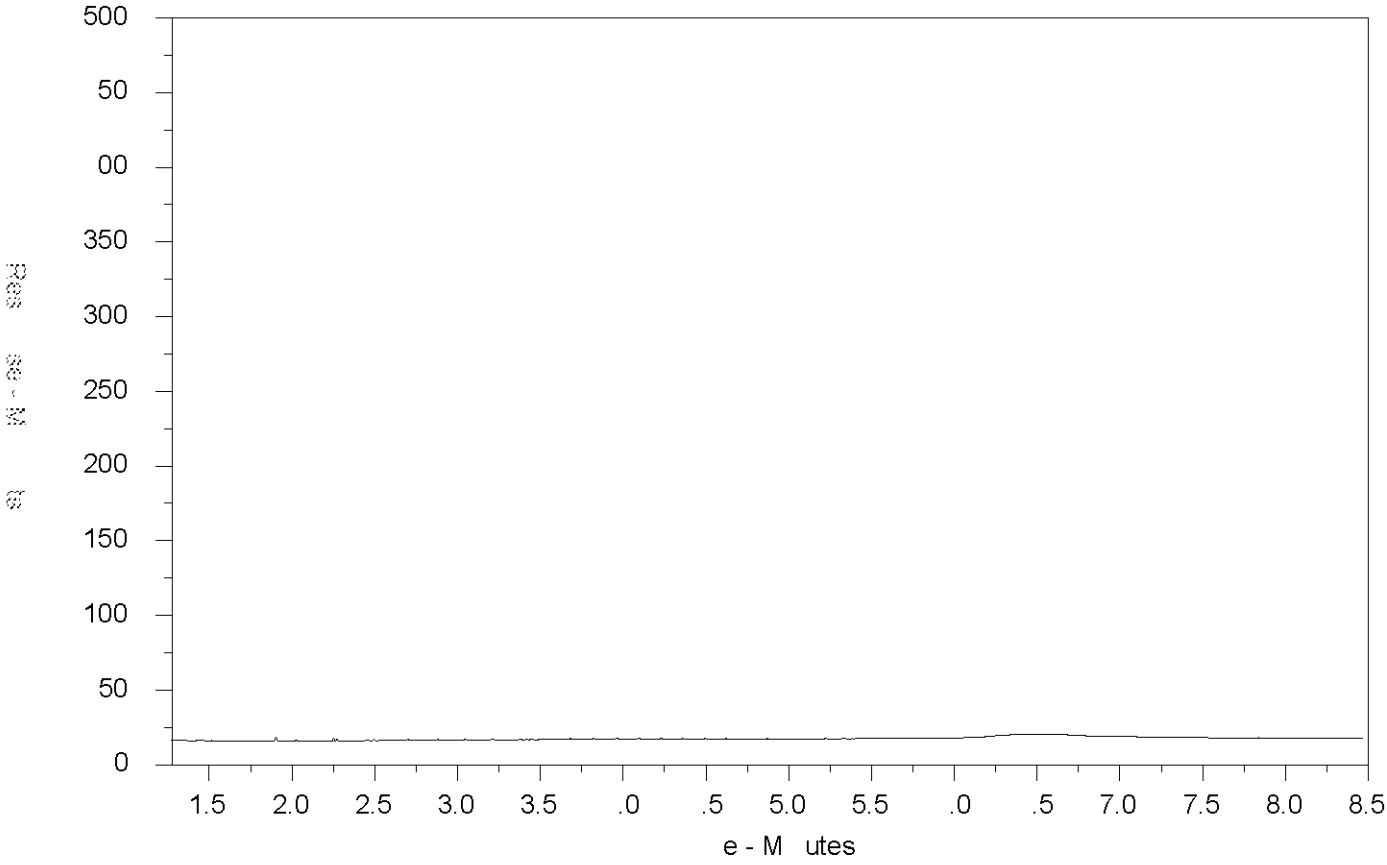
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-8
Client Sample ID: GW-45804-051816-TS-017



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

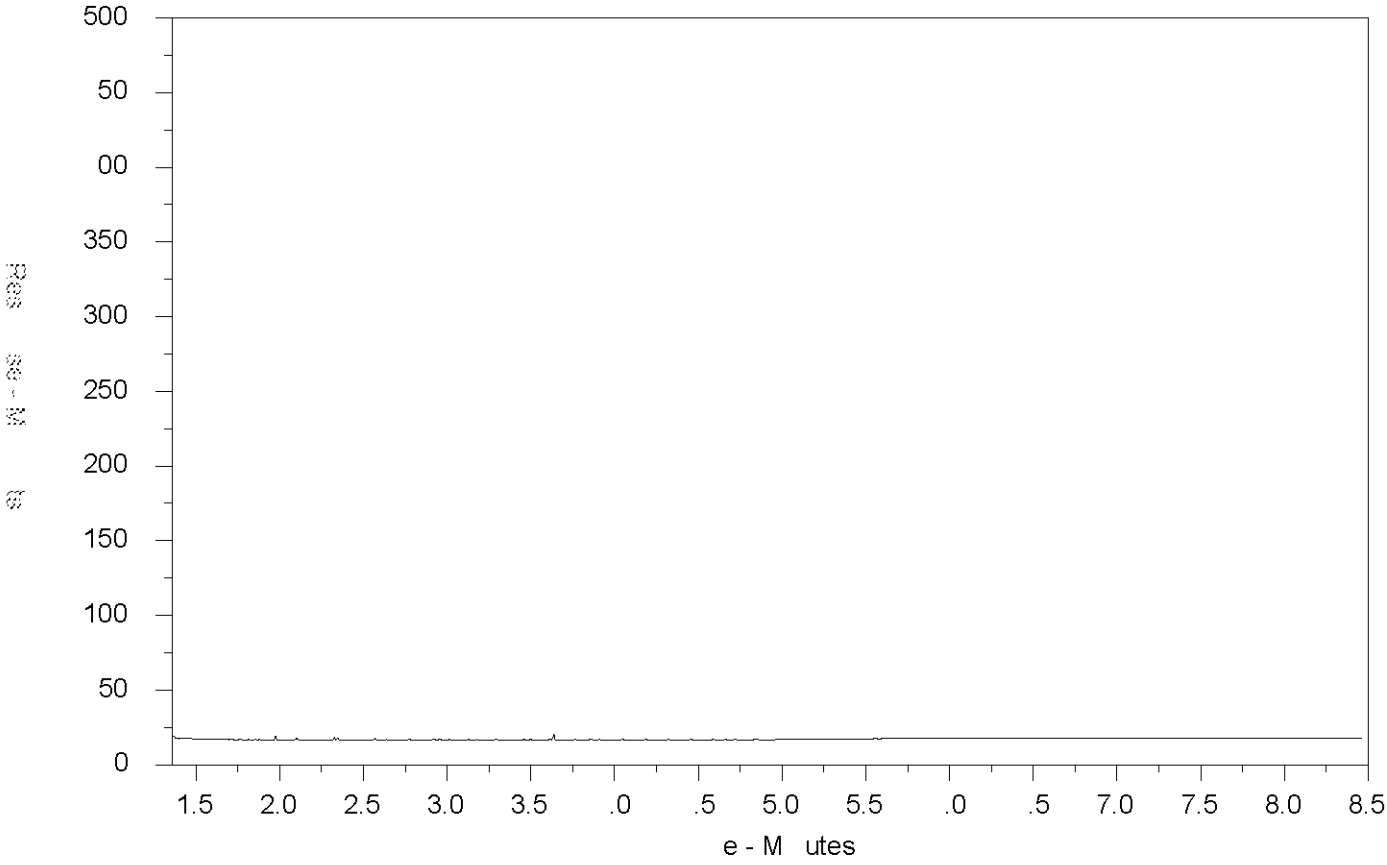
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-9
Client Sample ID: GW-45804-051816-TS-018



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

C of C # XXXXX
PAGE _1__ OF _1__

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

L1771020-COFC

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Crit
Reg 153/04
Table____
TCLP ____ MISA ____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX____
EMAIL airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both X

ANALYSIS REQUEST

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)
SUBMISSION # L1771020
ENTERED BY: RH
DATE/TIME ENTERED: 19 MAY 16
BIN # 19B

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT			FIELD PH	FIELD TEMP	COMMENTS	LAB ID
	825			X			GW-45804- 05/18/16 -TS-0[illegible]10	15	X			8.22	18.12		1
	920			X			GW-45804- -TS-0[illegible]11	15	X			8.22	10.63		2
	945			X			GW-45804- -TS-0[illegible]12	15	X			7.88	15.91		3
	1015			X			GW-45804- -TS-0[illegible]13	15	X			7.80	16.40		4
	1050			X			GW-45804- -TS-0[illegible]14	15	X			8.65	19.81		5
	1125			X			GW-45804- -TS-0[illegible]15	15	X			7.64	10.31		6
	1215			X			GW-45804- -TS-0[illegible]16	15	X			8.16	11.99		7
	1245			X			GW-45804- -TS-0[illegible]17	15	X			8.32	13.77		8
	1300			X			GW-45804- -TS-0[illegible]18	15	X			Field Blank			9
				X			GW-45804- -TS-0[illegible]	15	X						

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD ✓	6.9
COOLING INITIATED	
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT MR

SAMPLED BY: T.Saunders	DATE & TIME: 5/18/16	RECEIVED BY:	DATE & TIME: 5/18/16
RELINQUISHED BY: T.Saunders	DATE & TIME: 5/18/16	RECEIVED AT LAB BY:	DATE & TIME: 5/19/16 9:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

000940

8.2

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 16-AUG-16
Report Date: 23-AUG-16 10:54 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1814405
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-1 GW-45804-081616-TS-001 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.73		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.9		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	107		1.0	CU		17-AUG-16	R3528517
pH	7.60		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	15.5		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1530	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	52.6		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	449		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0476		0.0012	mg/L		18-AUG-16	
Ammonia, Total (as N)	16.1	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	81.3	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	16.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0381		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	671	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.4		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	4		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.08	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	0.536	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00807	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-1 GW-45804-081616-TS-001 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Aggregate Organics							
COD	18		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0016		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	101.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	83.6		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	95.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	64.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	102.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	92.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	99.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.73		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.9		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	88.0		1.0	CU		17-AUG-16	R3528517
pH	7.60		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	6.1		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1520	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	49.6		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	451		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0475		0.0012	mg/L		18-AUG-16	
Ammonia, Total (as N)	16.0	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	87.7	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	16.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0393		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	722	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.1		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	3		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.13	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	0.534	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00831	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.412	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	18		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0034		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	102.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	86.7		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	94.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	62.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	98.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	89.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	98.0		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1814405-3 GW-45804-081616-TS-003 Sampled By: T. SAUNDERS on 16-AUG-16 @ 08:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.72		0.10	pH		17-AUG-16	R3527654
Temperature, Client	22.7		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	237		1.0	CU		17-AUG-16	R3528517
pH	7.54		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	18.0	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1370	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	94.5		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	533	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0906		0.0061	mg/L		18-AUG-16	
Ammonia, Total (as N)	29.5	DLHC	2.0	mg/L		18-AUG-16	R3528572
Chloride (Cl)	85.7	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	32.3	DLHC	0.75	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0969		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	528	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.3		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	2		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0087	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	7.07	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	1.09	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0160	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-3 GW-45804-081616-TS-003 Sampled By: T. SAUNDERS on 16-AUG-16 @ 08:30 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	35		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0044		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	101.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	88.1		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	0.032		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	0.0451		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	81.9		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	69.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	106.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	75.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	90.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.42		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.7		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	141		1.0	CU		17-AUG-16	R3528517
pH	7.68		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	104	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1300	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	91.5		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	415		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0766		0.0028	mg/L		18-AUG-16	
Ammonia, Total (as N)	5.41	DLHC	0.20	mg/L		18-AUG-16	R3528572
Chloride (Cl)	61.3	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	15.6	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	5.97		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0449		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	519	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.2		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	0		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0035	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.0020	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	14.5	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	8.13	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0130	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.012	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	48		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0042		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	330		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	106.8		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	87.4		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	0.0554		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	80.9		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	64.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	96.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	75.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	95.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-5 GW-45804-081616-TS-005 Sampled By: T. SAUNDERS on 16-AUG-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.81		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.4		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	260		1.0	CU		17-AUG-16	R3528517
pH	7.63		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	9.0	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	810	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	66.0		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	322		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.00369		0.00011	mg/L		18-AUG-16	
Ammonia, Total (as N)	1.34	DLHC	0.040	mg/L		18-AUG-16	R3528572
Chloride (Cl)	101	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	2.07		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0156		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	223	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.5		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	6		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	50	DLM	10	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	3200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.00817		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Boron (B)-Dissolved	0.046		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	18-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.00194		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	17-AUG-16	18-AUG-16	R3528168
Iron (Fe)-Dissolved	5.93		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-5 GW-45804-081616-TS-005 Sampled By: T. SAUNDERS on 16-AUG-16 @ 10:30 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.79	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00983		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Nickel (Ni)-Dissolved	0.00436		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.0124		0.0010	mg/L	17-AUG-16	18-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	39		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0032		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	100.5		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	75.1		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	78.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	94.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	69.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	92.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.97		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.3		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	216	DLHC	2.0	CU		17-AUG-16	R3528517
pH	7.74		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	6.2		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1550	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	60.3		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	518	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0285		0.00079	mg/L		18-AUG-16	
Ammonia, Total (as N)	7.18	DLHC	0.20	mg/L		18-AUG-16	R3528572

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Anions and Nutrients							
Chloride (Cl)	148	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	7.70		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0820		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	580	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.0		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	1		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	60	DLM	10	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	3900	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0016	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.11	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.96	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.37	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0107	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	44		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0060		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	107.2		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	73.7		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	81.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	69.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	101.9		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	72.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	95.1		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-7 GW-45804-081616-TS-007 Sampled By: T. SAUNDERS on 16-AUG-16 @ 12:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.95		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.6		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	243		1.0	CU		17-AUG-16	R3528517
pH	7.54		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	20.2	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	2350	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	136		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	533	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0669		0.0015	mg/L		18-AUG-16	
Ammonia, Total (as N)	17.4	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	656	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	18.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.135		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	405	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.4		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	1		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	23		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	600	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0020	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-7 GW-45804-081616-TS-007 Sampled By: T. SAUNDERS on 16-AUG-16 @ 12:30 Matrix: WATER							
Dissolved Metals							
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	10.3	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.58	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0174	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	74		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0056		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	98.7		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	72.0		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	67.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	64.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	97.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	60.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	81.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.26		0.10	pH		17-AUG-16	R3527654
Temperature, Client	14.6		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	63.1		1.0	CU		17-AUG-16	R3528517
pH	7.69		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	22.3		2.0	mg/L	20-AUG-16	20-AUG-16	R3530133
Total Dissolved Solids	1370	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	30.5		0.10	NTU		17-AUG-16	R3527518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Physical Tests							
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	467		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0190		0.00058	mg/L		18-AUG-16	
Ammonia, Total (as N)	3.26	DLHC	0.10	mg/L		18-AUG-16	R3528572
Chloride (Cl)	107	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	0.24	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	3.43		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0684		0.0030	mg/L	19-AUG-16	19-AUG-16	R3528874
Sulfate (SO4)	503	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.7		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	15		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.00074		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Boron (B)-Dissolved	0.180		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	18-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.00039		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Copper (Cu)-Dissolved	0.00056		0.00020	mg/L	17-AUG-16	18-AUG-16	R3528168
Iron (Fe)-Dissolved	0.838		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Manganese (Mn)-Dissolved	1.06		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0170		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Nickel (Ni)-Dissolved	0.00222		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.0037		0.0010	mg/L	17-AUG-16	18-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	39		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0039		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Hydrocarbons							
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	108.2		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	74.5		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	77.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	67.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	93.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	67.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	86.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-9 GW-45804-081616-TS-009 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:30 Matrix: WATER							
Physical Tests							
Colour, Apparent	<1.0		1.0	CU		17-AUG-16	R3528517
pH	7.11		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	<2.0		2.0	mg/L	20-AUG-16	20-AUG-16	R3530133
Total Dissolved Solids	<10		10	mg/L		21-AUG-16	R3530791
Turbidity	0.15		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		17-AUG-16	R3528450
Ammonia, Total (as N)	<0.020		0.020	mg/L		18-AUG-16	R3528572
Chloride (Cl)	<0.50		0.50	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.020		0.020	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.010		0.010	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	<0.0030		0.0030	mg/L	19-AUG-16	19-AUG-16	R3528874
Sulfate (SO4)	<0.30		0.30	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	0		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	0		0	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.010		0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-9 GW-45804-081616-TS-009 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:30 Matrix: WATER							
Dissolved Metals							
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	0.00021		0.00020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	12		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0042		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-AUG-16	R3528930
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	96.9		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	99.6		60-140	%		19-AUG-16	R3528930
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	77.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	67.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	93.1		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	68.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	86.7		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Reference Information

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with

Reference Information

benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3528450								
WG2369989-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.2		%		80-120	17-AUG-16
WG2369989-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			101.5		%		80-120	17-AUG-16
WG2369989-4 DUP		**L1813751-2**						
Alkalinity, Total (as CaCO3)		2090	2150		mg/L	2.8	20	17-AUG-16
WG2369989-8 DUP		**L1814405-5**						
Alkalinity, Total (as CaCO3)		322	325		mg/L	0.8	20	17-AUG-16
WG2369989-2 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	17-AUG-16
WG2369989-6 LCS								
Alkalinity, Total (as CaCO3)			99.5		%		85-115	17-AUG-16
WG2369989-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-AUG-16
WG2369989-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-AUG-16
BOD-C-WT	Water							
Batch R3530904								
WG2369592-10 DUP		**L1814273-1**						
BOD Carbonaceous		2.2	2.1		mg/L	1.9	20	22-AUG-16
WG2369592-6 DUP		**L1813702-1**						
BOD Carbonaceous		2.5	2.5		mg/L	2.4	20	22-AUG-16
WG2369592-11 LCS								
BOD Carbonaceous			98.5		%		85-115	22-AUG-16
WG2369592-7 LCS								
BOD Carbonaceous			92.9		%		85-115	22-AUG-16
WG2369592-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-AUG-16
WG2369592-9 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-AUG-16
C-DIS-ORG-WT	Water							
Batch R3528829								
WG2370083-3 DUP		**L1814405-9**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	17-AUG-16
WG2370083-2 LCS								
Dissolved Organic Carbon			99.6		%		80-120	17-AUG-16
WG2370083-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R3528829								
WG2370083-4 MS		**L1814405-9**						
Dissolved Organic Carbon			99.0		%		70-130	17-AUG-16
CL-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Chloride (Cl)			101.2		%		70-130	18-AUG-16
WG2370306-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Chloride (Cl)			107.0		%		70-130	18-AUG-16
COD-T-WT	Water							
Batch R3528872								
WG2370939-3 DUP		**L1815800-6**						
COD		16	16		mg/L	1.3	20	18-AUG-16
WG2370939-2 LCS								
COD			102.3		%		85-115	18-AUG-16
WG2370939-1 MB								
COD			<10		mg/L		10	18-AUG-16
WG2370939-4 MS		**L1815800-6**						
COD			90.8		%		75-125	18-AUG-16
COLOUR-WT	Water							
Batch R3528517								
WG2369991-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			96.2		%		80-120	17-AUG-16
WG2369991-4 DUP		**L1814306-1**						
Colour, Apparent		15.7	17.0		CU	7.9	20	17-AUG-16
WG2369991-2 LCS								
Colour, Apparent			96.2		%		80-120	17-AUG-16
WG2369991-1 MB								
Colour, Apparent			<1.0		CU		1	17-AUG-16
EC-MF-WT	Water							

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3528658								
WG2369453-2 DUP		**WG2369453-4**						
E. Coli		4	3		CFU/100mL	29	65	18-AUG-16
WG2369453-1 MB								
E. Coli			0		CFU/100mL		1	18-AUG-16
F1-HS-WT	Water							
Batch R3528097								
WG2369753-4 DUP		**WG2369753-3**						
F1 (C6-C10)		130	150		ug/L	13	50	18-AUG-16
WG2369753-1 LCS								
F1 (C6-C10)			81.1		%		80-120	18-AUG-16
WG2369753-2 MB								
F1 (C6-C10)			<100		ug/L		100	18-AUG-16
Surrogate: 3,4-Dichlorotoluene			79.8		%		60-140	18-AUG-16
Batch R3528242								
WG2367593-4 DUP		**WG2367593-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	18-AUG-16
WG2367593-1 LCS								
F1 (C6-C10)			96.3		%		80-120	18-AUG-16
WG2367593-2 MB								
F1 (C6-C10)			<100		ug/L		100	18-AUG-16
Surrogate: 3,4-Dichlorotoluene			99.4		%		60-140	18-AUG-16
Batch R3528930								
WG2364295-4 DUP		**WG2364295-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-AUG-16
WG2364295-1 LCS								
F1 (C6-C10)			95.9		%		80-120	19-AUG-16
WG2364295-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-AUG-16
Surrogate: 3,4-Dichlorotoluene			102.1		%		60-140	19-AUG-16
F2-F4-WT	Water							
Batch R3531531								
WG2370152-2 LCS								
F2 (C10-C16)			99.96		%		65-135	18-AUG-16
F3 (C16-C34)			98.4		%		65-135	18-AUG-16
F4 (C34-C50)			97.8		%		65-135	18-AUG-16
WG2370152-3 LCSD		**WG2370152-2**						
F2 (C10-C16)		99.96	93.1		%	7.1	50	18-AUG-16

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3531531								
WG2370152-3 LCSD		**WG2370152-2**						
F3 (C16-C34)		98.4	93.7		%	4.9	50	18-AUG-16
F4 (C34-C50)		97.8	92.9		%	5.2	50	18-AUG-16
WG2370152-1 MB								
F2 (C10-C16)			<100		ug/L		100	18-AUG-16
F3 (C16-C34)			<250		ug/L		250	18-AUG-16
F4 (C34-C50)			<250		ug/L		250	18-AUG-16
Surrogate: 2-Bromobenzotrifluoride			100.2		%		60-140	18-AUG-16
FC-MF-WT	Water							
Batch R3528644								
WG2369450-2 DUP		**WG2369450-4**						
Fecal Coliforms		0	0		CFU/100mL	0.0	65	18-AUG-16
WG2369450-1 MB								
Fecal Coliforms			0		CFU/100mL		1	18-AUG-16
HG-D-CVAA-WT	Water							
Batch R3528357								
WG2370370-3 DUP		**L1814405-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-AUG-16
WG2370370-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	18-AUG-16
WG2370370-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-AUG-16
WG2370370-4 MS		**L1814405-2**						
Mercury (Hg)-Dissolved			99.3		%		70-130	18-AUG-16
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-4 DUP		**WG2369579-3**						
Arsenic (As)-Dissolved		0.0087	0.0085		mg/L	1.6	20	17-AUG-16
Boron (B)-Dissolved		0.12	0.12		mg/L	0.1	20	17-AUG-16
Cadmium (Cd)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-AUG-16
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-AUG-16
Cobalt (Co)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-AUG-16
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	17-AUG-16
Iron (Fe)-Dissolved		7.07	7.13		mg/L	0.8	20	17-AUG-16
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-AUG-16
Manganese (Mn)-Dissolved		1.09	1.09		mg/L	0.6	20	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-4 DUP		**WG2369579-3**						
Molybdenum (Mo)-Dissolved		0.0160	0.0160		mg/L	0.2	20	17-AUG-16
Nickel (Ni)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-AUG-16
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-AUG-16
WG2369579-2 LCS								
Arsenic (As)-Dissolved			94.4		%		80-120	17-AUG-16
Boron (B)-Dissolved			95.5		%		80-120	17-AUG-16
Cadmium (Cd)-Dissolved			96.7		%		80-120	17-AUG-16
Chromium (Cr)-Dissolved			97.1		%		80-120	17-AUG-16
Cobalt (Co)-Dissolved			96.8		%		80-120	17-AUG-16
Copper (Cu)-Dissolved			94.5		%		80-120	17-AUG-16
Iron (Fe)-Dissolved			97.2		%		80-120	17-AUG-16
Lead (Pb)-Dissolved			96.7		%		80-120	17-AUG-16
Manganese (Mn)-Dissolved			98.4		%		80-120	17-AUG-16
Molybdenum (Mo)-Dissolved			97.5		%		80-120	17-AUG-16
Nickel (Ni)-Dissolved			95.4		%		80-120	17-AUG-16
Zinc (Zn)-Dissolved			90.3		%		80-120	17-AUG-16
WG2369579-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-AUG-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-AUG-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-AUG-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-AUG-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-AUG-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-AUG-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-AUG-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-AUG-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-AUG-16
WG2369579-5 MS		**WG2369579-3**						
Arsenic (As)-Dissolved			76.5		%		70-130	17-AUG-16
Boron (B)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Cadmium (Cd)-Dissolved			93.8		%		70-130	17-AUG-16
Chromium (Cr)-Dissolved			93.3		%		70-130	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-5 MS		**WG2369579-3**						
Cobalt (Co)-Dissolved			91.6		%		70-130	17-AUG-16
Copper (Cu)-Dissolved			89.7		%		70-130	17-AUG-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Lead (Pb)-Dissolved			90.4		%		70-130	17-AUG-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Molybdenum (Mo)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Nickel (Ni)-Dissolved			91.3		%		70-130	17-AUG-16
Zinc (Zn)-Dissolved			88.5		%		70-130	17-AUG-16
NH3-WT	Water							
Batch R3528572								
WG2370267-3 DUP		**L1813939-1**						
Ammonia, Total (as N)		0.127	0.119		mg/L	6.6	20	18-AUG-16
WG2370267-2 LCS								
Ammonia, Total (as N)			102.2		%		85-115	18-AUG-16
WG2370267-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	18-AUG-16
WG2370267-4 MS		**L1813939-1**						
Ammonia, Total (as N)			84.7		%		75-125	18-AUG-16
NO2-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Nitrite (as N)			99.7		%		70-130	18-AUG-16
WG2370306-11 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Nitrite (as N)			104.8		%		70-130	18-AUG-16
NO3-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Nitrate (as N)			101.0		%		70-130	18-AUG-16
WG2370306-11 MB								
Nitrate (as N)			<0.020				0.02	

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R3529329								
WG2370306-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Nitrate (as N)			105.3		%		70-130	18-AUG-16
P-T-COL-WT	Water							
Batch R3528855								
WG2370110-3 DUP		**L1814017-6**						
Phosphorus, Total		0.0985	0.0858		mg/L	14	20	19-AUG-16
WG2370110-2 LCS								
Phosphorus, Total			98.3		%		80-120	18-AUG-16
WG2370110-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-AUG-16
WG2370110-4 MS		**L1814017-6**						
Phosphorus, Total			79.0		%		70-130	18-AUG-16
Batch R3528874								
WG2370974-3 DUP		**L1814405-8**						
Phosphorus, Total		0.0684	0.0638		mg/L	7.0	20	19-AUG-16
WG2370974-2 LCS								
Phosphorus, Total			103.3		%		80-120	19-AUG-16
WG2370974-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	19-AUG-16
WG2370974-4 MS		**L1814405-8**						
Phosphorus, Total			81.3		%		70-130	19-AUG-16
PAH-CCME-WT	Water							
Batch R3530792								
WG2370536-2 LCS								
Anthracene			102.4		%		50-140	22-AUG-16
Benzo(a)pyrene			104.8		%		60-130	22-AUG-16
WG2370536-1 MB								
Anthracene			<0.020		ug/L		0.02	22-AUG-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	22-AUG-16
Surrogate: d8-Naphthalene			97.4		%		60-140	22-AUG-16
Surrogate: d10-Phenanthrene			99.8		%		60-140	22-AUG-16
Surrogate: d12-Chrysene			104.1		%		60-140	22-AUG-16
Surrogate: d10-Acenaphthene			97.7		%		60-140	22-AUG-16
Surrogate: d9-Acridine (SS)			88.6		%		60-140	22-AUG-16
PH-WT	Water							

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3528145								
WG2369275-6 DUP		**WG2369275-5**						
pH		7.22	7.22	J	pH units	0.01	0.2	18-AUG-16
WG2369275-9 DUP		**WG2369275-8**						
pH		7.65	7.69	J	pH units	0.04	0.2	18-AUG-16
WG2369275-4 LCS								
pH			7.00		pH units		6.9-7.1	18-AUG-16
WG2369275-7 LCS								
pH			7.00		pH units		6.9-7.1	18-AUG-16
PHENOLS-4AAP-WT	Water							
Batch R3530068								
WG2372085-11 DUP		**L1813345-2**						
Phenols (4AAP)		0.0017	0.0018		mg/L	4.9	20	20-AUG-16
WG2372085-7 DUP		**L1813323-10**						
Phenols (4AAP)		0.0017	0.0015		mg/L	12	20	20-AUG-16
WG2372085-10 LCS								
Phenols (4AAP)			93.9		%		85-115	20-AUG-16
WG2372085-6 LCS								
Phenols (4AAP)			94.3		%		85-115	20-AUG-16
WG2372085-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	20-AUG-16
WG2372085-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	20-AUG-16
WG2372085-12 MS		**L1813345-2**						
Phenols (4AAP)			93.8		%		75-125	20-AUG-16
WG2372085-8 MS		**L1813323-10**						
Phenols (4AAP)			90.9		%		75-125	20-AUG-16
Batch R3530139								
WG2372255-3 DUP		**L1814677-2**						
Phenols (4AAP)		0.0023	0.0020		mg/L	11	20	21-AUG-16
WG2372255-2 LCS								
Phenols (4AAP)			95.4		%		85-115	21-AUG-16
WG2372255-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	21-AUG-16
WG2372255-4 MS		**L1814677-2**						
Phenols (4AAP)			92.5		%		75-125	21-AUG-16
SO4-IC-N-WT	Water							

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	18-AUG-16
WG2370306-12 LCS								
Sulfate (SO4)			101.2		%		90-110	18-AUG-16
WG2370306-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Sulfate (SO4)			107.3		%		75-125	18-AUG-16
SOLIDS-TDS-WT	Water							
Batch R3530791								
WG2372189-3 DUP		**L1813878-4**						
Total Dissolved Solids		255	255		mg/L	0.2	20	21-AUG-16
WG2372189-2 LCS								
Total Dissolved Solids			98.3		%		85-115	21-AUG-16
WG2372189-1 MB								
Total Dissolved Solids			<10		mg/L		10	21-AUG-16
SOLIDS-TSS-WT	Water							
Batch R3530133								
WG2371669-3 DUP		**WG2371669-4**						
Total Suspended Solids		18200	16600		mg/L	9.2	20	20-AUG-16
WG2371669-2 LCS								
Total Suspended Solids			100.6		%		85-115	20-AUG-16
WG2371669-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-AUG-16
Batch R3530146								
WG2371665-3 DUP		**L1816197-3**						
Total Suspended Solids		2950	2950		mg/L	0.0	20	20-AUG-16
WG2371665-2 LCS								
Total Suspended Solids			97.4		%		85-115	20-AUG-16
WG2371665-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-AUG-16
TC-MF-WT	Water							
Batch R3528636								
WG2369452-3 DUP		**WG2369452-4**						
Total Coliforms		0	0		CFU/100mL	0.0	65	18-AUG-16
WG2369452-1 MB								
Total Coliforms			0		CFU/100mL		1	18-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3528765								
WG2370098-3 DUP		**L1814452-1**						
Total Kjeldahl Nitrogen		15.6	16.4		mg/L	4.9	20	18-AUG-16
WG2370098-2 LCS								
Total Kjeldahl Nitrogen			93.7		%		75-125	18-AUG-16
WG2370098-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	18-AUG-16
WG2370098-4 MS		**L1814452-1**						
Total Kjeldahl Nitrogen			92.2		%		70-130	18-AUG-16
TURBIDITY-WT	Water							
Batch R3527518								
WG2369239-6 DUP		**L1814306-1**						
Turbidity		3.56	3.45		NTU	3.1	15	17-AUG-16
WG2369239-9 DUP		**L1814405-5**						
Turbidity		66.0	67.3		NTU	2.0	15	17-AUG-16
WG2369239-5 LCS								
Turbidity			108.0		%		85-115	17-AUG-16
WG2369239-8 LCS								
Turbidity			99.5		%		85-115	17-AUG-16
WG2369239-4 MB								
Turbidity			<0.10		NTU		0.1	17-AUG-16
WG2369239-7 MB								
Turbidity			<0.10		NTU		0.1	17-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

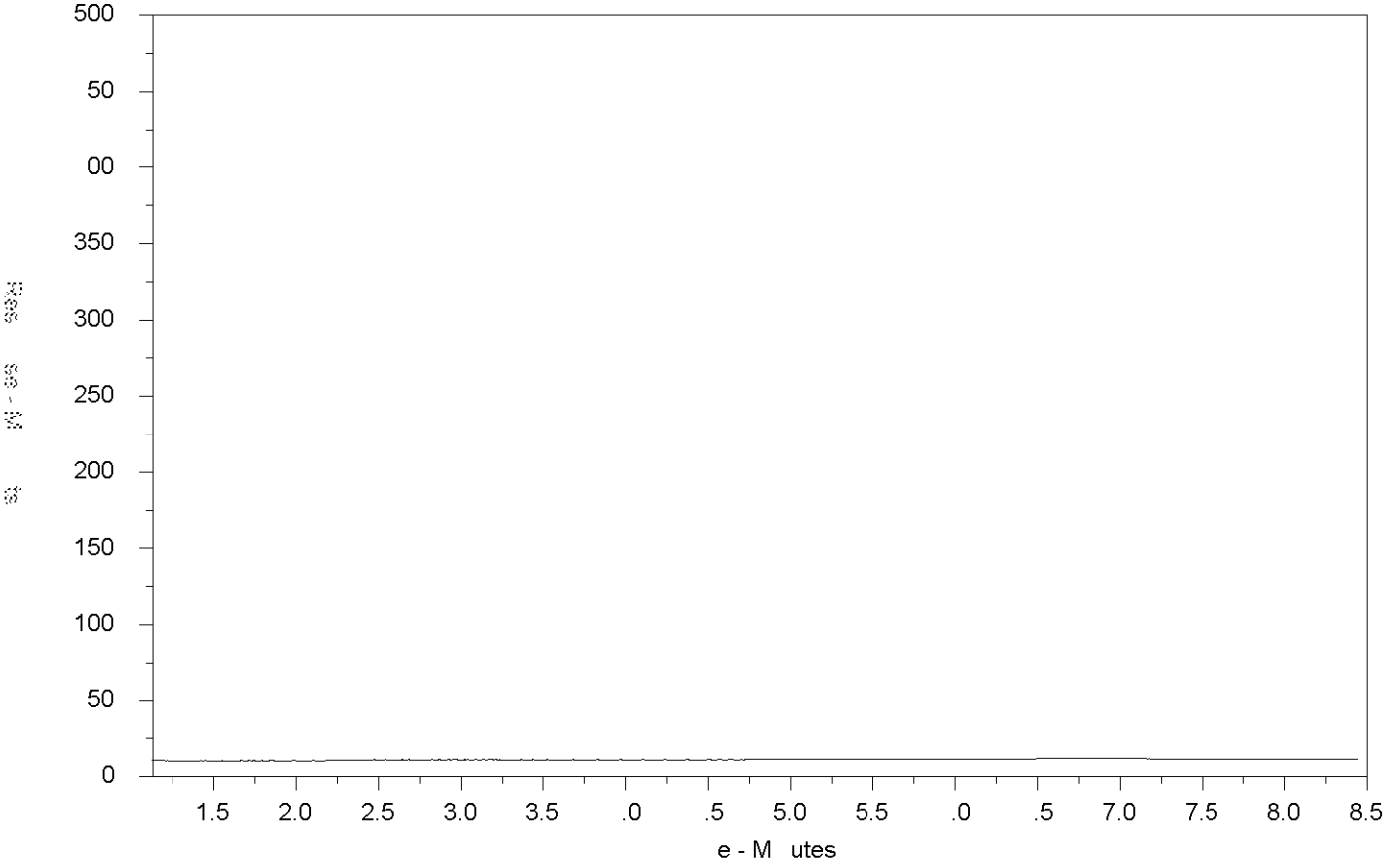
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-1
Client Sample ID: GW-45804-081616-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

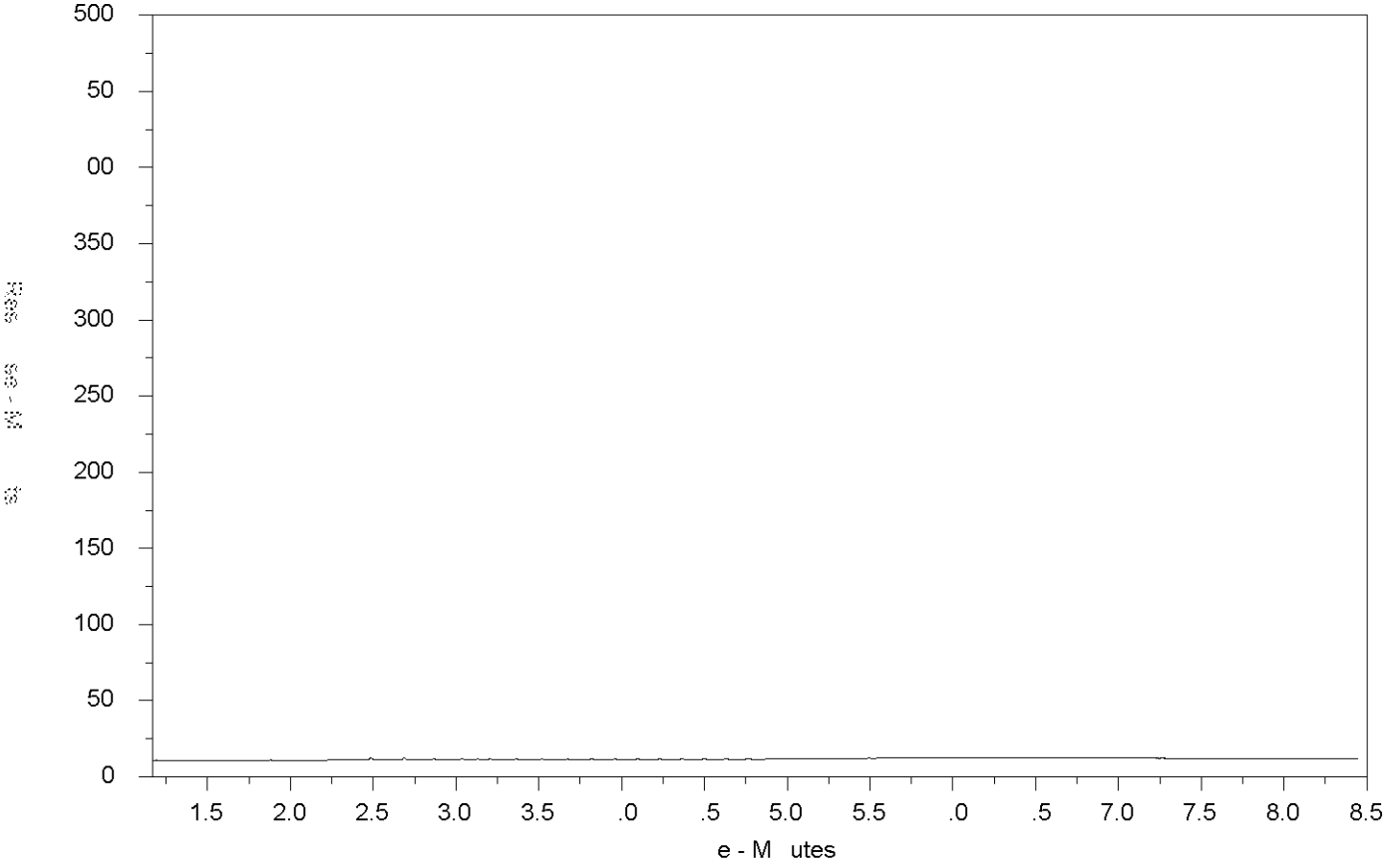
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-2
Client Sample ID: GW-45804-081616-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

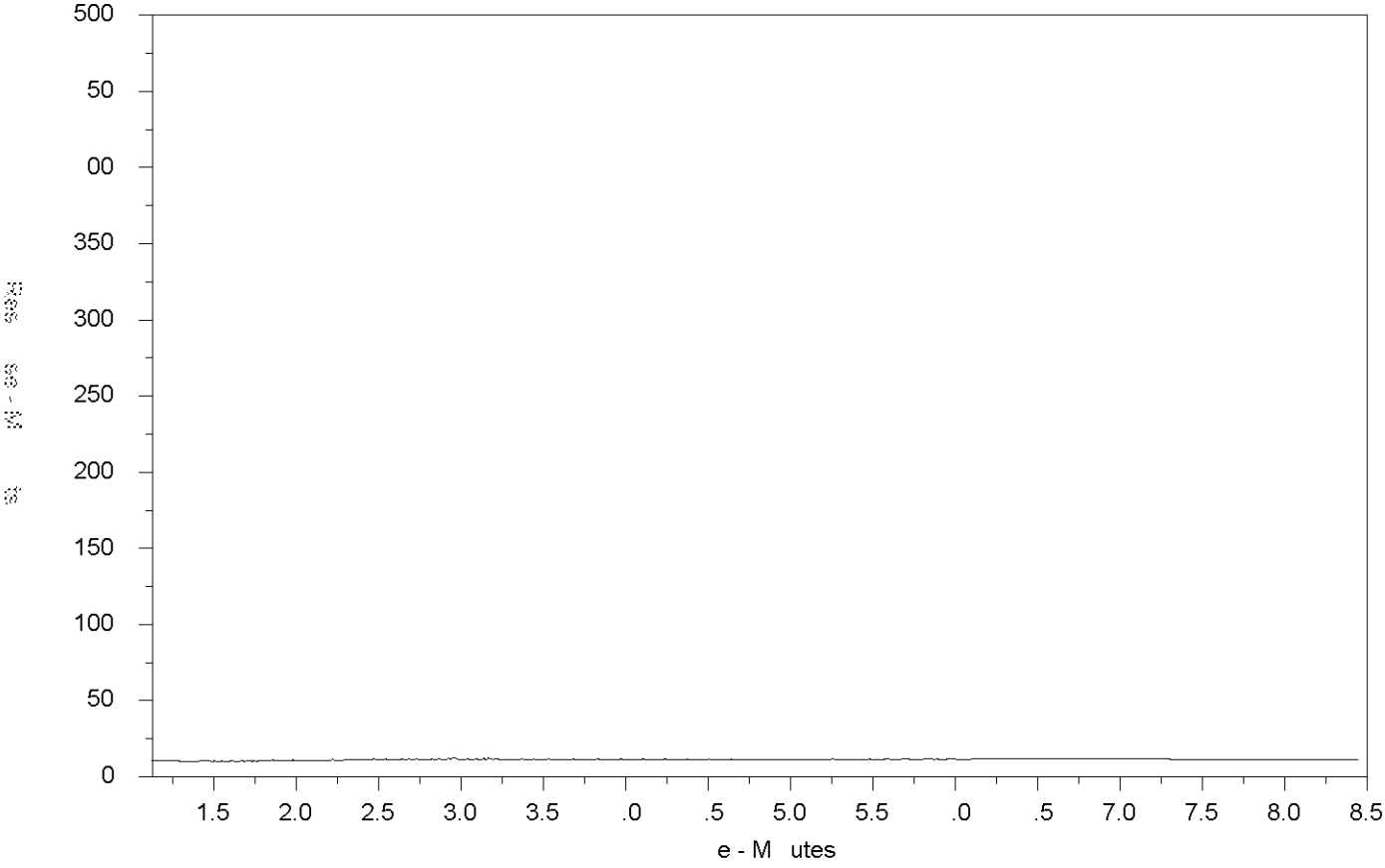
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-3
Client Sample ID: GW-45804-081616-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

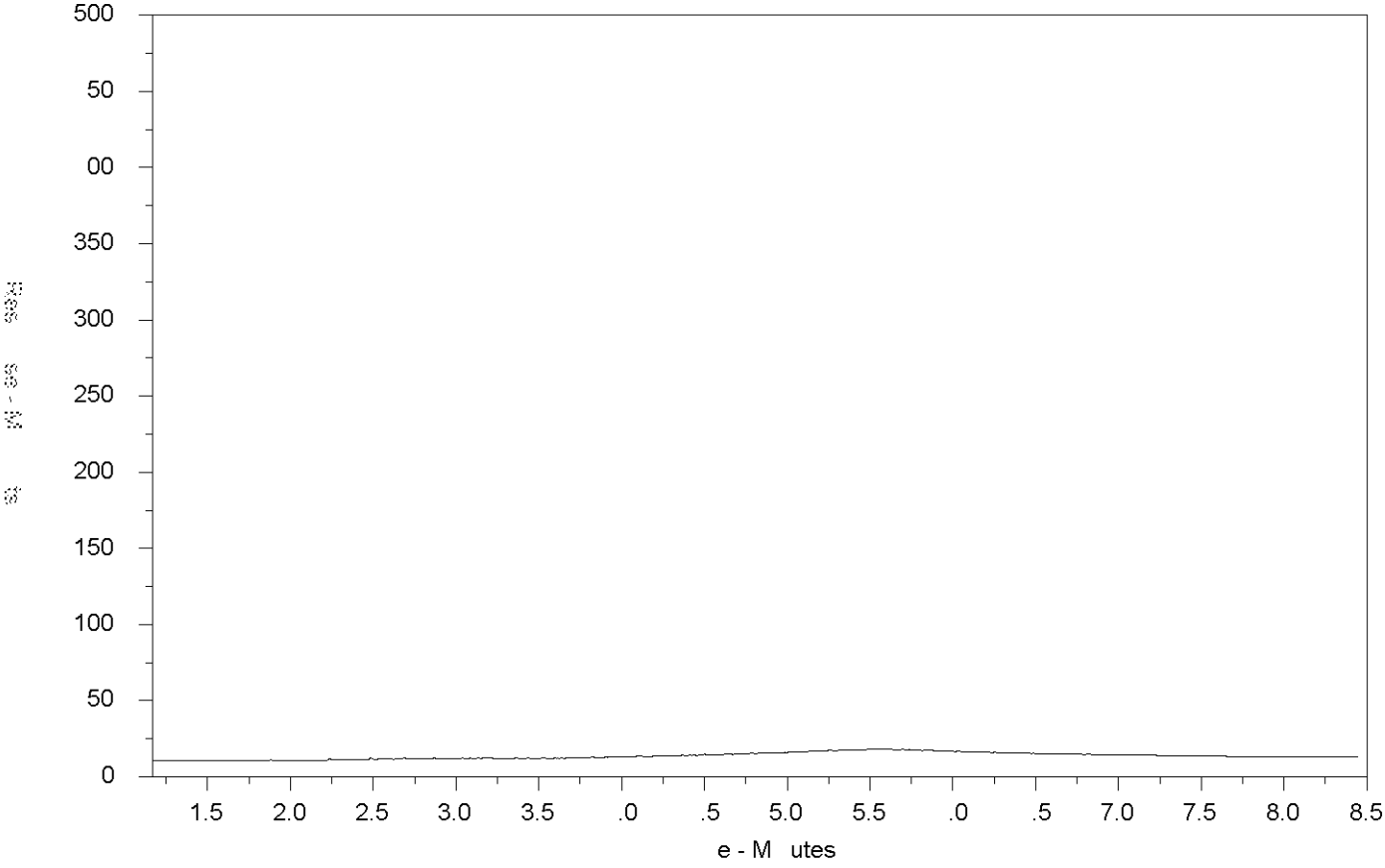
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-4
Client Sample ID: GW-45804-081616-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

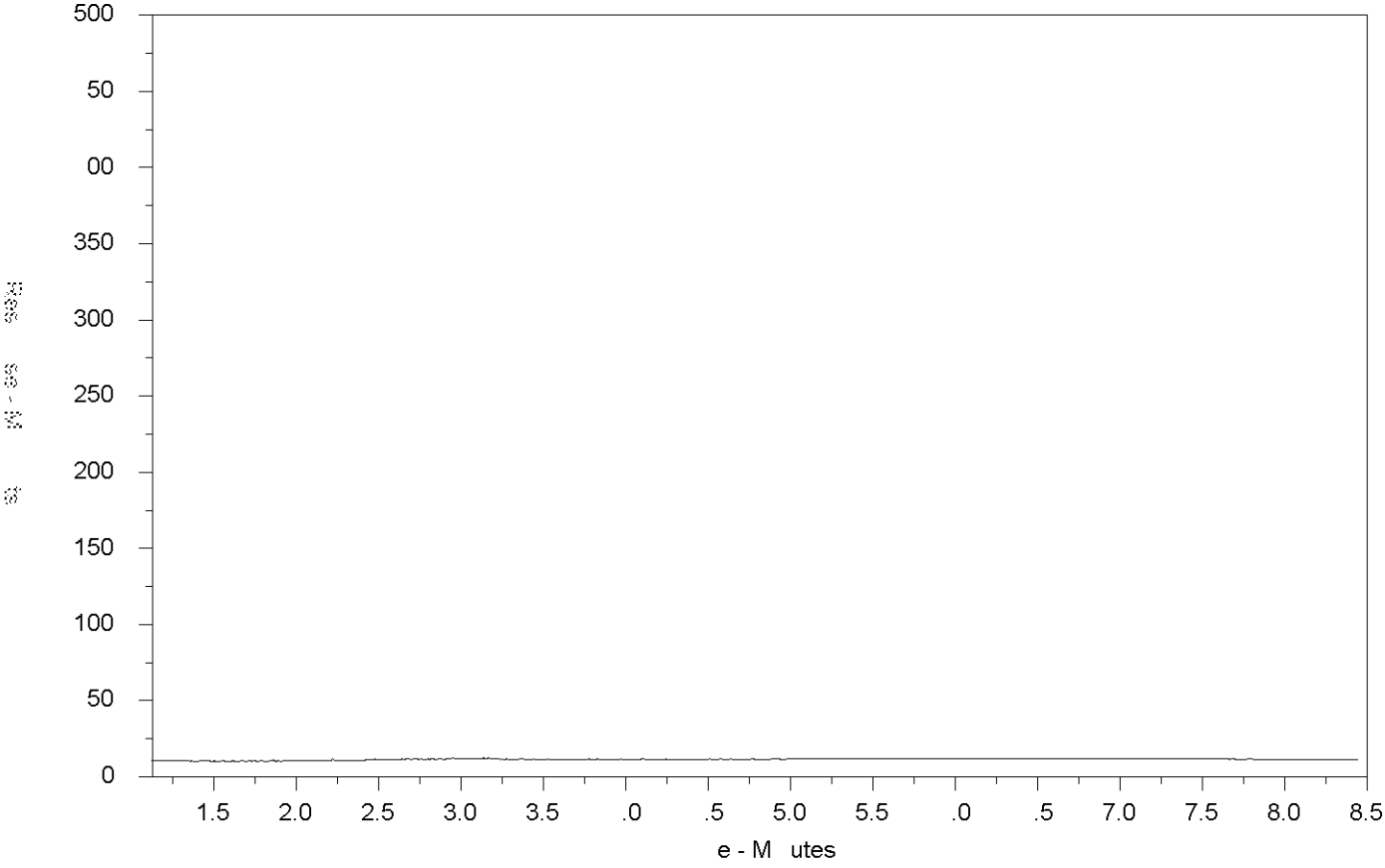
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-5
Client Sample ID: GW-45804-081616-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

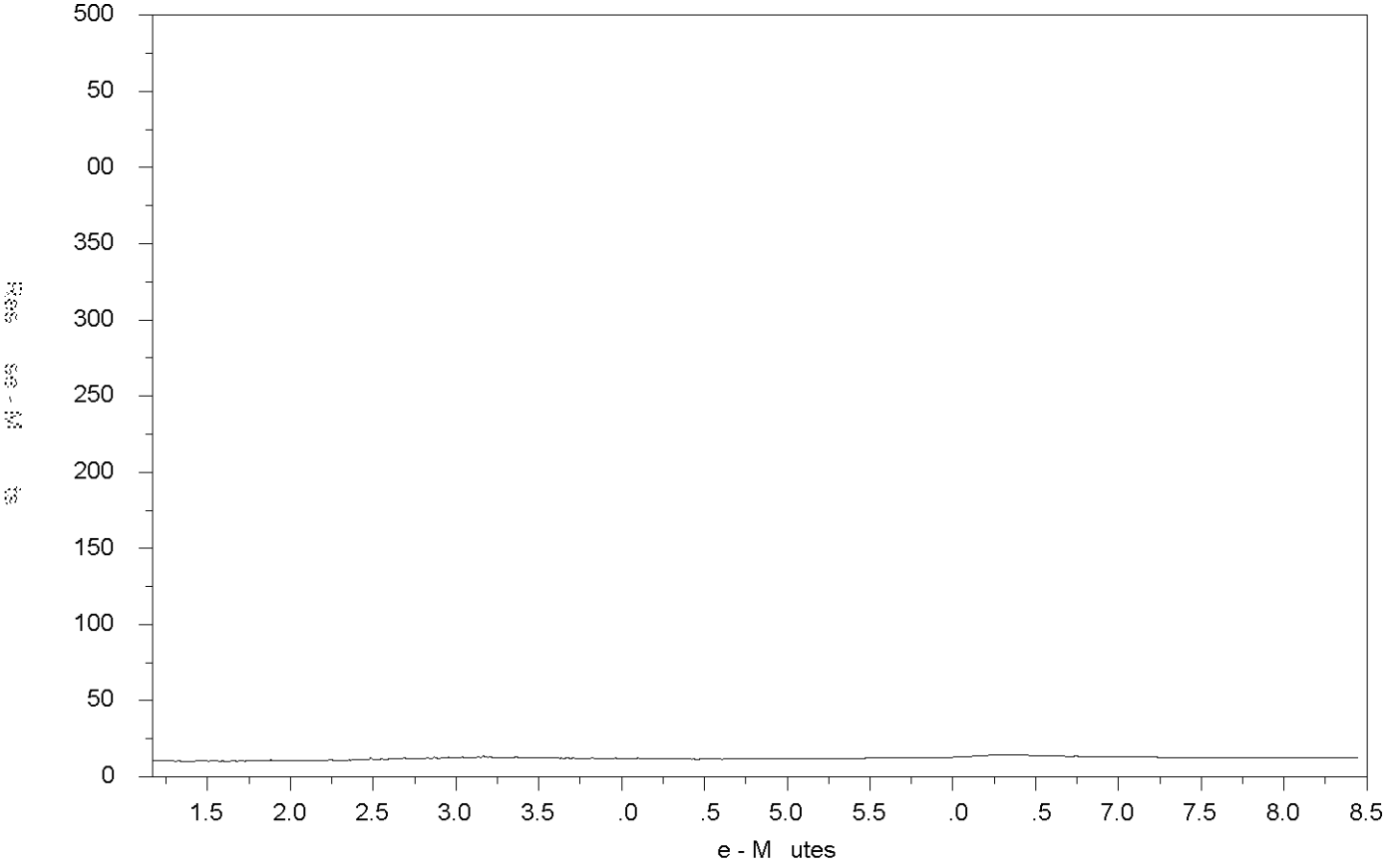
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-6
Client Sample ID: GW-45804-081616-TS-006



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

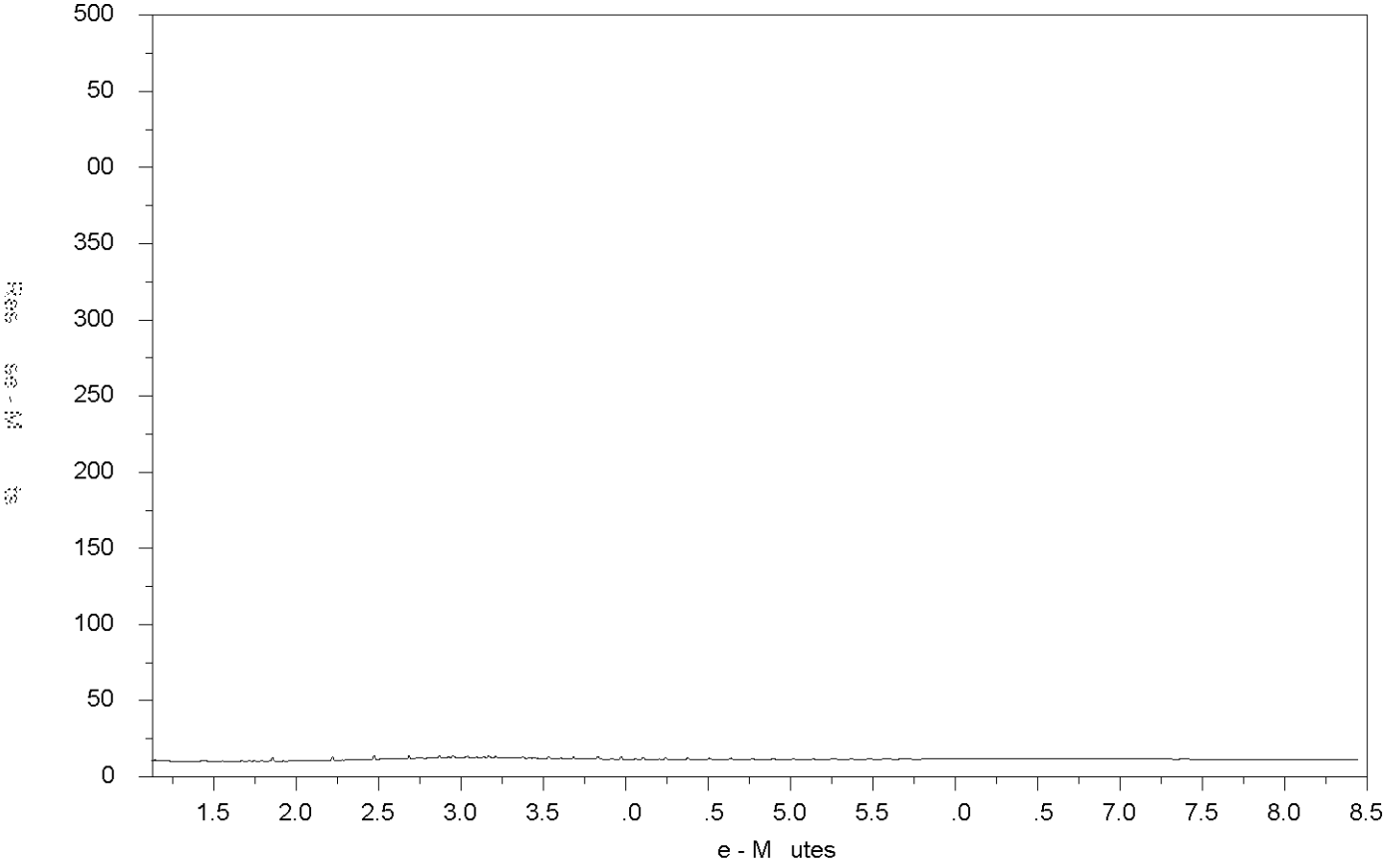
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-7
Client Sample ID: GW-45804-081616-TS-007



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

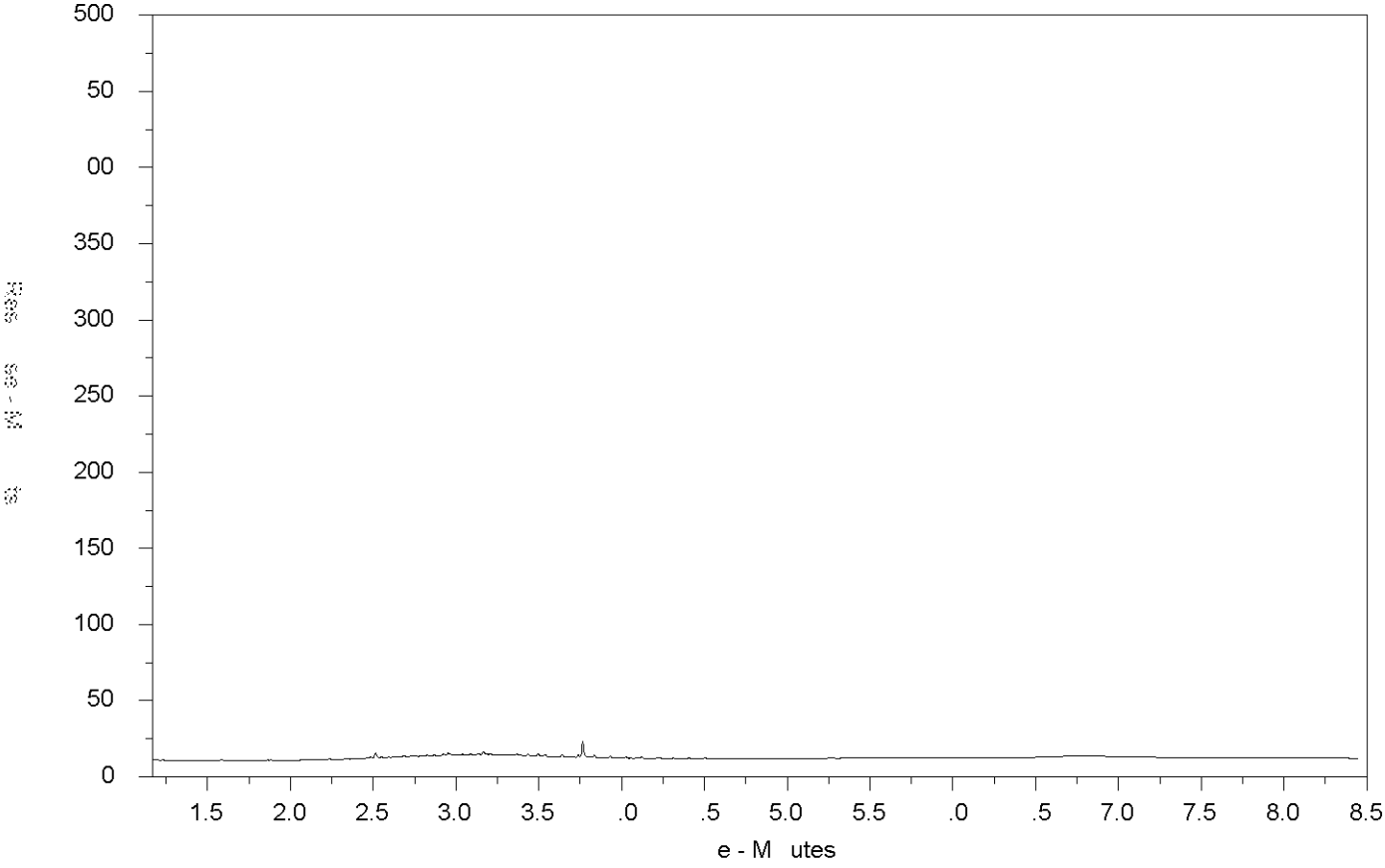
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-8
Client Sample ID: GW-45804-081616-TS-008



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

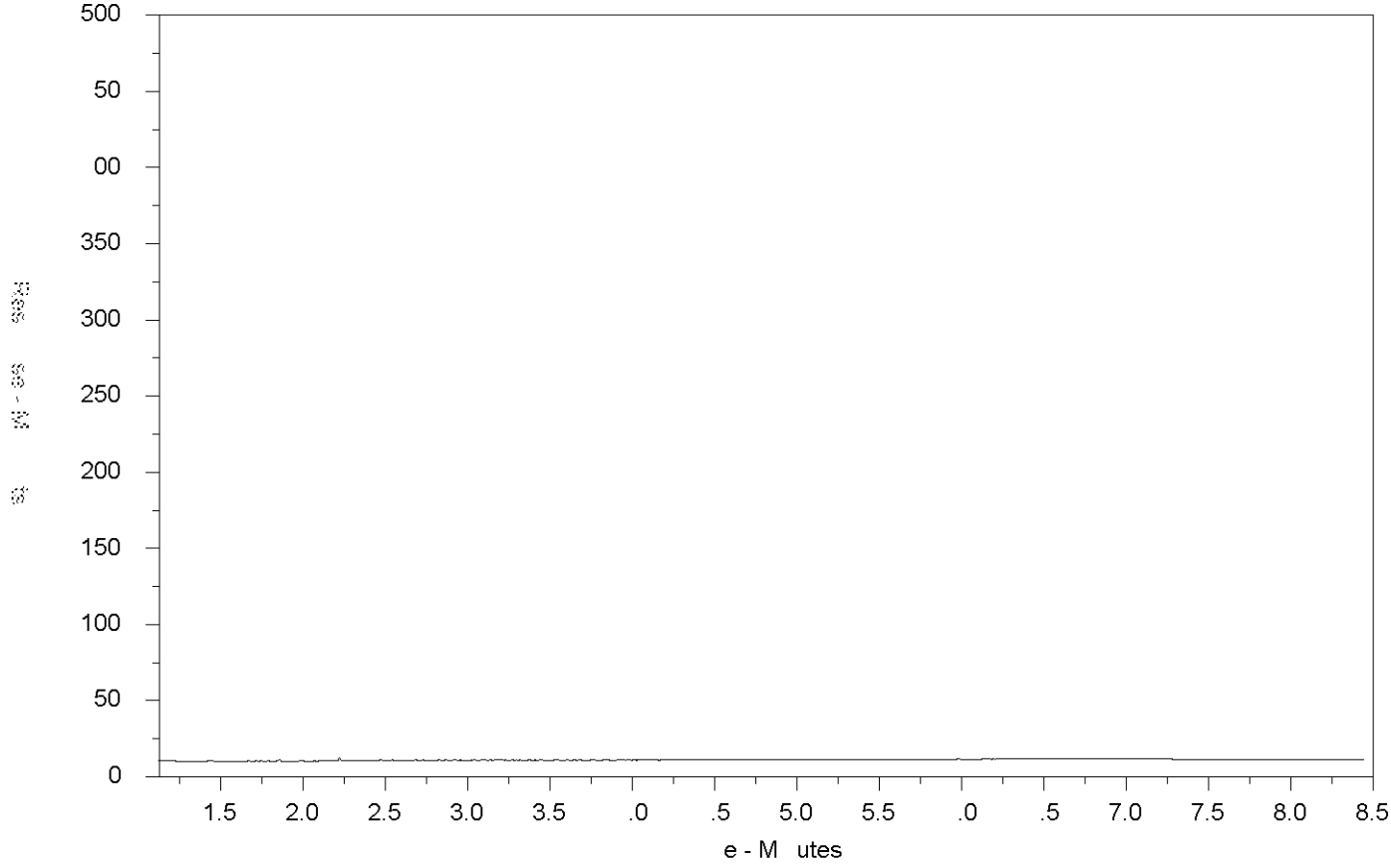
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-9
Client Sample ID: GW-45804-081616-TS-009



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

C of C # XXXXX

PAGE _1__ OF _1__

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791

PROJECT MANAGER: AIRESSE MACPHEE

JOB #: 45804-58

PO #: 73502328

DUE DATE:

CRITERIA: Criteria on report (y/n) ____
Reg 153/04
Table ____
TCLP ____ MISA ____ PWQO ____
OTHER _CLASSDETAILQCPLUS_ALS____

REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL__X__ FAX_____
EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL_Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both__X__

ANALYSIS REQUEST

L1814405-COFC

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION # L1814405

ENTERED BY: RM

DATE/TIME ENTERED: 17 Aug 16 1601

BIN # 17A

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX								
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT		FIELD PH	FIELD TEMP	COMMENTS	LAB ID
16/8/16	0745			X			GW-45804-08/Le/Le -TS-001	15	X		6.73	21.89		1
	0745			X			GW-45804- -TS-002	15	X		6.73	21.89		2
	0830			X			GW-45804- -TS-003	15	X		6.72	22.70		3
	0930			X			GW-45804- -TS-004	15	X		7.42	21.68		4
	1080			X			GW-45804- -TS-005	15	X		6.81	18.38		5
	1130			X			GW-45804- -TS-006	15	X		6.97	18.33		6
	1230			X			GW-45804- -TS-007	15	X		6.95	18.56		7
	1300			X			GW-45804- -TS-008	15	X		7.26	14.60		8
	1330			X			GW-45804- -TS-009	15	X		BLANK			9
				X			GW-45804- -TS-010	15	X					

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.

GROUNDWATER METALS ARE FIELD FILTERED.

********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	
COOLING INITIATED X	18.2
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	8/16/16	Tonny Anderson	8/16/16 2:10 pm
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
		RM	17/Aug/16 0900

NOTES AND CONDITIONS:

1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

000979

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 14-NOV-16
Report Date: 21-NOV-16 13:41 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1857475
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-1 SW-45804-111416-TS-001 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.1		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	98.4		2.0	CU		15-NOV-16	R3596197
pH	8.12		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	24.6		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	507	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	19.4		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	176		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00659		0.00021	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.26	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	57.3		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	<0.020		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.023		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	4.52		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.215		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	149		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.6		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	20		10	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	60		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00070		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.030		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	0.00150		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00053		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0015		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.646		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00036		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.291		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00388		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00212		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0036		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	10.6		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	67		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0051		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-1 SW-45804-111416-TS-001 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		21-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	98.2		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	80.2		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	21-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Acenaphthene	82.3		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	78.1		40-130	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d12-Chrysene	86.9		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d8-Naphthalene	105.7		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Phenanthrene	113.0		60-140	%	16-NOV-16	21-NOV-16	R3597671
L1857475-2 SW-45804-111416-TS-002 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.1		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	91.9		2.0	CU		15-NOV-16	R3596197
pH	8.08		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	33.3		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	424	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	20.9		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	174		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00650		0.00021	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.25	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	57.6		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	<0.020		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.023		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	3.76		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.234		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	149		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.1		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-2 SW-45804-111416-TS-002 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Bacteriological Tests							
E. Coli	30		10	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	90		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	1000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00075		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.031		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	0.00166		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00056		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0015		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.710		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00036		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.322		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00409		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00216		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0038		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	10.1		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	71		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0067		0.0010	mg/L		16-NOV-16	R3596956
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		21-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	95.1		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	89.5		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	21-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Acenaphthene	87.7		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	81.0		40-130	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d12-Chrysene	79.1		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d8-Naphthalene	113.1		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Phenanthrene	97.3		60-140	%	16-NOV-16	21-NOV-16	R3597671
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.11		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.2		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	5.6		2.0	CU		15-NOV-16	R3596197
pH	7.63		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	3.0		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	1280	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	1.04		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	238		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	<0.000051		0.000051	mg/L		18-NOV-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	163		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	1.03		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	<0.010		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.39		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0044		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	683		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.0		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	2		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	10		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	1000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.095		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.00020	DLM	0.00020	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00079		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0011		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	<0.050		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00016		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0314		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.276		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00955		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0068		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	130	DLM	100	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0017		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	90.9		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	84.4		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	94.2		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	74.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	87.8		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	89.0		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	92.1		60-140	%	16-NOV-16	18-NOV-16	R3597671
Report Remarks : DLM - Cd RL increased due to potential interference from Mo							
L1857475-4 SW-45804-111416-TS-004 Sampled By: T. SAUNDERS on 14-NOV-16 @ 11:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.47		0.10	pH		15-NOV-16	R3595100
Temperature, Client	6.5		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	26.2		2.0	CU		15-NOV-16	R3596197
pH	7.98		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	8.1		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	798	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	4.41		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	236		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00032		0.00010	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.064		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	141		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	0.280		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.017		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.42		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0141		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	276		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.3		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-4 SW-45804-111416-TS-004 Sampled By: T. SAUNDERS on 14-NOV-16 @ 11:30 Matrix: WATER							
Bacteriological Tests							
E. Coli	23		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	50		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00030		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.044		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00025		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	<0.0010		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.186		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00010		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0837		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00887		0.000050	mg/L	15-NOV-16	16-NOV-16	R3595929
Nickel (Ni)-Total	0.00263		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	22		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0044		0.0010	mg/L		16-NOV-16	R3596956
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	89.2		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	91.9		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	87.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	76.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	83.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	76.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	89.7		60-140	%	16-NOV-16	18-NOV-16	R3597671
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.66		0.10	pH		15-NOV-16	R3595100
Temperature, Client	5.6		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	22.2		2.0	CU		15-NOV-16	R3596197
pH	7.99		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	3.6		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	882	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	2.31		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	244		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00029		0.00014	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.041		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	141		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	0.359		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.015		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.36		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0125		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	332		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.2		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	29		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	40		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.049		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000030	DLM	0.000030	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	<0.0010		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.177		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00012		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0848		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.0515		0.000050	mg/L	15-NOV-16	16-NOV-16	R3595929
Nickel (Ni)-Total	0.00370		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	18		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0035		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	104.1		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	79.8		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	93.3		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	78.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	94.9		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	89.1		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	94.8		60-140	%	16-NOV-16	18-NOV-16	R3597671
Report Remarks : DLM - Cd RL increased due to potential interference from Mo							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Iron (Fe)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Ammonia, Total (as N)	MS-B	L1857475-1, -2, -3, -4, -5

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.

Reference Information

4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT Water Total Metals by CRC ICPMS EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B

Reference Information

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS
Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3598522								
WG2435073-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			105.2		%		80-120	18-NOV-16
WG2435073-4 DUP		**L1857051-1**						
Alkalinity, Total (as CaCO3)		165	164		mg/L	0.4	20	18-NOV-16
WG2435073-2 LCS								
Alkalinity, Total (as CaCO3)			97.7		%		85-115	18-NOV-16
WG2435073-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-NOV-16
BOD-C-WT	Water							
Batch R3599571								
WG2433289-2 DUP		**L1857475-3**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	20-NOV-16
WG2433289-3 LCS								
BOD Carbonaceous			102.0		%		85-115	20-NOV-16
WG2433289-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	20-NOV-16
C-DIS-ORG-WT	Water							
Batch R3597475								
WG2434305-3 DUP		**L1857475-5**						
Dissolved Organic Carbon		6.2	6.5		mg/L	3.7	20	16-NOV-16
WG2434305-2 LCS								
Dissolved Organic Carbon			97.9		%		80-120	16-NOV-16
WG2434305-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-NOV-16
WG2434305-4 MS		**L1857475-5**						
Dissolved Organic Carbon			91.1		%		70-130	16-NOV-16
CL-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Chloride (Cl)		26.8	26.9		mg/L	0.1	25	17-NOV-16
WG2434308-2 LCS								
Chloride (Cl)			100.9		%		70-130	17-NOV-16
WG2434308-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Chloride (Cl)			94.6		%		70-130	17-NOV-16
COD-T-WT	Water							

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3597507								
WG2435181-3 DUP		**L1857475-5**						
COD		18	23	J	mg/L	5	20	17-NOV-16
WG2435181-2 LCS								
COD			98.2		%		85-115	17-NOV-16
WG2435181-1 MB								
COD			<10		mg/L		10	17-NOV-16
WG2435181-4 MS		**L1857475-5**						
COD			94.6		%		75-125	17-NOV-16
COLOUR-WT	Water							
Batch R3596197								
WG2433858-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			97.2		%		80-120	15-NOV-16
WG2433858-4 DUP		**L1857475-1**						
Colour, Apparent		98.4	98.4		CU	0.0	20	15-NOV-16
WG2433858-2 LCS								
Colour, Apparent			102.9		%		80-120	15-NOV-16
WG2433858-1 MB								
Colour, Apparent			<2.0		CU		2	15-NOV-16
EC-MF-WT	Water							
Batch R3597276								
WG2432721-2 DUP		**WG2432721-4**						
E. Coli		10	10		CFU/100mL	0.0	65	16-NOV-16
WG2432721-1 MB								
E. Coli			0		CFU/100mL		1	16-NOV-16
F1-HS-WT	Water							
Batch R3596982								
WG2432549-4 DUP		**WG2432549-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2432549-1 LCS								
F1 (C6-C10)			103.5		%		80-120	16-NOV-16
WG2432549-2 MB								
F1 (C6-C10)			<100		ug/L		100	16-NOV-16
Surrogate: 3,4-Dichlorotoluene			100.8		%		60-140	16-NOV-16
F2-F4-WT	Water							

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3596674								
WG2432818-2 LCS								
F2 (C10-C16)			106.9		%		65-135	16-NOV-16
F3 (C16-C34)			104.0		%		65-135	16-NOV-16
F4 (C34-C50)			103.0		%		65-135	16-NOV-16
WG2432818-3 LCSD		**WG2432818-2**						
F2 (C10-C16)		106.9	92.7		%	14	50	16-NOV-16
F3 (C16-C34)		104.0	97.6		%	6.4	50	16-NOV-16
F4 (C34-C50)		103.0	97.4		%	5.6	50	16-NOV-16
WG2432818-1 MB								
F2 (C10-C16)			<100		ug/L		100	16-NOV-16
F3 (C16-C34)			<250		ug/L		250	16-NOV-16
F4 (C34-C50)			<250		ug/L		250	16-NOV-16
Surrogate: 2-Bromobenzotrifluoride			93.6		%		60-140	16-NOV-16
FC-MF-WT	Water							
Batch R3597175								
WG2432718-1 MB								
Fecal Coliforms			0		CFU/100mL		1	16-NOV-16
HG-T-CVAA-WT	Water							
Batch R3595274								
WG2432707-3 DUP		**L1857475-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	15-NOV-16
WG2432707-2 LCS								
Mercury (Hg)-Total			108.0		%		80-120	15-NOV-16
WG2432707-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	15-NOV-16
WG2432707-4 MS		**L1857475-2**						
Mercury (Hg)-Total			89.6		%		70-130	15-NOV-16
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-4 DUP		**WG2432748-3**						
Arsenic (As)-Total		0.00039	0.00041		mg/L	5.4	20	15-NOV-16
Boron (B)-Total		0.246	0.270		mg/L	9.3	20	15-NOV-16
Cadmium (Cd)-Total		0.000011	0.000011		mg/L	0.0	20	15-NOV-16
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-NOV-16
Cobalt (Co)-Total		<0.00010	0.00010	RPD-NA	mg/L	N/A	20	15-NOV-16

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-4 DUP		**WG2432748-3**						
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-NOV-16
Iron (Fe)-Total		0.118	0.136		mg/L	15	20	15-NOV-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-NOV-16
Manganese (Mn)-Total		0.275	0.288		mg/L	4.5	20	15-NOV-16
Molybdenum (Mo)-Total		0.000394	0.000452		mg/L	14	20	15-NOV-16
Nickel (Ni)-Total		<0.00050	0.00056	RPD-NA	mg/L	N/A	20	15-NOV-16
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	15-NOV-16
WG2432748-2 LCS								
Arsenic (As)-Total			99.3		%		80-120	15-NOV-16
Boron (B)-Total			98.2		%		80-120	15-NOV-16
Cadmium (Cd)-Total			96.8		%		80-120	15-NOV-16
Chromium (Cr)-Total			98.4		%		80-120	15-NOV-16
Cobalt (Co)-Total			98.6		%		80-120	15-NOV-16
Copper (Cu)-Total			97.9		%		80-120	15-NOV-16
Iron (Fe)-Total			93.2		%		80-120	15-NOV-16
Lead (Pb)-Total			102.6		%		80-120	15-NOV-16
Manganese (Mn)-Total			98.6		%		80-120	15-NOV-16
Molybdenum (Mo)-Total			97.7		%		80-120	15-NOV-16
Nickel (Ni)-Total			98.5		%		80-120	15-NOV-16
Zinc (Zn)-Total			91.6		%		80-120	15-NOV-16
WG2432748-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	15-NOV-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	15-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	15-NOV-16
Iron (Fe)-Total			<0.050		mg/L		0.05	15-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	15-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-NOV-16
WG2432748-5 MS		**WG2432748-3**						

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-5 MS		**WG2432748-3**						
Arsenic (As)-Total			99.0		%		70-130	15-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	15-NOV-16
Cadmium (Cd)-Total			95.1		%		70-130	15-NOV-16
Chromium (Cr)-Total			97.6		%		70-130	15-NOV-16
Cobalt (Co)-Total			93.9		%		70-130	15-NOV-16
Copper (Cu)-Total			96.2		%		70-130	15-NOV-16
Iron (Fe)-Total			N/A	MS-B	%		-	15-NOV-16
Lead (Pb)-Total			91.9		%		70-130	15-NOV-16
Manganese (Mn)-Total			N/A	MS-B	%		-	15-NOV-16
Molybdenum (Mo)-Total			97.4		%		70-130	15-NOV-16
Nickel (Ni)-Total			92.4		%		70-130	15-NOV-16
Zinc (Zn)-Total			95.3		%		70-130	15-NOV-16
NH3-WT	Water							
Batch R3597795								
WG2433623-3 DUP		**L1856916-1**						
Ammonia, Total (as N)		2.16	2.23		mg/L	3.2	20	16-NOV-16
WG2433623-2 LCS								
Ammonia, Total (as N)			99.3		%		85-115	16-NOV-16
WG2433623-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	16-NOV-16
WG2433623-4 MS		**L1856916-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	16-NOV-16
NO2-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	17-NOV-16
WG2434308-2 LCS								
Nitrite (as N)			101.9		%		70-130	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Nitrite (as N)			96.0		%		70-130	17-NOV-16
NO3-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Nitrate (as N)		0.282	0.273		mg/L	3.0	25	17-NOV-16
WG2434308-2 LCS								

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R3596991								
WG2434308-2 LCS								
Nitrate (as N)			100.3		%		70-130	17-NOV-16
WG2434308-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Nitrate (as N)			96.1		%		70-130	17-NOV-16
P-T-COL-WT	Water							
Batch R3596574								
WG2433515-3 DUP		**L1857036-3**						
Phosphorus, Total		0.0154	0.0173		mg/L	12	20	17-NOV-16
WG2433515-2 LCS								
Phosphorus, Total			104.5		%		80-120	17-NOV-16
WG2433515-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	17-NOV-16
WG2433515-4 MS		**L1857036-3**						
Phosphorus, Total			90.6		%		70-130	17-NOV-16
PAH-CCME-WT	Water							
Batch R3597671								
WG2433461-2 LCS								
Anthracene			81.1		%		50-140	18-NOV-16
Benzo(a)pyrene			75.0		%		60-130	18-NOV-16
WG2433461-3 LCSD		**WG2433461-2**						
Anthracene		81.1	87.3		%	7.3	50	18-NOV-16
Benzo(a)pyrene		75.0	87.3		%	15	50	18-NOV-16
WG2433461-1 MB								
Anthracene			<0.020		ug/L		0.02	18-NOV-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	18-NOV-16
Surrogate: d8-Naphthalene			90.9		%		60-140	18-NOV-16
Surrogate: d10-Phenanthrene			88.2		%		60-140	18-NOV-16
Surrogate: d12-Chrysene			90.8		%		60-140	18-NOV-16
Surrogate: d10-Acenaphthene			88.8		%		60-140	18-NOV-16
Surrogate: d9-Acridine (SS)			76.3		%		40-130	18-NOV-16
PH-WT	Water							

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3596618								
WG2433572-3 DUP		**WG2433572-2**						
pH		8.12	8.14	J	pH units	0.02	0.2	16-NOV-16
WG2433572-1 LCS								
pH			7.02		pH units		6.9-7.1	16-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3596956								
WG2433971-11 DUP		**L1857251-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-NOV-16
WG2433971-10 LCS								
Phenols (4AAP)			97.0		%		85-115	16-NOV-16
WG2433971-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-NOV-16
WG2433971-12 MS		**L1857251-2**						
Phenols (4AAP)			89.8		%		75-125	16-NOV-16
SO4-IC-N-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Sulfate (SO4)		25.8	25.9		mg/L	0.3	20	17-NOV-16
WG2434308-2 LCS								
Sulfate (SO4)			100.9		%		90-110	17-NOV-16
WG2434308-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Sulfate (SO4)			95.2		%		75-125	17-NOV-16
SOLIDS-TDS-WT	Water							
Batch R3599517								
WG2436190-3 DUP		**L1857475-1**						
Total Dissolved Solids		507	489		mg/L	3.6	20	19-NOV-16
WG2436190-2 LCS								
Total Dissolved Solids			91.6		%		85-115	19-NOV-16
WG2436190-1 MB								
Total Dissolved Solids			<10		mg/L		10	19-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3598798								
WG2435295-3 DUP		**L1857897-1**						
Total Suspended Solids		406	374		mg/L	8.4	20	20-NOV-16
WG2435295-2 LCS								

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R3598798								
WG2435295-2 LCS								
Total Suspended Solids			98.8		%		85-115	20-NOV-16
WG2435295-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-NOV-16
TC-MF-WT	Water							
Batch R3597164								
WG2432725-1 MB								
Total Coliforms			0		CFU/100mL		1	16-NOV-16
TKN-WT	Water							
Batch R3596321								
WG2433469-3 DUP		**L1855344-2**						
Total Kjeldahl Nitrogen		0.20	0.20		mg/L	1.2	20	16-NOV-16
WG2433469-2 LCS								
Total Kjeldahl Nitrogen			106.2		%		75-125	16-NOV-16
WG2433469-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	16-NOV-16
WG2433469-4 MS		**L1855344-2**						
Total Kjeldahl Nitrogen			110.6		%		70-130	16-NOV-16
TURBIDITY-WT	Water							
Batch R3595629								
WG2433059-3 DUP		**L1857475-1**						
Turbidity		19.4	17.6		NTU	9.7	15	15-NOV-16
WG2433059-2 LCS								
Turbidity			103.0		%		85-115	15-NOV-16
WG2433059-1 MB								
Turbidity			<0.10		NTU		0.1	15-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

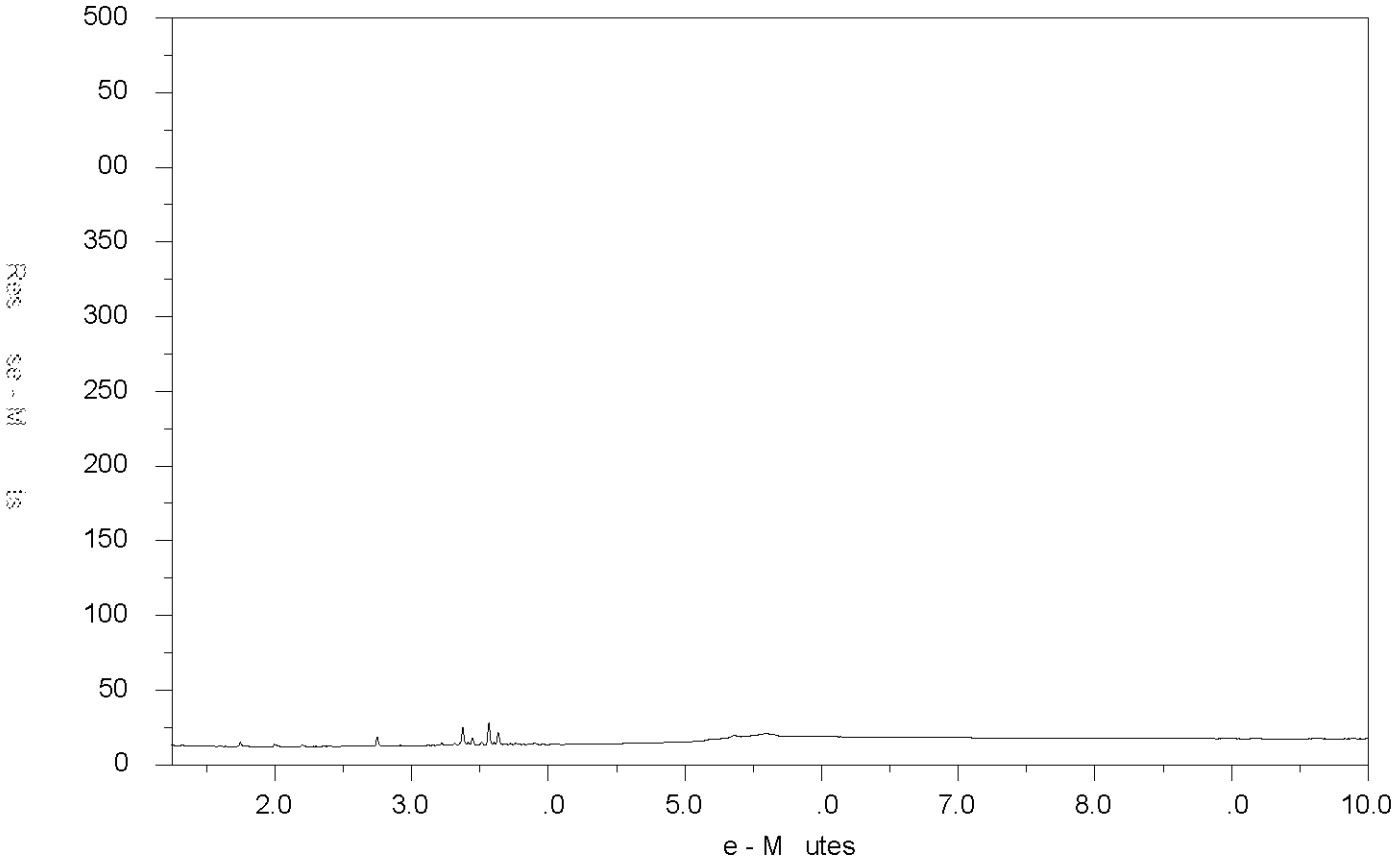
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-1
Client Sample ID: SW-45804-111416-TS-001



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

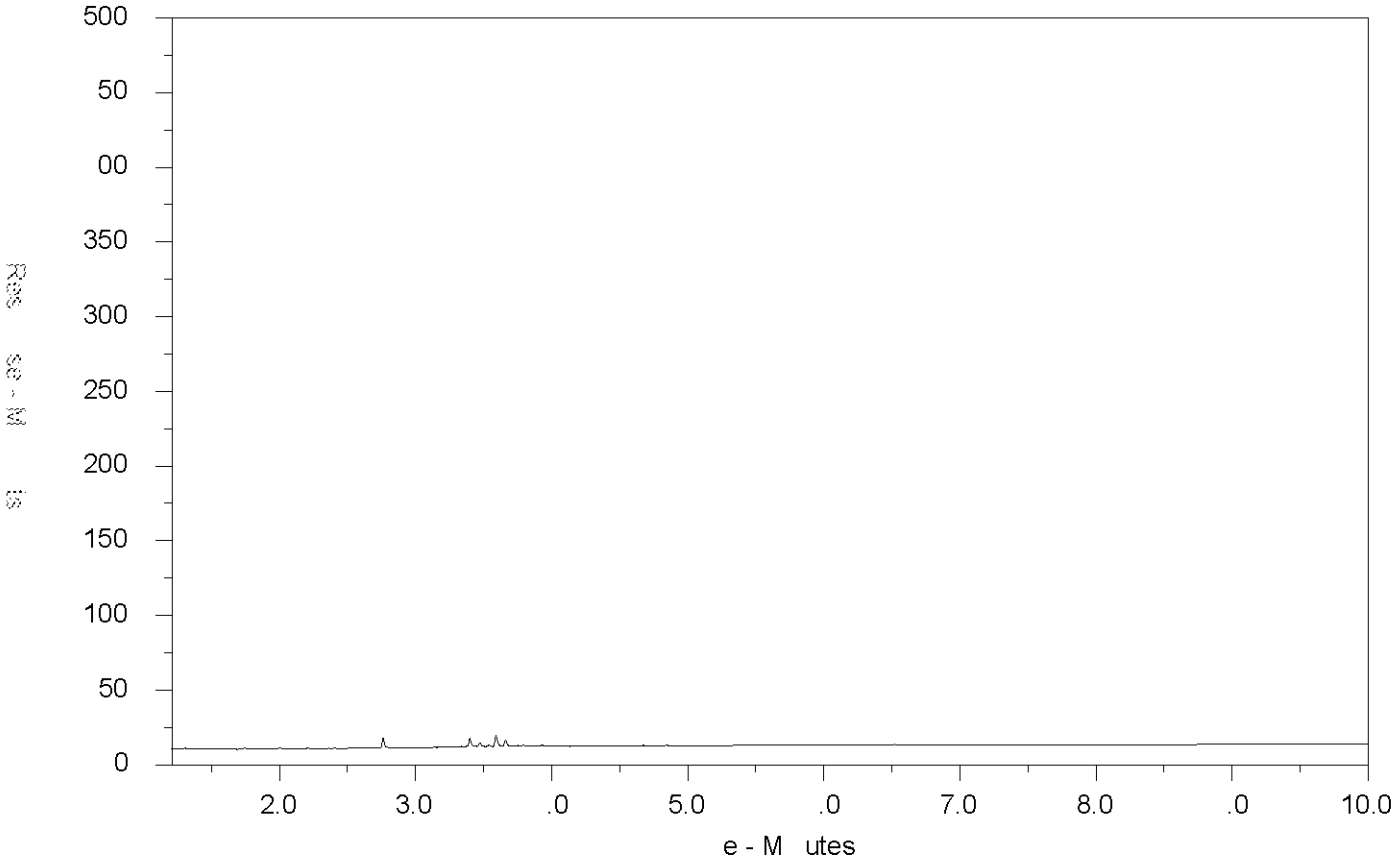
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-2
Client Sample ID: SW-45804-111416-TS-002



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

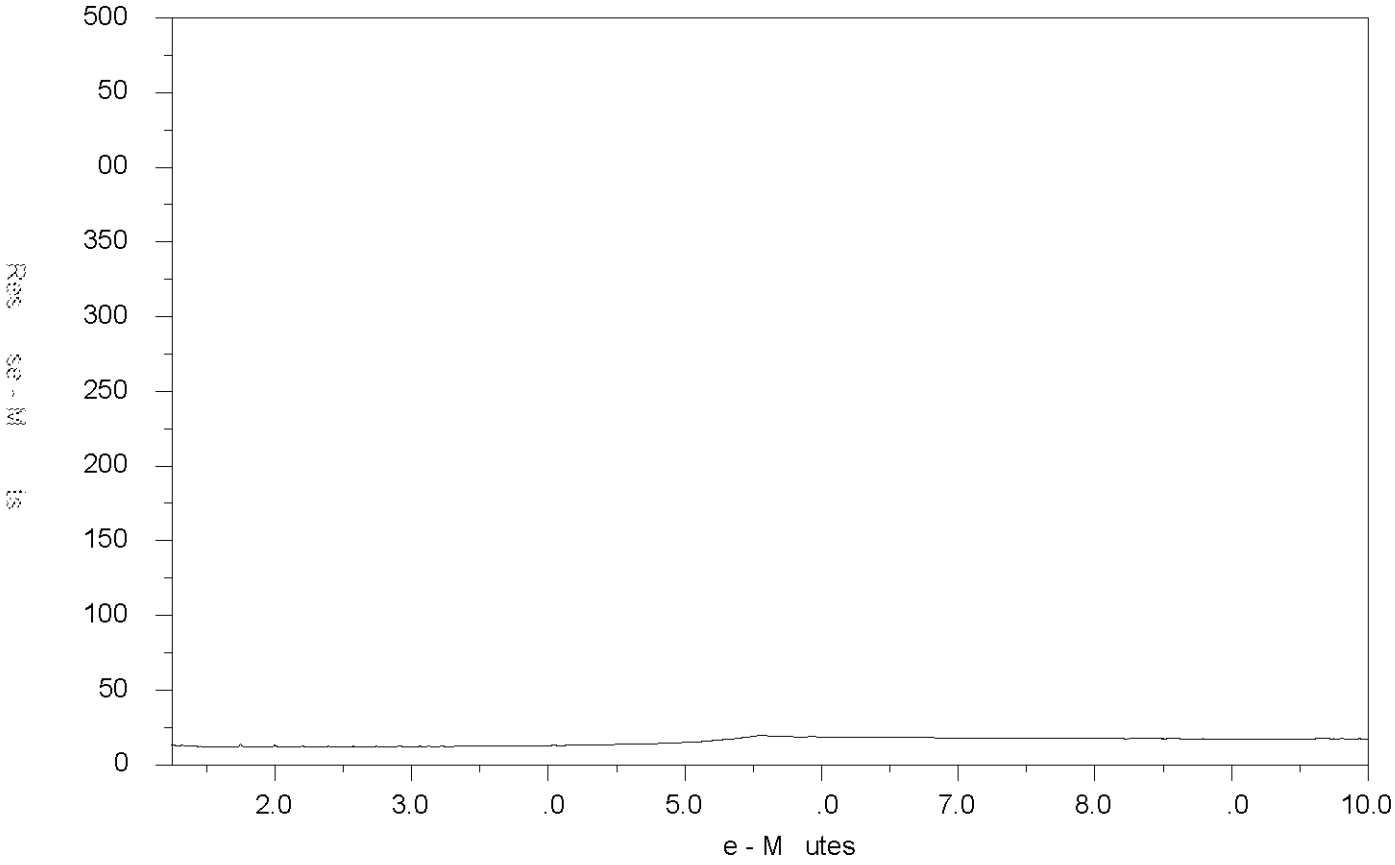
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-3
Client Sample ID: SW-45804-111416-TS-003



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

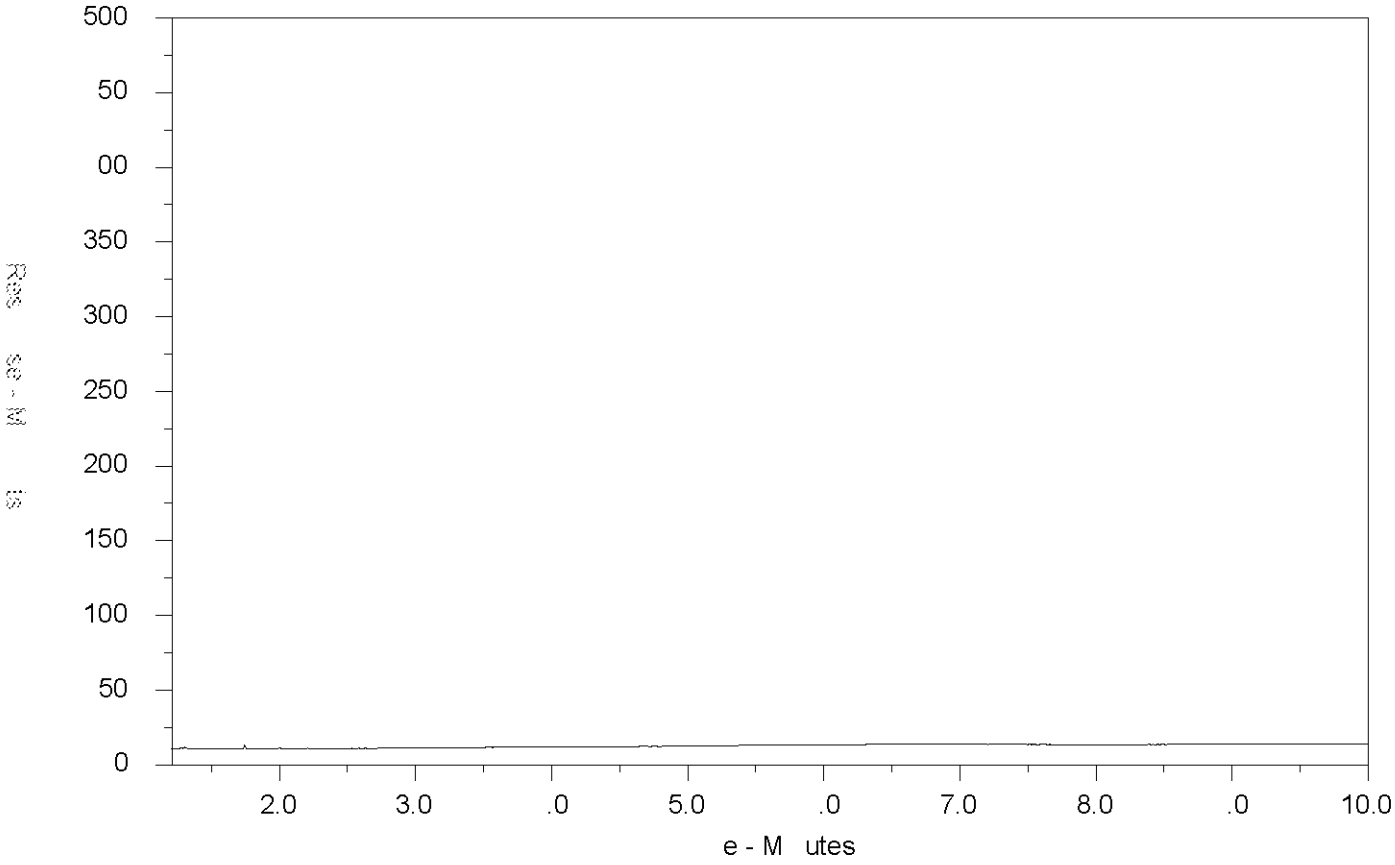
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-4
Client Sample ID: SW-45804-111416-TS-004



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

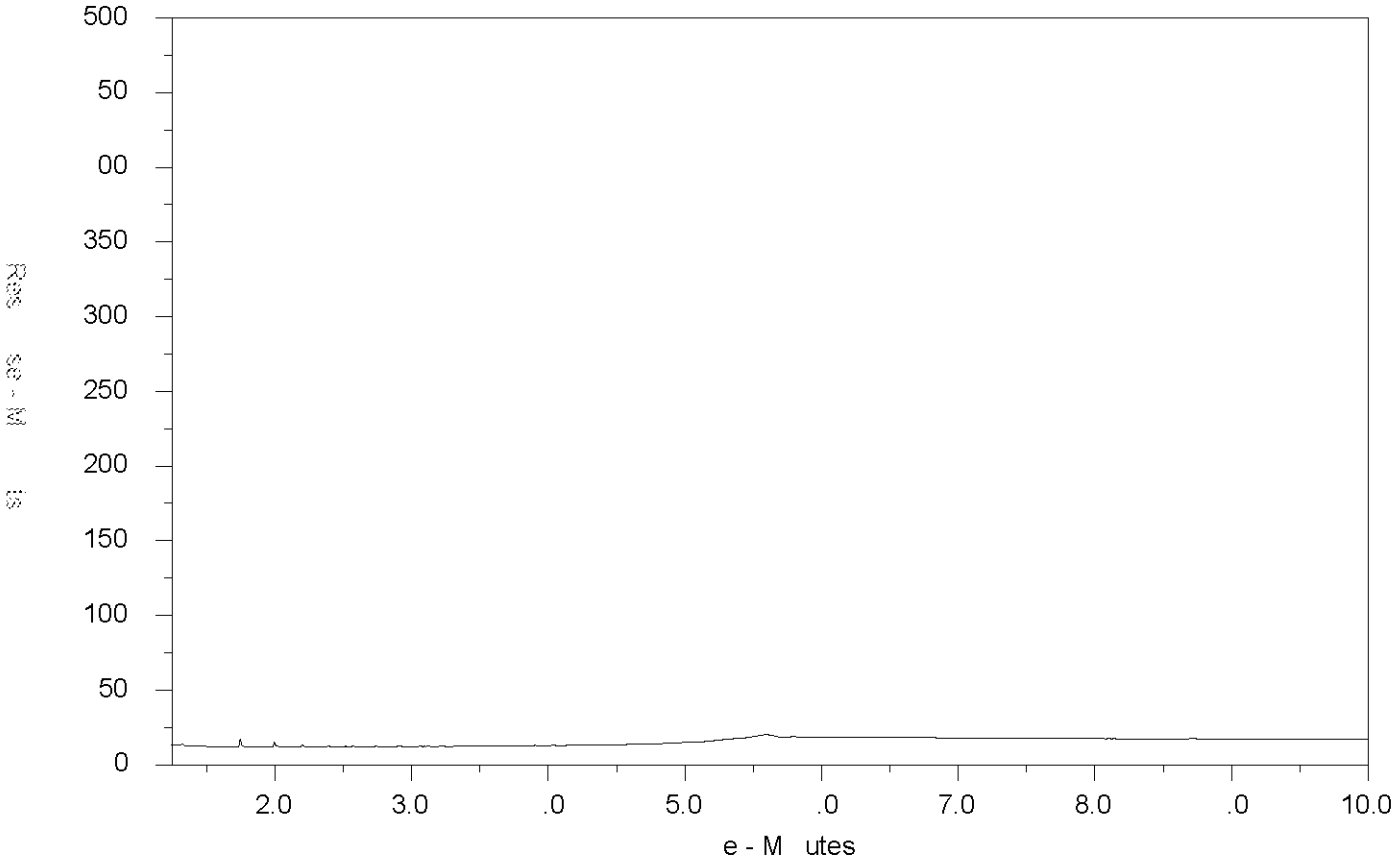
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-5
Client Sample ID: SW-45804-111416-TS-005



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CH L1857475-COFC

S REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME 13791: GHD LIMITED
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Criteria on report (y/n) ___; Reg 153/04; Table ___; TCLP ___ MISA ___ PWQO ___; OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ___
EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com,___
EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL_Wayne.Williams@ghd.com
SELECT: pdf ___ digital ___ both X

SUBMISSION # L1857475
ENTERED BY: SN
DATE/TIME ENTERED: 15-NOV-16
BIN # 15A

ANALYSIS REQUEST — INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
11/14/16	1000			X			SW-45804- 111416 -TS-001	15		X	7.43	8.10		1
	1030			X			SW-45804- -TS-002	15		X	7.43	8.10		2
	1030			X			SW-45804- -TS-003	15		X	7.11	8.23		3
	1130			X			SW-45804- -TS-004	15		X	7.47	6.47		4
	1230			X			SW-45804- -TS-005	15		X	7.66	5.59		5
				X			SW-45804- -TS-006	15		X				
				X			SW-45804- -TS-007	15		X				
				X			SW-45804- -TS-008	15		X				
				X			SW-45804- -TS-009	15		X				

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION: FROZEN; COLD; COOLING INITIATED ✓; AMBIENT; CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___
MEAN TEMP: 9.4 (9.2)
INIT: SN

SAMPLED BY: Trevor Saunders	DATE & TIME: 11/14/16 1350	RECEIVED BY: Tammy Andrews	DATE & TIME: NOV. 14th 2016 13:50
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY: SN	DATE & TIME: 15-NOV-16 900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

001006

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 15-NOV-16
Report Date: 23-NOV-16 12:16 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1858227
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-1 GW-45804-111516-TS-001 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.70		0.10	pH		16-NOV-16	R3596150
Temperature, Client	18.6		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	56.9		2.0	CU		16-NOV-16	R3597156
pH	6.94		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	8.3		2.0	mg/L	18-NOV-16	21-NOV-16	R3599494
Total Dissolved Solids	1790	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	28.8		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	406		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0258		0.00087	mg/L		18-NOV-16	
Ammonia, Total (as N)	11.9	DLHC	0.40	mg/L		16-NOV-16	R3597795
Chloride (Cl)	94.1	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	12.8	DLHC	0.30	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0306		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	947	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.8		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	200	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0303	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	2.20	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.852	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00710	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-1 GW-45804-111516-TS-001 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Aggregate Organics							
COD	20		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0016		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3597251
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	90.8		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	84.7		60-140	%		17-NOV-16	R3597251
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-2 GW-45804-111516-TS-002 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		16-NOV-16	R3596150
Temperature, Client	10.4		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	38.4		2.0	CU		16-NOV-16	R3597156
pH	7.39		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	8.7		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	777	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	43.8		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	301		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00036		0.00012	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.057		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	81.2		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	0.487		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.30		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0160		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	271		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.9		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-2 GW-45804-111516-TS-002 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	0.27	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0607	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.0256	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0847	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	13		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0048		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	85.0		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	95.0		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	71.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.57		0.10	pH		16-NOV-16	R3596150
Temperature, Client	11.4		-50	Deg. C		16-NOV-16	R3596150

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
Physical Tests							
Colour, Apparent	31.6		2.0	CU		16-NOV-16	R3597156
pH	8.82		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	5.1		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	241	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	12.3		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	102		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0029		0.0017	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.033		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	86.5		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.020		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.23		0.15	mg/L	21-NOV-16	21-NOV-16	R3600501
Phosphorus, Total	0.0060		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	0.34		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.5		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.023		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0539		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	0.199		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	0.000078		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.0486		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00131		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	0.0021		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	5.2		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	21		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0025		0.0010	mg/L		18-NOV-16	R3598334

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.5		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	99.3		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.4		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-4 GW-45804-111516-TS-004 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.06		0.10	pH		16-NOV-16	R3596150
Temperature, Client	12.0		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	343	DLHC	4.0	CU		16-NOV-16	R3597156
pH	7.11		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	10.3		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	897	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	111		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	329		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00431		0.00012	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.43	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	83.5		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.020		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	2.62		0.15	mg/L	21-NOV-16	21-NOV-16	R3600501
Phosphorus, Total	0.0243		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	283		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-4 GW-45804-111516-TS-004 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.0101		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.044		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00022		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0403		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	8.40		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	0.000107		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	4.29	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00371		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00078		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	0.0024		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	44		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0011		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	84.2		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	87.0		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	69.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.4		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.00		0.10	pH		16-NOV-16	R3596150
Temperature, Client	11.2		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	448	DLHC	4.0	CU		16-NOV-16	R3597156
pH	6.96		0.10	pH units		17-NOV-16	R3596954

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Physical Tests							
Total Suspended Solids	12.1		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1360	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	107		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	273		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00227		0.000050	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.917		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	101	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.79		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.147		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	689	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00161		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.026		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00058		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	8.11		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	2.09	DLHC	0.0050	mg/L	16-NOV-16	21-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00180		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00065		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	33		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0024		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Hydrocarbons							
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.8		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	97.4		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.7		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-6 GW-45804-111516-TS-006 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.10		0.10	pH		16-NOV-16	R3596150
Temperature, Client	13.5		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	196		2.0	CU		16-NOV-16	R3597156
pH	7.34		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	2.6		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1580	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	50.9		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	558	DLHC	20	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0254		0.00074	mg/L		18-NOV-16	
Ammonia, Total (as N)	6.85	DLHC	0.20	mg/L		16-NOV-16	R3597795
Chloride (Cl)	128	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	5.62		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0943		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	511	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.9		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-6 GW-45804-111516-TS-006 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Arsenic (As)-Dissolved	0.00108		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.078		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00027		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00058		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	4.06		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	2.50	DLHC	0.0050	mg/L	16-NOV-16	21-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00679		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00105		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	45		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0022		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	81.9		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	67.5		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.09		0.10	pH		16-NOV-16	R3596150
Temperature, Client	12.0		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	13.2		2.0	CU		16-NOV-16	R3597156
pH	7.24		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	9.5		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1460	DLDS	20	mg/L		20-NOV-16	R3599545

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Physical Tests							
Turbidity	3.99		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	313		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.000237		0.000065	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.073		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	77.2	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.16		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0063		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	710	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.074		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	0.000021		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00036		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00287		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	0.410		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.126		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0450		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00142		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	14		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0034		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.4		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	80.8		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	63.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-8 GW-45804-111516-TS-008 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.24		0.10	pH		16-NOV-16	R3596150
Temperature, Client	10.4		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	<2.0		2.0	CU		16-NOV-16	R3597156
pH	7.08		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	<2.0		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1620	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	1.21		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	342		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.000194		0.000081	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.048		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	95.9	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.15		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0038		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	816	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.1		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-8 GW-45804-111516-TS-008 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0517	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.160	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0211	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.0064	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	10		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0020		0.0010	mg/L		17-NOV-16	R3597693
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	82.4		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	81.4		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	64.1		60-140	%	18-NOV-16	23-NOV-16	R3601165

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.

Reference Information

4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

Reference Information

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3598522								
WG2435073-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			100.0		%		80-120	18-NOV-16
WG2435073-8 DUP		**L1857583-11**						
Alkalinity, Total (as CaCO3)		259	262		mg/L	1.0	20	18-NOV-16
WG2435073-6 LCS								
Alkalinity, Total (as CaCO3)			100.9		%		85-115	18-NOV-16
WG2435073-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-NOV-16
BOD-C-WT	Water							
Batch R3600653								
WG2434531-2 DUP		**L1858105-3**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	22-NOV-16
WG2434531-3 LCS								
BOD Carbonaceous			93.4		%		85-115	22-NOV-16
WG2434531-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-NOV-16
C-DIS-ORG-WT	Water							
Batch R3599042								
WG2435178-3 DUP		**L1858227-1**						
Dissolved Organic Carbon		3.8	3.8		mg/L	0.1	20	17-NOV-16
WG2435178-2 LCS								
Dissolved Organic Carbon			94.2		%		80-120	17-NOV-16
WG2435178-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	17-NOV-16
WG2435178-4 MS		**L1858227-1**						
Dissolved Organic Carbon			92.5		%		70-130	17-NOV-16
CL-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Chloride (Cl)		86.4	86.5		mg/L	0.1	25	18-NOV-16
WG2435860-2 LCS								
Chloride (Cl)			101.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Chloride (Cl)			94.7		%		70-130	18-NOV-16
COD-T-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3599056								
WG2436599-3 DUP		**L1859400-6**						
COD		18	23	J	mg/L	4	20	20-NOV-16
WG2436599-2 LCS								
COD			105.2		%		85-115	20-NOV-16
WG2436599-1 MB								
COD			<10		mg/L		10	20-NOV-16
WG2436599-4 MS		**L1859400-6**						
COD			87.5		%		75-125	20-NOV-16
COLOUR-WT	Water							
Batch R3597156								
WG2434274-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			94.6		%		80-120	16-NOV-16
WG2434274-4 DUP		**L1857803-1**						
Colour, Apparent		30.1	29.8		CU	0.9	20	16-NOV-16
WG2434274-2 LCS								
Colour, Apparent			100.1		%		80-120	16-NOV-16
WG2434274-1 MB								
Colour, Apparent			<2.0		CU		2	16-NOV-16
EC-MF-WT	Water							
Batch R3597315								
WG2433785-2 DUP		**WG2433785-4**						
E. Coli		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433785-1 MB								
E. Coli			0		CFU/100mL		1	17-NOV-16
F1-HS-WT	Water							
Batch R3596982								
WG2432549-4 DUP		**WG2432549-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2432549-1 LCS								
F1 (C6-C10)			103.5		%		80-120	16-NOV-16
WG2432549-2 MB								
F1 (C6-C10)			<100		ug/L		100	16-NOV-16
Surrogate: 3,4-Dichlorotoluene			100.8		%		60-140	16-NOV-16
Batch R3597251								
WG2433655-4 DUP		**WG2433655-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2433655-1 LCS								

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3597251								
WG2433655-1 LCS								
F1 (C6-C10)			99.1		%		80-120	17-NOV-16
WG2433655-2 MB								
F1 (C6-C10)			<100		ug/L		100	17-NOV-16
Surrogate: 3,4-Dichlorotoluene			95.0		%		60-140	17-NOV-16
F2-F4-WT	Water							
Batch R3597062								
WG2434303-2 LCS								
F2 (C10-C16)			102.7		%		65-135	17-NOV-16
F3 (C16-C34)			92.6		%		65-135	17-NOV-16
F4 (C34-C50)			104.7		%		65-135	17-NOV-16
WG2434303-3 LCSD		**WG2434303-2**						
F2 (C10-C16)		102.7	94.9		%	7.9	50	17-NOV-16
F3 (C16-C34)		92.6	96.0		%	3.6	50	17-NOV-16
F4 (C34-C50)		104.7	101.0		%	3.6	50	17-NOV-16
WG2434303-1 MB								
F2 (C10-C16)			<100		ug/L		100	17-NOV-16
F3 (C16-C34)			<250		ug/L		250	17-NOV-16
F4 (C34-C50)			<250		ug/L		250	17-NOV-16
Surrogate: 2-Bromobenzotrifluoride			84.7		%		60-140	17-NOV-16
FC-MF-WT	Water							
Batch R3597308								
WG2433787-1 MB								
Fecal Coliforms			0		CFU/100mL		1	17-NOV-16
HG-D-CVAA-WT	Water							
Batch R3597024								
WG2434581-4 DUP		**WG2434581-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-NOV-16
WG2434581-2 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	17-NOV-16
WG2434581-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	17-NOV-16
WG2434581-6 MS		**WG2434581-5**						
Mercury (Hg)-Dissolved			109.5		%		70-130	17-NOV-16
MET-D-CCMS-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3596203								
WG2433917-4 DUP		**WG2433917-3**						
Arsenic (As)-Dissolved		0.00042	0.00041		mg/L	1.9	20	16-NOV-16
Boron (B)-Dissolved		0.089	0.089		mg/L	0.3	20	16-NOV-16
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-NOV-16
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	16-NOV-16
Cobalt (Co)-Dissolved		0.00019	0.00018		mg/L	8.4	20	16-NOV-16
Copper (Cu)-Dissolved		0.0302	0.0303		mg/L	0.1	20	16-NOV-16
Iron (Fe)-Dissolved		2.22	2.22		mg/L	0.1	20	16-NOV-16
Lead (Pb)-Dissolved		0.000075	0.000075		mg/L	0.3	20	16-NOV-16
Manganese (Mn)-Dissolved		0.872	0.881		mg/L	1.1	20	16-NOV-16
Molybdenum (Mo)-Dissolved		0.00664	0.00670		mg/L	0.9	20	16-NOV-16
Nickel (Ni)-Dissolved		0.00140	0.00140		mg/L	0.2	20	16-NOV-16
Zinc (Zn)-Dissolved		0.0017	0.0016		mg/L	4.2	20	16-NOV-16
WG2433917-2 LCS								
Arsenic (As)-Dissolved			97.3		%		80-120	16-NOV-16
Boron (B)-Dissolved			101.2		%		80-120	16-NOV-16
Cadmium (Cd)-Dissolved			97.5		%		80-120	16-NOV-16
Chromium (Cr)-Dissolved			97.6		%		80-120	16-NOV-16
Cobalt (Co)-Dissolved			97.0		%		80-120	16-NOV-16
Copper (Cu)-Dissolved			95.6		%		80-120	16-NOV-16
Iron (Fe)-Dissolved			92.4		%		80-120	16-NOV-16
Lead (Pb)-Dissolved			98.4		%		80-120	16-NOV-16
Manganese (Mn)-Dissolved			99.6		%		80-120	16-NOV-16
Molybdenum (Mo)-Dissolved			97.4		%		80-120	16-NOV-16
Nickel (Ni)-Dissolved			97.1		%		80-120	16-NOV-16
Zinc (Zn)-Dissolved			90.6		%		80-120	16-NOV-16
WG2433917-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	16-NOV-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	16-NOV-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	16-NOV-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	16-NOV-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	16-NOV-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	16-NOV-16
Lead (Pb)-Dissolved			<0.000050				0.00005	

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3596203								
WG2433917-1 MB								
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	16-NOV-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	16-NOV-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	16-NOV-16
WG2433917-5 MS		**WG2433917-3**						
Arsenic (As)-Dissolved			119.8		%		70-130	16-NOV-16
Boron (B)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Cadmium (Cd)-Dissolved			101.6		%		70-130	16-NOV-16
Chromium (Cr)-Dissolved			100.8		%		70-130	16-NOV-16
Cobalt (Co)-Dissolved			97.4		%		70-130	16-NOV-16
Copper (Cu)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Lead (Pb)-Dissolved			96.6		%		70-130	16-NOV-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Molybdenum (Mo)-Dissolved			101.7		%		70-130	16-NOV-16
Nickel (Ni)-Dissolved			94.4		%		70-130	16-NOV-16
Zinc (Zn)-Dissolved			92.3		%		70-130	16-NOV-16
NH3-WT	Water							
Batch R3597795								
WG2433623-15 DUP		**L1858343-2**						
Ammonia, Total (as N)		0.332	0.338		mg/L	2.0	20	16-NOV-16
WG2433623-14 LCS								
Ammonia, Total (as N)			96.2		%		85-115	16-NOV-16
WG2433623-13 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	16-NOV-16
WG2433623-16 MS		**L1858343-2**						
Ammonia, Total (as N)			92.6		%		75-125	16-NOV-16
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrite (as N)			102.4		%		70-130	18-NOV-16
WG2435860-1 MB								

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrite (as N)			102.5		%		70-130	18-NOV-16
NO3-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrate (as N)			100.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrate (as N)			102.5		%		70-130	18-NOV-16
P-T-COL-WT	Water							
Batch R3599045								
WG2435220-3 DUP		**L1858227-1**						
Phosphorus, Total		0.0306	0.0341		mg/L	11	20	20-NOV-16
WG2435220-2 LCS								
Phosphorus, Total			103.1		%		80-120	20-NOV-16
WG2435220-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	20-NOV-16
WG2435220-4 MS		**L1858227-1**						
Phosphorus, Total			81.9		%		70-130	20-NOV-16
PAH-CCME-WT	Water							
Batch R3601165								
WG2435271-2 LCS								
Anthracene			58.1		%		50-140	23-NOV-16
Benzo(a)pyrene			89.7		%		60-130	23-NOV-16
WG2435271-3 LCSD		**WG2435271-2**						
Anthracene		58.1	57.7		%	0.8	50	23-NOV-16
Benzo(a)pyrene		89.7	86.9		%	3.1	50	23-NOV-16
WG2435271-1 MB								
Anthracene			<0.020		ug/L		0.02	23-NOV-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	23-NOV-16
Surrogate: d10-Phenanthrene			67.6		%		60-140	23-NOV-16
Surrogate: d12-Chrysene			73.1		%		60-140	23-NOV-16

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3596954								
WG2434422-3 DUP		**WG2434422-2**						
pH		6.96	7.09	J	pH units	0.13	0.2	17-NOV-16
WG2434422-6 DUP		**WG2434422-5**						
pH		6.96	6.97	J	pH units	0.01	0.2	17-NOV-16
WG2434422-1 LCS								
pH			6.98		pH units		6.9-7.1	17-NOV-16
WG2434422-4 LCS								
pH			7.02		pH units		6.9-7.1	17-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3597693								
WG2434828-7 DUP		**L1857251-20**						
Phenols (4AAP)		0.0018	0.0019		mg/L	8.7	20	17-NOV-16
WG2434828-6 LCS								
Phenols (4AAP)			92.0		%		85-115	17-NOV-16
WG2434828-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	17-NOV-16
WG2434828-8 MS		**L1857251-20**						
Phenols (4AAP)			89.9		%		75-125	17-NOV-16
Batch R3598334								
WG2435662-11 DUP		**L1857541-1**						
Phenols (4AAP)		0.0036	0.0037		mg/L	1.8	20	18-NOV-16
WG2435662-15 DUP		**L1858227-5**						
Phenols (4AAP)		0.0024	0.0022		mg/L	6.9	20	18-NOV-16
WG2435662-10 LCS								
Phenols (4AAP)			99.6		%		85-115	18-NOV-16
WG2435662-14 LCS								
Phenols (4AAP)			98.2		%		85-115	18-NOV-16
WG2435662-13 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-NOV-16
WG2435662-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-NOV-16
WG2435662-12 MS		**L1857541-1**						
Phenols (4AAP)			101.7		%		75-125	18-NOV-16
WG2435662-16 MS		**L1858227-5**						
Phenols (4AAP)			92.5		%		75-125	18-NOV-16
SO4-IC-N-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	18-NOV-16
WG2435860-2 LCS								
Sulfate (SO4)			101.2		%		90-110	18-NOV-16
WG2435860-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Sulfate (SO4)			104.2		%		75-125	18-NOV-16
SOLIDS-TDS-WT	Water							
Batch R3599531								
WG2436459-3 DUP		**L1857359-1**						
Total Dissolved Solids		368	364		mg/L	1.1	20	20-NOV-16
WG2436459-2 LCS								
Total Dissolved Solids			96.9		%		85-115	20-NOV-16
WG2436459-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-NOV-16
Batch R3599545								
WG2436466-3 DUP		**L1857079-1**						
Total Dissolved Solids		849	850		mg/L	0.2	20	20-NOV-16
WG2436466-2 LCS								
Total Dissolved Solids			96.5		%		85-115	20-NOV-16
WG2436466-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3599494								
WG2435298-3 DUP		**L1857783-2**						
Total Suspended Solids		4.0	3.0	J	mg/L	1.0	4	21-NOV-16
WG2435298-2 LCS								
Total Suspended Solids			97.6		%		85-115	21-NOV-16
WG2435298-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
Batch R3599510								
WG2435300-3 DUP		**L1858237-1**						
Total Suspended Solids		27.9	30.1		mg/L	7.6	20	21-NOV-16
WG2435300-2 LCS								
Total Suspended Solids			98.0		%		85-115	21-NOV-16
WG2435300-1 MB								
							2	

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R3599510								
WG2435300-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
TC-MF-WT	Water							
Batch R3597304								
WG2433783-3 DUP		**WG2433783-4**						
Total Coliforms		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433783-1 MB								
Total Coliforms			0		CFU/100mL		1	17-NOV-16
TKN-WT	Water							
Batch R3597465								
WG2434415-3 DUP		**L1858125-6**						
Total Kjeldahl Nitrogen		1.41	1.53		mg/L	8.4	20	17-NOV-16
WG2434415-2 LCS								
Total Kjeldahl Nitrogen			102.3		%		75-125	17-NOV-16
WG2434415-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	17-NOV-16
WG2434415-4 MS		**L1858125-6**						
Total Kjeldahl Nitrogen			115.3		%		70-130	17-NOV-16
Batch R3600501								
WG2436699-3 DUP		**L1857908-5**						
Total Kjeldahl Nitrogen		0.61	0.69		mg/L	12	20	21-NOV-16
WG2436699-2 LCS								
Total Kjeldahl Nitrogen			109.7		%		75-125	21-NOV-16
WG2436699-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	21-NOV-16
WG2436699-4 MS		**L1857908-5**						
Total Kjeldahl Nitrogen			98.5		%		70-130	21-NOV-16
TURBIDITY-WT	Water							
Batch R3597595								
WG2434432-3 DUP		**L1858125-2**						
Turbidity		0.77	0.73		NTU	4.8	15	17-NOV-16
WG2434432-2 LCS								
Turbidity			104.0		%		85-115	17-NOV-16
WG2434432-1 MB								
Turbidity			<0.10		NTU		0.1	17-NOV-16

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

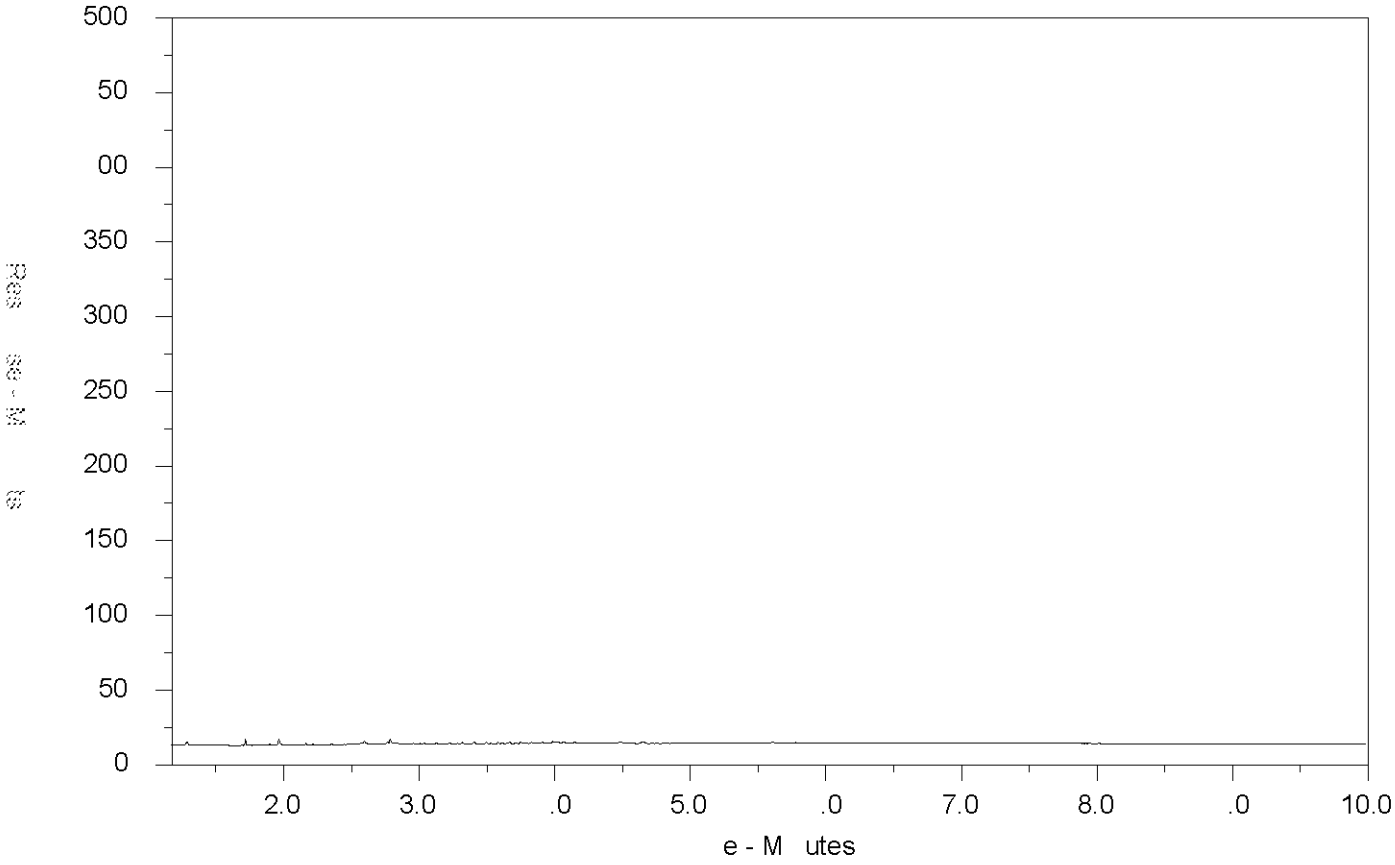
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-1
Client Sample ID: GW-45804-111516-TS-001



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

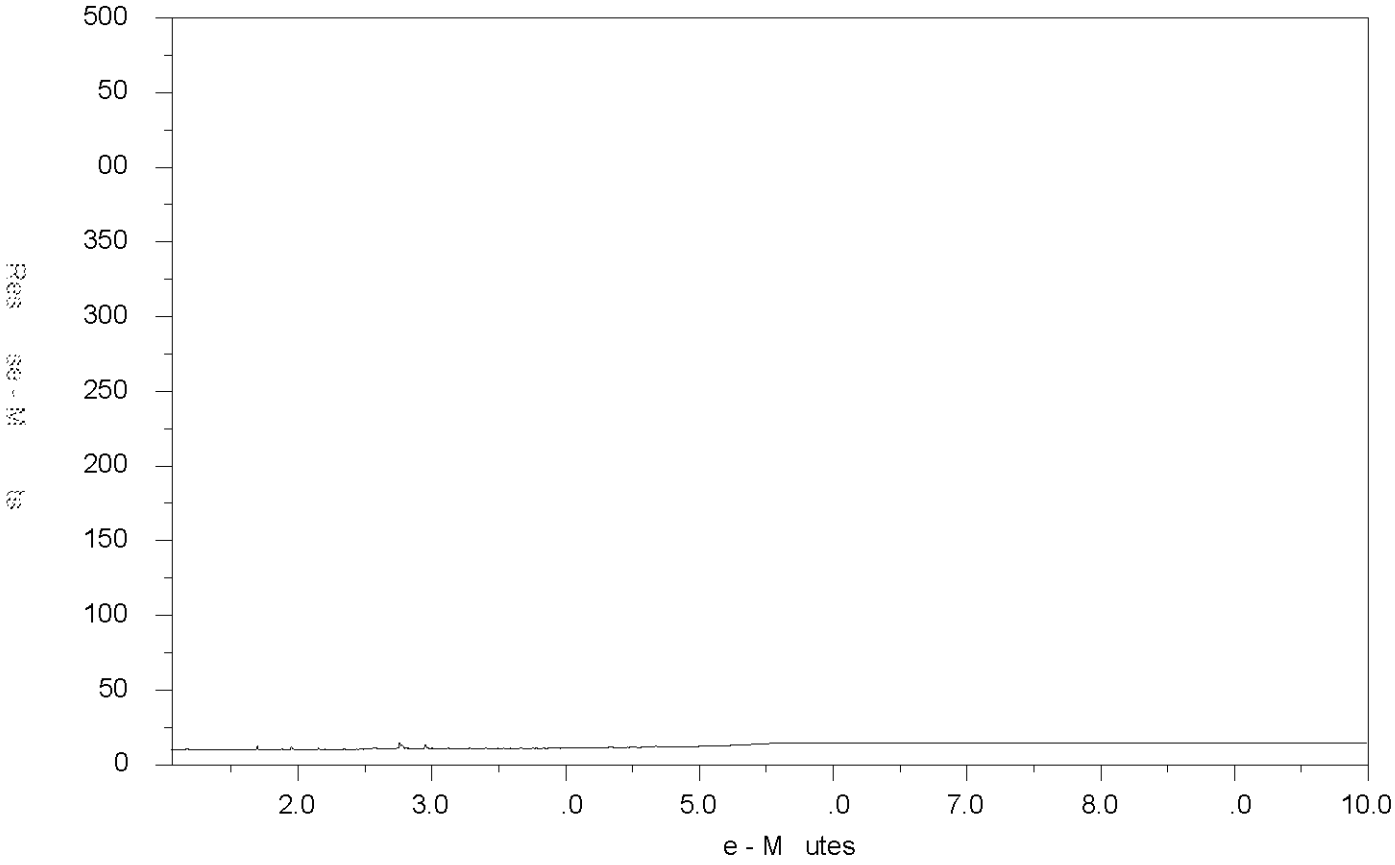
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-2
Client Sample ID: GW-45804-111516-TS-002



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

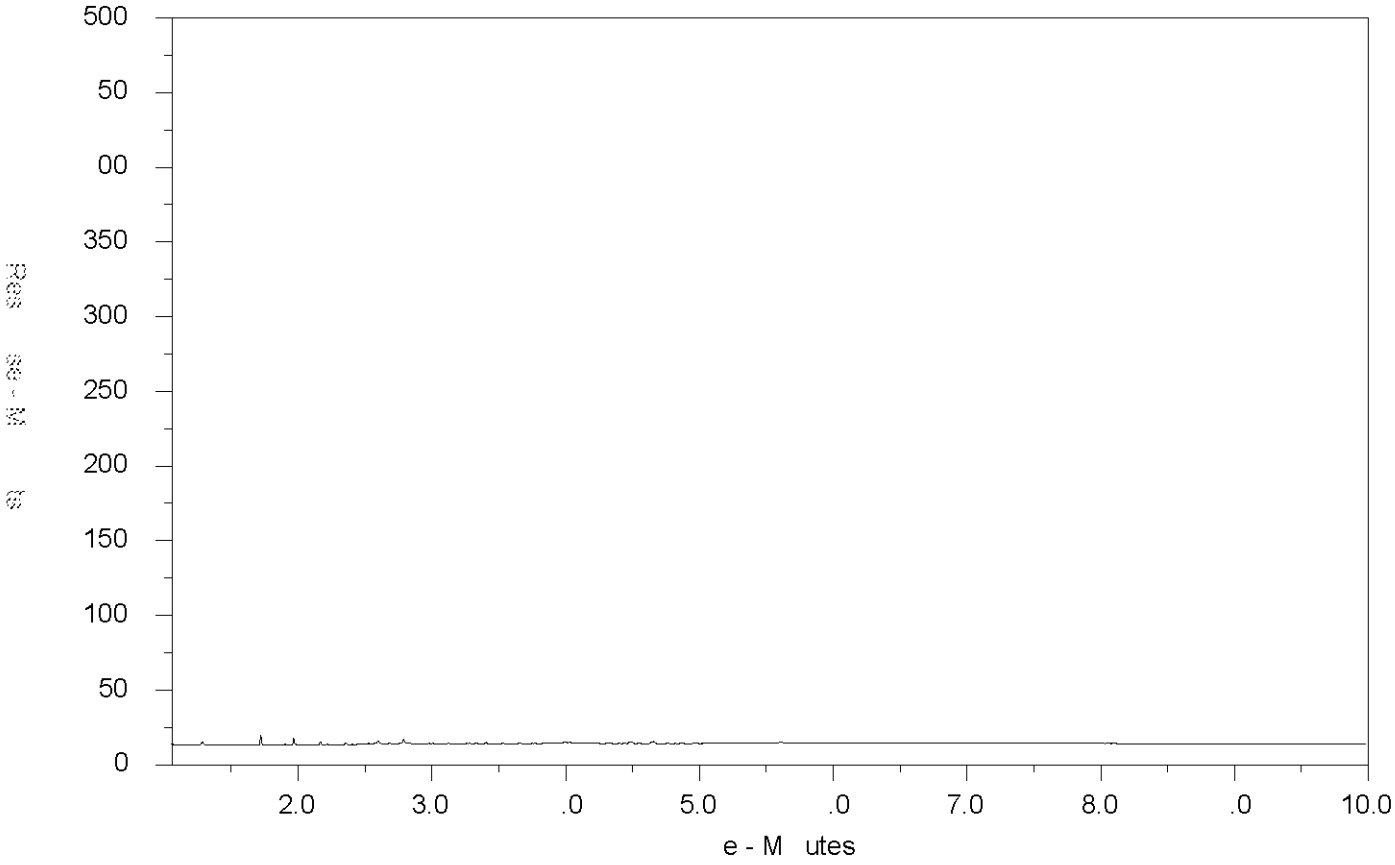
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-3
Client Sample ID: GW-45804-111516-TS-003



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

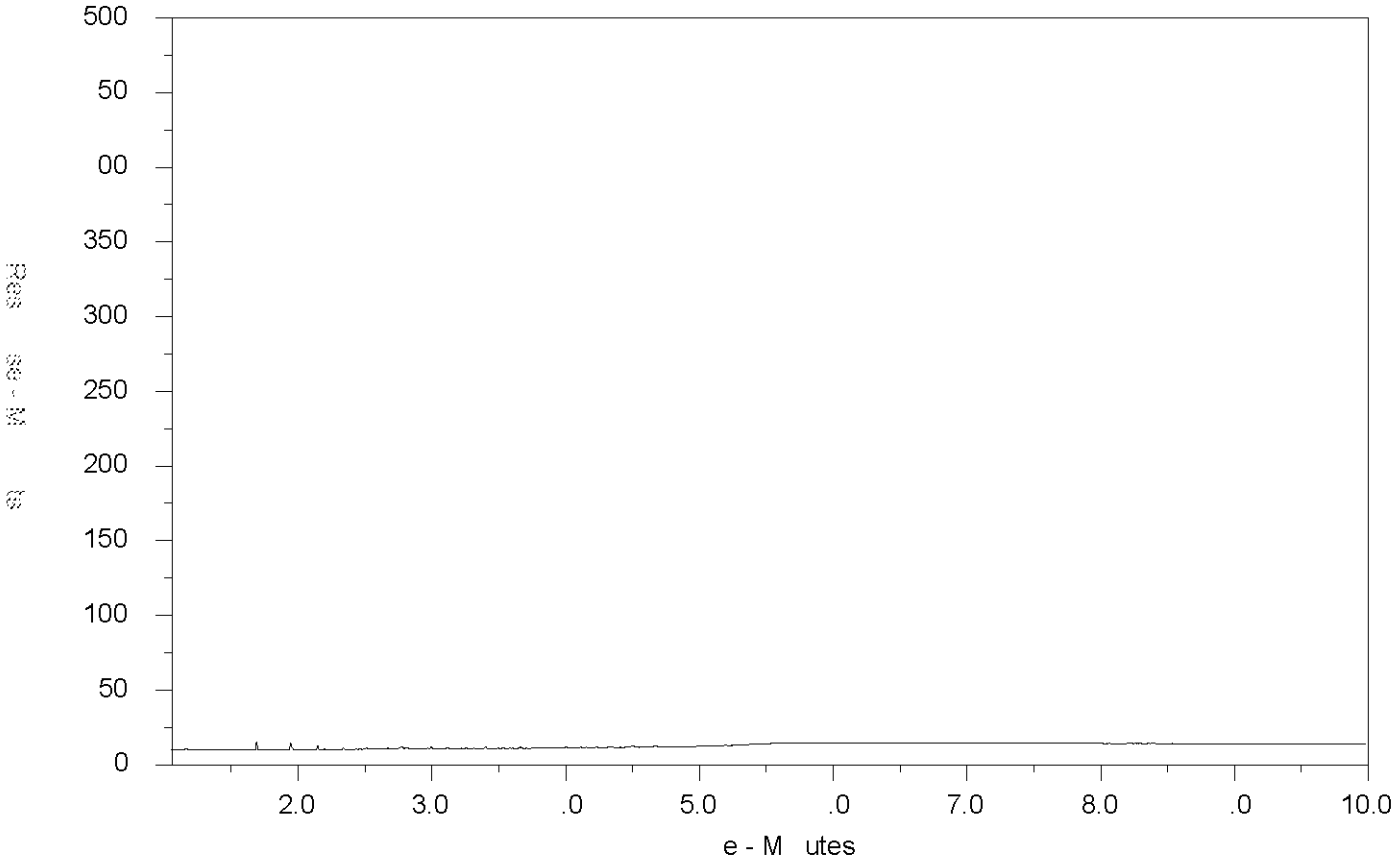
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-4
Client Sample ID: GW-45804-111516-TS-004



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

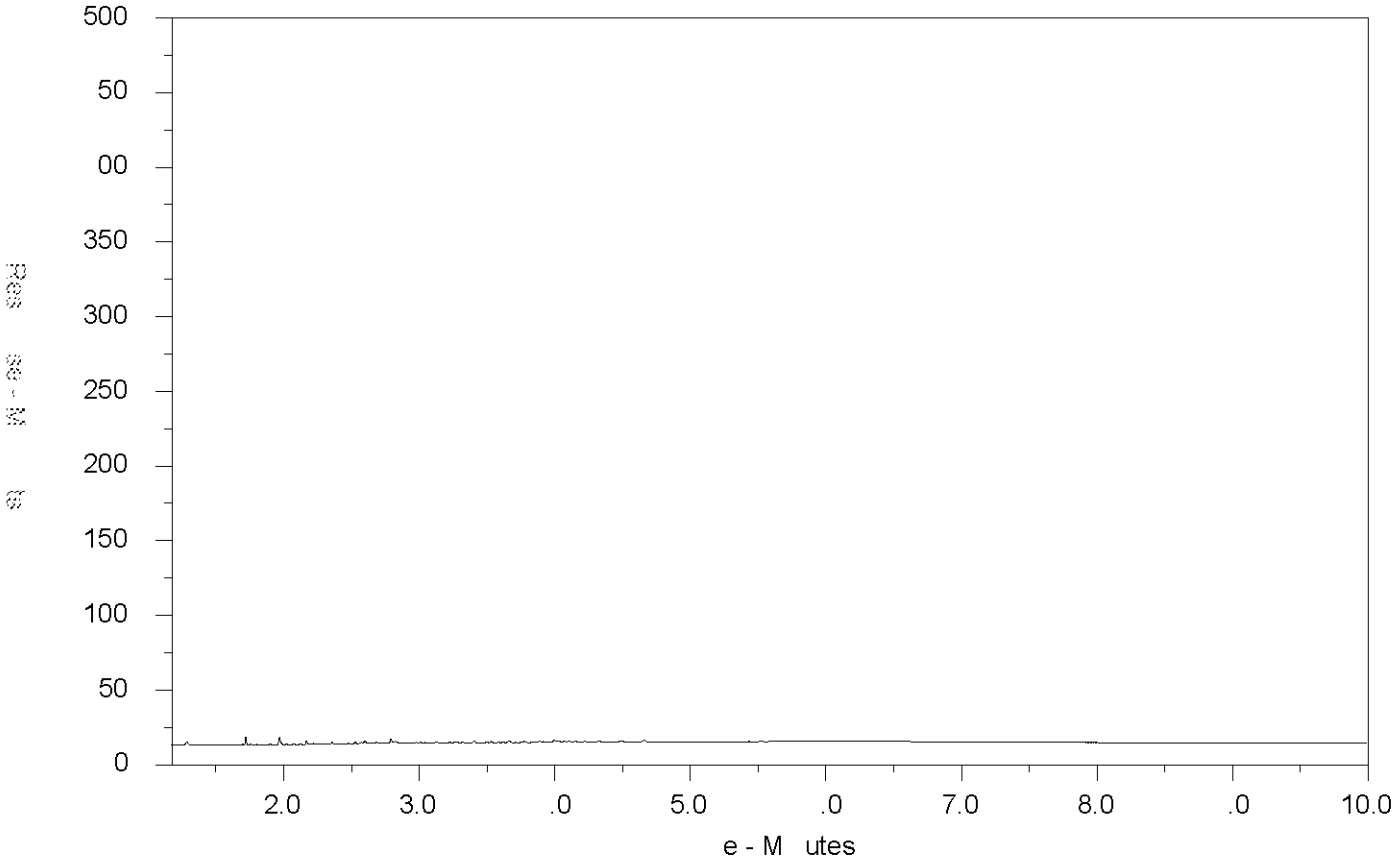
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-5
Client Sample ID: GW-45804-111516-TS-005



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

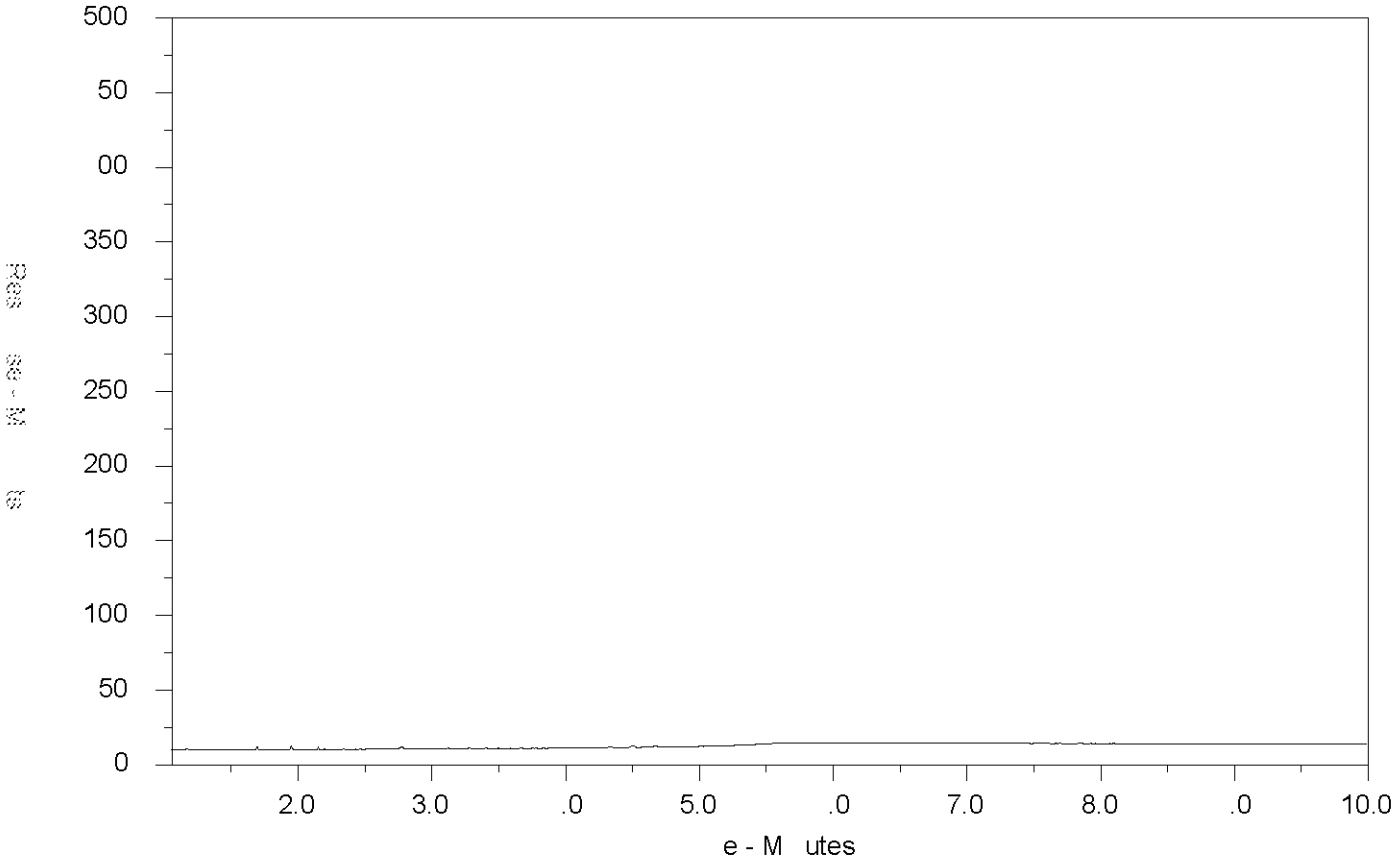
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-6
Client Sample ID: GW-45804-111516-TS-006



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

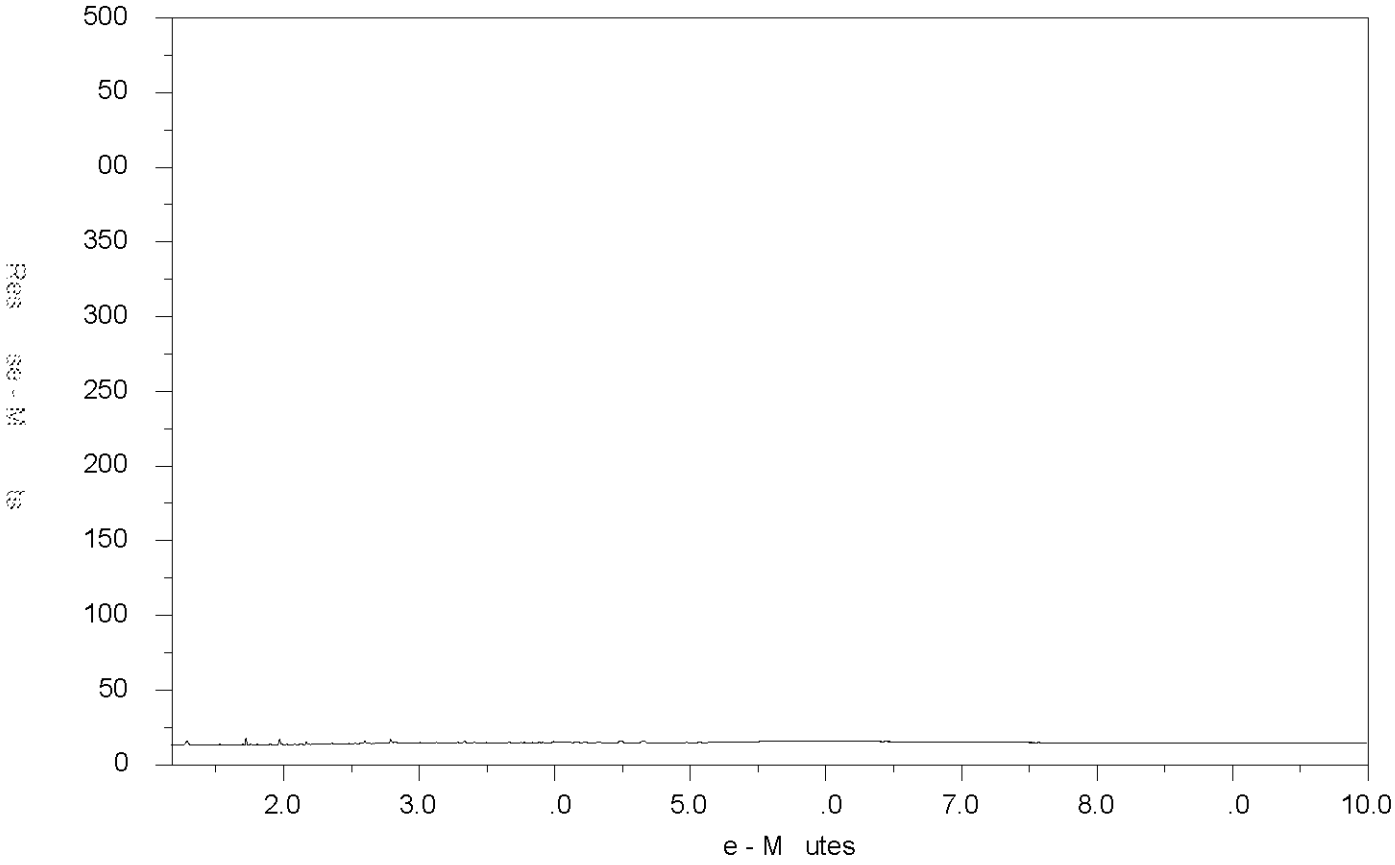
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-7
Client Sample ID: GW-45804-111516-TS-007



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

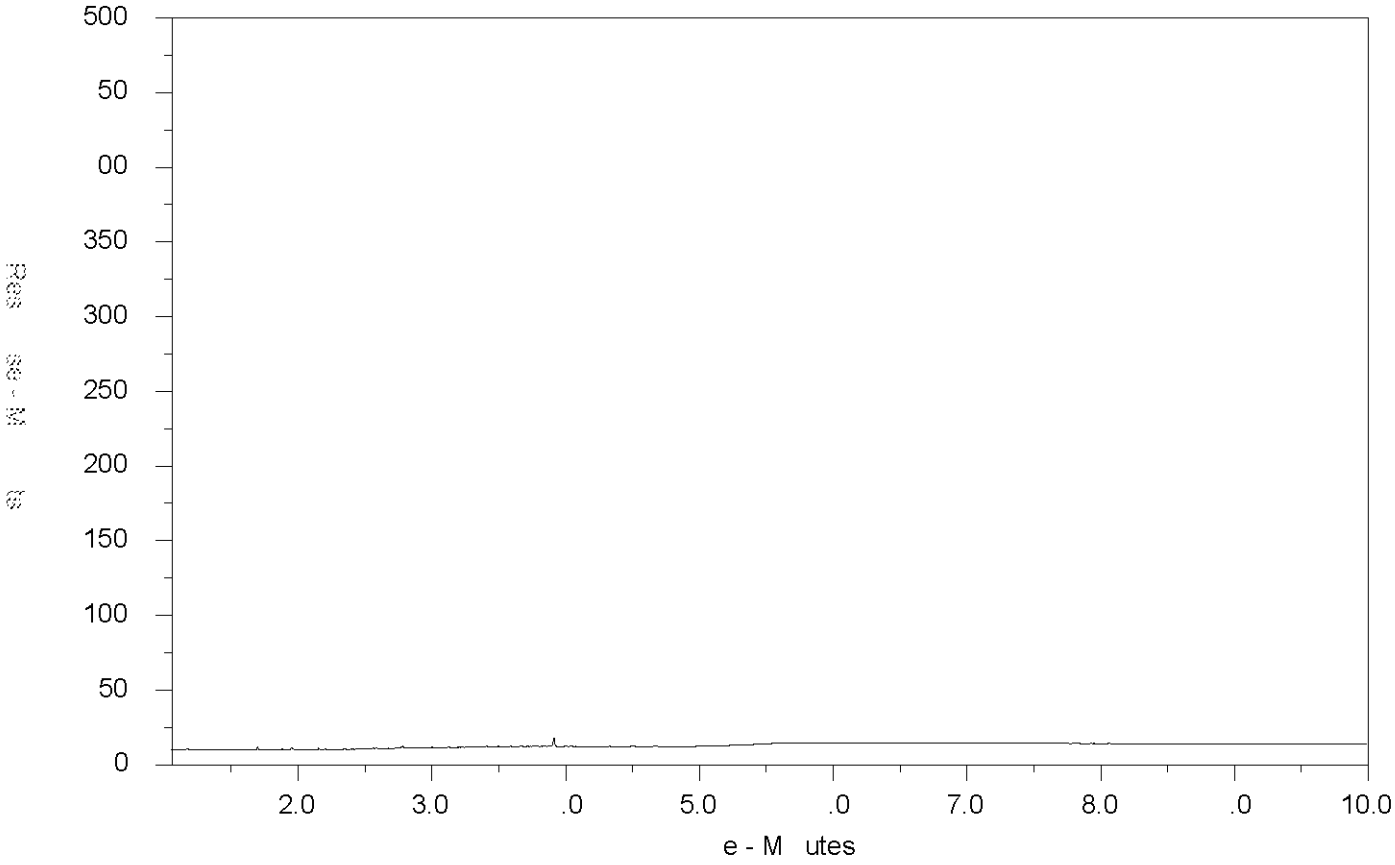
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-8
Client Sample ID: GW-45804-111516-TS-008



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

10.5°

C of C # XXXXX

PAGE _1__ OF _1__

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-66

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

L1858227-COFC

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED (13791)

CRITERIA: Reg 153/I

Table ____

TCLP ____ MISA ____ PWQO ____

OTHER _CLASSDETAILQCPLUS_ALS____

REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED

EMAIL__X__ FAX_____

EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com___

EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com

EMAIL_Wayne.Williams@ghd.com_____

SELECT: pdf_____ digital_____ both___X___

PROJECT MANAGER: AIRESSE MACPHEE

JOB #: 45804-58

PO #: 73502328

DUE DATE:

SAMPLING INFORMATION

ANALYSIS REQUEST

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION #: L1858227

ENTERED BY: RH

DATE/TIME ENTERED: 16/11/16

BIN #: 16B

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT			FIELD PH	FIELD TEMP	COMMENTS	LAB ID
11/15/16				X			GW-45804- 111516 -TS-001	15	X				6.70	18.57		1
				X			GW-45804- -TS-002	15	X				7.43	10.39		2
				X			GW-45804- -TS-003	15	X				8.57	11.36		3
				X			GW-45804- -TS-004	15	X				7.06	11.98		4
				X			GW-45804- -TS-005	15	X				7.00	11.23		5
				X			GW-45804- -TS-006	15	X				7.10	13.50		6
				X			GW-45804- -TS-007	15	X				7.09	11.96		7
				X			GW-45804- -TS-008	15	X				7.24	10.39		8
				X			GW-45804- -TS-009	15	X							
				X			GW-45804- -TS-010	15	X							
				X			GW-45804- -TS-011	15	X							
				X			GW-45804- -TS-012	15	X							
				X			GW-45804- -TS-013	15	X							

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.

GROUNDWATER METALS ARE FIELD FILTERED.

********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	
COOLING INITIATED ✓	13.2
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT

SAMPLED BY: Trevor Saunders	DATE & TIME: 11/15/16	RECEIVED BY: Tammy Andrews	DATE & TIME: 11/15/16 2:30
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY: RH	DATE & TIME: 16/11/16 @ 1000

NOTES AND CONDITIONS:

1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

9.9°

White - report copy YELLOW - File copy PINK - Customer Copy

001041

PM

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☑ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143	Email 1 or Fax npora@orgaworld.ca	Specify Date Required for E2,E or P:
	613-822-2056 ext#142 (Leigh Moulton)	Email 2 lmoulton@orgaworld.ca	
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca	
Contact:	Nick Pora	Email 2 lmoulton@orgaworld.ca	
Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Alison	Sampler: Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As, Bo, Cd, Cr, Co, Cu, Pb, Hg, Ni, Z	Total Phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	16-Mar-16	9:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temperature: -2°C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	Ice packs	Yes ☐	No ☐
Cooling Initiated	☐	Custody seal intact	Yes ☐	No ☐			

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: Mar 16/16	Time:	Received by:	Date: Mar/16/16	Time: 1:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA FM-0220a v09 Front/04 January

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

001042

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1745718-1 STORM WATER POND Sampled By: JESSICA BLACK on 16-MAR-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	-2.0		-50	Deg. C		17-MAR-16	R3420803
Physical Tests							
Conductivity	496		3.0	umhos/cm		17-MAR-16	R3421700
Oxygen, Dissolved	8.71	PEHR	0.050	mg/L		17-MAR-16	R3421088
pH	7.80		0.10	pH units		17-MAR-16	R3421697
Total Suspended Solids	6.5		2.0	mg/L	17-MAR-16	18-MAR-16	R3421791
Anions and Nutrients							
Unionized ammonia	0.00431		0.00020	mg/L		21-MAR-16	
Ammonia, Total (as N)	0.814	DLM	0.040	mg/L		18-MAR-16	R3422878
Nitrate and Nitrite as N	0.061		0.022	mg/L		21-MAR-16	
Nitrate (as N)	0.048		0.020	mg/L		18-MAR-16	R3422885
Nitrite (as N)	0.013		0.010	mg/L		18-MAR-16	R3422885
Total Kjeldahl Nitrogen	1.86		0.15	mg/L	18-MAR-16	18-MAR-16	R3421354
Phosphorus, Total	0.244		0.030	mg/L	18-MAR-16	18-MAR-16	R3422219
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.0		1.0	mg/L		17-MAR-16	R3421171
acteriological Tests							
E. Coli	24	DLM	2	CFU/100mL	17-MAR-16	18-MAR-16	R3422148
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Boron (B)-Total	0.015		0.010	mg/L	17-MAR-16	18-MAR-16	R3421966
Cadmium (Cd)-Total	0.000013		0.000010	mg/L	17-MAR-16	18-MAR-16	R3421966
Chromium (Cr)-Total	0.00072		0.00050	mg/L	17-MAR-16	18-MAR-16	R3421966
Cobalt (Co)-Total	0.00044		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Copper (Cu)-Total	0.0022		0.0010	mg/L	17-MAR-16	18-MAR-16	R3421966
Lead (Pb)-Total	0.00038		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAR-16	R3421198
Nickel (Ni)-Total	0.0014		0.0010	mg/L	17-MAR-16	18-MAR-16	R3421966
Zinc (Zn)-Total	0.0090		0.0030	mg/L	17-MAR-16	18-MAR-16	R3421966
Aggregate Organics							
BOD	3.3		2.0	mg/L	17-MAR-16	22-MAR-16	R3423413
BOD Carbonaceous	3.1		2.0	mg/L	17-MAR-16	22-MAR-16	R3423420
COD	38		10	mg/L		20-MAR-16	R3422624
Oil and Grease, Total	<2.0		2.0	mg/L	17-MAR-16	17-MAR-16	R3422914
Phenols (4AAP)	0.0064		0.0010	mg/L		18-MAR-16	R3422238
Report Remarks : Dilution due to undetermined matrix interference.							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD (#23523)	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 x143	Email 1 or Fax	npora@orgaworld.ca, mmyre@orgaworld.ca	Specify Date Required for E2,E or P:
	613-822-2056 x142 (Leigh Moulton/Michele Myre)	Email 2	lmoulton@orgaworld.ca	

Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Company:	ORGAWORLD	Email 1 or Fax	npora@orgaworld.ca, mmyre@orgaworld.ca
Contact:	Nick Pora	Email 2	lmoulton@orgaworld.ca

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Andrew Sampler: Jessica Black

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD, CBOD	PH, CONDUCTIVITY, TSS, NO2, NO3	TKN-TP, PHENOL, NH3-UN-ION-LAB, COD	METALS & HG	As, Bo, Cd, Cr, Co, Cu, Pb, Ni, Zn	TOTAL O&G	DOC	DISSOLVED OXYGEN	E.COLI	T-AMM	Temperature	EC		Number of Containers
	Storm Water Pond	15-Apr-16	10:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R		10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temperature @ sampling: -1°C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: 15-Apr-16	Time:	Received by:	Date: Apr/15/16	Time: 1:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0328e v09 Front/04 Janua

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

001044

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1756583-1 STORM WATER POND Sampled By: JESSICA BLACK on 15-APR-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	-1.0		-50	Deg. C		18-APR-16	R3440642
Physical Tests							
Conductivity	1120		3.0	umhos/cm		17-APR-16	R3440651
Oxygen, Dissolved	11.5	PEHR	0.050	mg/L		18-APR-16	R3440759
pH	8.42		0.10	pH units		17-APR-16	R3440609
Total Suspended Solids	8.7		2.0	mg/L	19-APR-16	20-APR-16	R3441600
Anions and Nutrients							
Unionized ammonia	0.00802		0.00040	mg/L		19-APR-16	
Ammonia, Total (as N)	0.338		0.020	mg/L		18-APR-16	R3440910
Nitrate and Nitrite as N	<0.11		0.11	mg/L		20-APR-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		19-APR-16	R3441674
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		19-APR-16	R3441674
Total Kjeldahl Nitrogen	1.99		0.15	mg/L	19-APR-16	19-APR-16	R3441411
Phosphorus, Total	0.0998		0.0030	mg/L	20-APR-16	21-APR-16	R3442141
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.9		1.0	mg/L		17-APR-16	R3440838
acteriological Tests							
Escherichia Coli	8	DLM	2	MPN/100mL		17-APR-16	R3439618
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Boron (B)-Total	0.031		0.010	mg/L	17-APR-16	19-APR-16	R3440858
Cadmium (Cd)-Total	0.000011		0.000010	mg/L	17-APR-16	19-APR-16	R3440858
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	17-APR-16	19-APR-16	R3440858
Cobalt (Co)-Total	0.00021		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-APR-16	19-APR-16	R3440858
Lead (Pb)-Total	0.00011		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-APR-16	R3439744
Nickel (Ni)-Total	0.0023		0.0010	mg/L	17-APR-16	19-APR-16	R3440858
Zinc (Zn)-Total	0.0068		0.0030	mg/L	17-APR-16	19-APR-16	R3440858
Aggregate Organics							
BOD	4.1		2.0	mg/L	16-APR-16	21-APR-16	R3442251
BOD Carbonaceous	4.5		2.0	mg/L	16-APR-16	21-APR-16	R3442252
COD	47		10	mg/L		19-APR-16	R3441447
Oil and Grease, Total	<2.0		2.0	mg/L	19-APR-16	19-APR-16	R3443233
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-APR-16	R3440631

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No Copy of Invoice with Report ☑ Yes ☐ No	**Invoice Distribution** Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	**Analysis Request**
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Contact:	Leigh Moulton		
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID: / Cost Center:	
Job #:	Storm Water Pond	GL Account: / Routing Code:	
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Alison / **Sampler:** Jessica Black	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total Phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	11-May-16	8:30am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Temperature: 4°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Leigh Moulton	May 11/16			May/11/16	2:10			

REFER TO BACK FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA FM-0326a v09 Front/04 June

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

001046

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1767554-1 STORM WATER POND Sampled By: JESSICA BLACK on 11-MAY-16 @ 08:30 Matrix: WATER							
Field Tests							
Temperature, Client	4.0		-50	Deg. C		12-MAY-16	R3456212
Physical Tests							
Conductivity	1170		3.0	umhos/cm		12-MAY-16	R3456823
Oxygen, Dissolved	9.09	PEHR	0.050	mg/L		12-MAY-16	R3456695
pH	8.17		0.10	pH units		12-MAY-16	R3456817
Total Suspended Solids	5.2		2.0	mg/L	13-MAY-16	14-MAY-16	R3457581
Anions and Nutrients							
Unionized ammonia	0.00316		0.00030	mg/L		13-MAY-16	
Ammonia, Total (as N)	0.154		0.020	mg/L		12-MAY-16	R3457077
Nitrate and Nitrite as N	<0.11		0.11	mg/L		16-MAY-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		13-MAY-16	R3458727
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		13-MAY-16	R3458727
Total Kjeldahl Nitrogen	1.21		0.15	mg/L	13-MAY-16	16-MAY-16	R3459015
Phosphorus, Total	0.0477		0.0030	mg/L	13-MAY-16	16-MAY-16	R3457888
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.5		1.0	mg/L		16-MAY-16	R3459089
acteriological Tests							
Escherichia Coli	2	DLM	2	MPN/100mL		13-MAY-16	R3457224
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Boron (B)-Total	0.032		0.010	mg/L	13-MAY-16	16-MAY-16	R3457014
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	13-MAY-16	16-MAY-16	R3457014
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	13-MAY-16	16-MAY-16	R3457014
Cobalt (Co)-Total	0.00022		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Copper (Cu)-Total	<0.0010		0.0010	mg/L	13-MAY-16	16-MAY-16	R3457014
Lead (Pb)-Total	0.00013		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		13-MAY-16	R3457041
Nickel (Ni)-Total	0.0019		0.0010	mg/L	13-MAY-16	16-MAY-16	R3457014
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	13-MAY-16	16-MAY-16	R3457014
Aggregate Organics							
BOD	<2.0		2.0	mg/L	12-MAY-16	17-MAY-16	R3459525
BOD Carbonaceous	<2.0		2.0	mg/L	12-MAY-16	17-MAY-16	R3459537
COD	38		10	mg/L		16-MAY-16	R3459132
Oil and Grease, Total	<2.0		2.0	mg/L	13-MAY-16	13-MAY-16	R3459491
Phenols (4AAP)	0.0027		0.0010	mg/L		12-MAY-16	R3456776

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No	**Invoice Distribution**	**Analysis Request**
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca	
Contact:	Leigh Moulton	Email 2 lmoulton@orgaworld.ca	
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID: / Cost Center:	
Job #:	Storm Water Pond	GL Account: / Routing Code:	
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only) | **ALS Contact:** Alison | **Sampler:** Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	16-Jun-16	10:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Temp 16°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ | Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: Jun 16/16	Time:	Received by:	Date: Jun/16/16	Time: 1:00	Received by:	Date:	Time:

REFER TO BACK FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0220e v09 Front 04 Janu

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

001048

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1784860-1 STORM WATER POND Sampled By: JESSICA BLACK on 16-JUN-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	16.0		-50	Deg. C		17-JUN-16	R3482670
Physical Tests							
Conductivity	1010		3.0	umhos/cm		17-JUN-16	R3483313
Oxygen, Dissolved	9.49	PEHR	0.050	mg/L		17-JUN-16	R3482964
pH	9.04		0.10	pH units		17-JUN-16	R3483310
Total Suspended Solids	11.3		2.0	mg/L	18-JUN-16	20-JUN-16	R3483795
Anions and Nutrients							
Unionized ammonia	<0.0050		0.0050	mg/L		21-JUN-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		20-JUN-16	R3485263
Nitrate and Nitrite as N	<0.11		0.11	mg/L		21-JUN-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-JUN-16	R3486154
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-JUN-16	R3486154
Total Kjeldahl Nitrogen	1.38		0.15	mg/L	21-JUN-16	21-JUN-16	R3486367
Phosphorus, Total	0.0723		0.0030	mg/L	20-JUN-16	21-JUN-16	R3484898
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.3		1.0	mg/L		20-JUN-16	R3486460
ıcteriological Tests							
E. Coli	8	DLM	2	CFU/100mL		18-JUN-16	R3483211
Total Metals							
Arsenic (As)-Total	0.00059		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Boron (B)-Total	0.033		0.010	mg/L	17-JUN-16	20-JUN-16	R3483517
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-JUN-16	20-JUN-16	R3483517
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	17-JUN-16	20-JUN-16	R3483517
Cobalt (Co)-Total	0.00018		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-JUN-16	20-JUN-16	R3483517
Lead (Pb)-Total	<0.00010		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		20-JUN-16	R3483818
Nickel (Ni)-Total	0.0013		0.0010	mg/L	17-JUN-16	20-JUN-16	R3483517
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-JUN-16	20-JUN-16	R3483517
Aggregate Organics							
BOD	5.3		2.0	mg/L	17-JUN-16	22-JUN-16	R3486896
BOD Carbonaceous	3.6		2.0	mg/L	17-JUN-16	22-JUN-16	R3486903
COD	43		10	mg/L		20-JUN-16	R3484893
Oil and Grease, Total	<2.0		2.0	mg/L	23-JUN-16	23-JUN-16	R3489011
Phenols (4AAP)	0.0025		0.0010	mg/L		18-JUN-16	R3484996

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No Copy of Invoice with Report ☑ Yes ☐ No	**Invoice Distribution** Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	**Analysis Request** Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	
Contact:	Leigh Moulton		
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID: / Cost Center:	
Job #:	Storm Water Pond	GL Account: / Routing Code:	
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Alison	**Sampler:** Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBOD5	Temperature	E Coli	Number of Containers
	Storm Water Pond	13-Jul-16	9:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No Are samples for human drinking water use? ☐ Yes ☑ No	Temp: 26°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Luis Moulton	Date: July 13/16	Time:	Received by:	Date: July 16/16	Time: 2:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

00150

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1798122-1 STORM WATER POND Sampled By: JESSICA BLACK on 13-JUL-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	26.0		-50	Deg. C		14-JUL-16	R3503390
Physical Tests							
Conductivity	1080		3.0	umhos/cm		14-JUL-16	R3503854
Oxygen, Dissolved	8.21	PEHR	0.050	mg/L		14-JUL-16	R3504964
pH	8.31		0.10	pH units		14-JUL-16	R3503850
Total Suspended Solids	15.5		2.0	mg/L	16-JUL-16	18-JUL-16	R3506633
Anions and Nutrients							
Unionized ammonia	<0.0020		0.0020	mg/L		15-JUL-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		15-JUL-16	R3504058
Nitrate and Nitrite as N	<0.11		0.11	mg/L		18-JUL-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		15-JUL-16	R3505952
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		15-JUL-16	R3505952
Total Kjeldahl Nitrogen	1.72		0.15	mg/L	15-JUL-16	15-JUL-16	R3504230
Phosphorus, Total	0.101		0.0030	mg/L	18-JUL-16	19-JUL-16	R3506234
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.5		1.0	mg/L		17-JUL-16	R3505321
acteriological Tests							
E. Coli	50	DLM	10	CFU/100mL		15-JUL-16	R3504721
Total Metals							
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	14-JUL-16	15-JUL-16	R3504278
Cadmium (Cd)-Total	<0.00010	DLHC	0.00010	mg/L	14-JUL-16	15-JUL-16	R3504278
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	14-JUL-16	15-JUL-16	R3504278
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	14-JUL-16	15-JUL-16	R3504278
Lead (Pb)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-JUL-16	R3504096
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	14-JUL-16	15-JUL-16	R3504278
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	14-JUL-16	15-JUL-16	R3504278
Aggregate Organics							
BOD	6.3		2.0	mg/L	14-JUL-16	19-JUL-16	R3506743
BOD Carbonaceous	6.1		2.0	mg/L	14-JUL-16	19-JUL-16	R3506732
COD	69		10	mg/L		17-JUL-16	R3505340
Oil and Grease, Total	<2.0		2.0	mg/L	16-JUL-16	16-JUL-16	R3508313
Phenols (4AAP)	0.0022		0.0010	mg/L		18-JUL-16	R3506855

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS Environmental

Report To	Nick Pora, ORGAWORLD CANADA LTD. 5123 Hawthorne Road Ottawa, ON K1G 3Y3	**Date Received** **Report Date** **Report Revision** **Version**	
Client Phone	613-822-2056		

Certificate of Analysis

Lab Work Order #	L1811895
Project P.O. #	
Job Reference	STORM WATER POND
Legal Site Description	
C of C Numbers	

Case Narrative/Comments

Work Order Qualifiers:

Temperature - 13.4 °

P. Stastny

Peter Stastny

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

10-Aug-2016 13:30
18-Aug-2016 07:24
1
FINAL

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 10-AUG-16
Report Date: 18-AUG-16 07:24 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1811895
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

P. Shotyk

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

4

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1811895-1 STORM WATER POND Sampled By: JESSICA BLACK on 10-AUG-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	13.4		-50	Deg. C		16-AUG-16	R3526578
Physical Tests							
Conductivity	1190		3.0	umhos/cm		12-AUG-16	R3524239
Oxygen, Dissolved	7.97	PEHR	0.050	mg/L		11-AUG-16	R3524727
pH	8.01		0.10	pH units		12-AUG-16	R3524237
Total Suspended Solids	42.5	DLHC	4.0	mg/L	13-AUG-16	14-AUG-16	R3525415
Anions and Nutrients							
Unionized ammonia	<0.00050		0.00050	mg/L		12-AUG-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		12-AUG-16	R3524604
Nitrate and Nitrite as N	<0.11		0.11	mg/L		15-AUG-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		15-AUG-16	R3526141
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		15-AUG-16	R3526141
Total Kjeldahl Nitrogen	2.56		0.15	mg/L	12-AUG-16	12-AUG-16	R3524760
Phosphorus, Total	0.193		0.0030	mg/L	12-AUG-16	15-AUG-16	R3525572
Organic / Inorganic Carbon							
Dissolved Organic Carbon	17.6		1.0	mg/L		11-AUG-16	R3525567
teriological Tests							
E. Coli	60	DLM	10	CFU/100mL		12-AUG-16	R3524873
Total Metals							
Arsenic (As)-Total	0.00132		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Boron (B)-Total	0.046		0.010	mg/L	12-AUG-16	12-AUG-16	R3524544
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	12-AUG-16	12-AUG-16	R3524544
Chromium (Cr)-Total	0.00153		0.00050	mg/L	12-AUG-16	12-AUG-16	R3524544
Cobalt (Co)-Total	0.00044		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Copper (Cu)-Total	<0.0010		0.0010	mg/L	12-AUG-16	12-AUG-16	R3524544
Lead (Pb)-Total	0.00056		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		12-AUG-16	R3524455
Nickel (Ni)-Total	0.00196		0.00050	mg/L	12-AUG-16	12-AUG-16	R3524544
Zinc (Zn)-Total	0.0044		0.0030	mg/L	12-AUG-16	12-AUG-16	R3524544
Aggregate Organics							
BOD	5.5		2.0	mg/L	11-AUG-16	16-AUG-16	R3526913
BOD Carbonaceous	5.4		2.0	mg/L	11-AUG-16	16-AUG-16	R3526916
COD	82		10	mg/L		14-AUG-16	R3525570
Oil and Grease, Total	<2.0		2.0	mg/L	12-AUG-16	12-AUG-16	R3526587
Phenols (4AAP)	0.0016		0.0010	mg/L		16-AUG-16	R3527297

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Total	DLHC	L1811895-1
Duplicate	Boron (B)-Total	DLHC	L1811895-1
Duplicate	Cadmium (Cd)-Total	DLHC	L1811895-1
Duplicate	Chromium (Cr)-Total	DLHC	L1811895-1
Duplicate	Cobalt (Co)-Total	DLHC	L1811895-1
Duplicate	Copper (Cu)-Total	DLHC	L1811895-1
Duplicate	Lead (Pb)-Total	DLHC	L1811895-1
Duplicate	Nickel (Ni)-Total	DLHC	L1811895-1
Duplicate	Zinc (Zn)-Total	DLHC	L1811895-1
Duplicate	Phosphorus, Total	DLHC	L1811895-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1811895-1
Matrix Spike	Phosphorus, Total	MS-B	L1811895-1
Matrix Spike	Nitrate (as N)	MS-B	L1811895-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

6

Reference Information

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

, automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 .C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.*

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
- The reporting limit.
- Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
:OD-C-WT	Water							
Batch R3526916								
WG2365815-6 DUP		**L1811221-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	16-AUG-16
WG2365815-7 LCS								
BOD Carbonaceous			92.4		%		85-115	16-AUG-16
WG2365815-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	16-AUG-16
:OD-WT	Water							
Batch R3526913								
WG2365806-12 DUP		**L1810882-2**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	16-AUG-16
WG2365806-10 LCS								
BOD			108.1		%		85-115	16-AUG-16
:2365806-9 MB								
BOD			<2.0		mg/L		2	16-AUG-16
:-DIS-ORG-WT	Water							
Batch R3525567								
WG2366176-3 DUP		**L1807074-1**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	11-AUG-16
WG2366176-2 LCS								
Dissolved Organic Carbon			97.0		%		80-120	11-AUG-16
WG2366176-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	11-AUG-16
WG2366176-4 MS		**L1807074-1**						
Dissolved Organic Carbon			96.4		%		70-130	11-AUG-16
:OD-T-WT	Water							
Batch R3525570								
WG2367527-3 DUP		**L1810877-1**						
COD		15	19	J	mg/L	4	20	14-AUG-16
WG2367527-2 LCS								
COD			97.1		%		85-115	14-AUG-16
WG2367527-1 MB								
COD			<10		mg/L		10	14-AUG-16
WG2367527-4 MS		**L1810877-1**						
COD			93.4		%		75-125	14-AUG-16
:F-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-MF-WT	Water							
Batch R3524873								
WG2365813-5 DUP		**WG2365813-6**						
E. Coli		0	0		CFU/100mL	0.0	65	12-AUG-16
WG2365813-1 MB								
E. Coli			0		CFU/100mL		1	12-AUG-16
WG2365813-2 MB								
E. Coli			0		CFU/100mL		1	12-AUG-16
C-WT	Water							
Batch R3524239								
WG2365857-4 DUP		**WG2365857-3**						
Conductivity		790	790		umhos/cm	0.0	10	12-AUG-16
WG2365857-2 LCS								
Conductivity			100.1		%		90-110	12-AUG-16
[illegible]2365857-1 MB								
[illegible]onductivity			<3.0		umhos/cm		3	12-AUG-16
IG-T-CVAA-WT	Water							
Batch R3524455								
WG2366403-3 DUP		**L1811958-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-AUG-16
WG2366403-2 LCS								
Mercury (Hg)-Total			100.0		%		80-120	12-AUG-16
WG2366403-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	12-AUG-16
WG2366403-4 MS		**L1811987-1**						
Mercury (Hg)-Total			93.4		%		70-130	12-AUG-16
IET-T-CCMS-WT	Water							
Batch R3524544								
WG2366207-4 DUP		**WG2366207-3**						
Arsenic (As)-Total		0.0011	0.0011		mg/L	4.6	20	12-AUG-16
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	12-AUG-16
Cadmium (Cd)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-AUG-16
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	12-AUG-16
Cobalt (Co)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-AUG-16
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	12-AUG-16
Lead (Pb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-AUG-16
[illegible]ckel (Ni)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	12-AUG-16
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	12-AUG-16

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IET-T-CCMS-WT	Water							
Batch R3524544								
WG2366207-2 LCS								
Arsenic (As)-Total			101.0		%		80-120	12-AUG-16
Boron (B)-Total			94.8		%		80-120	12-AUG-16
Cadmium (Cd)-Total			99.3		%		80-120	12-AUG-16
Chromium (Cr)-Total			101.5		%		80-120	12-AUG-16
Cobalt (Co)-Total			102.1		%		80-120	12-AUG-16
Copper (Cu)-Total			98.0		%		80-120	12-AUG-16
Lead (Pb)-Total			99.6		%		80-120	12-AUG-16
Nickel (Ni)-Total			99.0		%		80-120	12-AUG-16
Zinc (Zn)-Total			94.3		%		80-120	12-AUG-16
WG2366207-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Boron (B)-Total			<0.010		mg/L		0.01	12-AUG-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	12-AUG-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	12-AUG-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	12-AUG-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	12-AUG-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	12-AUG-16
WG2366207-5 MS		**WG2366207-3**						
Arsenic (As)-Total			107.4		%		70-130	12-AUG-16
Cadmium (Cd)-Total			108.1		%		70-130	12-AUG-16
Chromium (Cr)-Total			105.7		%		70-130	12-AUG-16
Cobalt (Co)-Total			109.1		%		70-130	12-AUG-16
Copper (Cu)-Total			119.0		%		70-130	12-AUG-16
Lead (Pb)-Total			108.2		%		70-130	12-AUG-16
Nickel (Ni)-Total			119.4		%		70-130	12-AUG-16
NH3-WT	Water							
Batch R3524604								
WG2366390-3 DUP		**L1812140-1**						
Ammonia, Total (as N)		1.29	1.33		mg/L	3.0	20	12-AUG-16
WG2366390-2 LCS								
Ammonia, Total (as N)			102.0		%		85-115	12-AUG-16
WG2366390-1 MB								

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IH3-WT	Water							
Batch R3524604								
WG2366390-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	12-AUG-16
WG2366390-4 MS		L1812140-1						
Ammonia, Total (as N)			N/A	MS-B	%		-	12-AUG-16
IO2-IC-WT	Water							
Batch R3526141								
WG2366425-9 DUP		WG2366425-10						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	15-AUG-16
WG2366425-7 LCS								
Nitrite (as N)			102.9		%		70-130	15-AUG-16
WG2366425-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	15-AUG-16
[illegible]2366425-8 MS		WG2366425-10						
[illegible]itrite (as N)			86.7		%		70-130	15-AUG-16
IO3-IC-WT	Water							
Batch R3526141								
WG2366425-9 DUP		WG2366425-10						
Nitrate (as N)		1.08	1.08		mg/L	0.1	25	15-AUG-16
WG2366425-7 LCS								
Nitrate (as N)			100.9		%		70-130	15-AUG-16
WG2366425-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	15-AUG-16
WG2366425-8 MS		WG2366425-10						
Nitrate (as N)			93.3		%		70-130	15-AUG-16
)2-DIS-WT	Water							
Batch R3524727								
WG2365870-1 DUP		L1810662-1						
Oxygen, Dissolved		9.30	9.15		mg/L	1.6	25	11-AUG-16
)GG-TOT-WT	Water							
Batch R3526587								
WG2366598-2 LCS								
Oil and Grease, Total			85.5		%		70-130	12-AUG-16
WG2366598-3 LCSD		WG2366598-2						
Oil and Grease, Total		85.5	81.5		%	4.9	40	12-AUG-16
[illegible]2366598-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	12-AUG-16

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
-T-COL-WT	Water							
Batch R3525572								
WG2366426-3 DUP		**L1810916-1**						
Phosphorus, Total		48.5	52.4		mg/L	7.7	20	15-AUG-16
WG2366426-2 LCS								
Phosphorus, Total			101.1		%		80-120	15-AUG-16
WG2366426-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	15-AUG-16
WG2366426-4 MS		**L1810916-1**						
Phosphorus, Total			N/A	MS-B	%		-	15-AUG-16
H-WT	Water							
Batch R3524237								
WG2365816-6 DUP		**WG2365816-5**						
pH		7.92	7.93	J	pH units	0.00	0.2	12-AUG-16
2365816-4 LCS								
pH			7.01		pH units		6.9-7.1	12-AUG-16
HENOLS-4AAP-WT	Water							
Batch R3527297								
WG2368864-3 DUP		**L1810883-1**						
Phenols (4AAP)		0.0026	0.0027		mg/L	4.6	20	16-AUG-16
WG2368864-2 LCS								
Phenols (4AAP)			97.8		%		85-115	16-AUG-16
WG2368864-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-AUG-16
WG2368864-4 MS		**L1810883-1**						
Phenols (4AAP)			90.5		%		75-125	16-AUG-16
OLIDS-TSS-WT	Water							
Batch R3525415								
WG2367221-3 DUP		**L1811895-1**						
Total Suspended Solids		42.5	42.0		mg/L	1.2	20	14-AUG-16
WG2367221-2 LCS								
Total Suspended Solids			101.4		%		85-115	14-AUG-16
WG2367221-1 MB								
Total Suspended Solids			<2.0		mg/L		2	14-AUG-16
KN-WT	Water							
Batch R3524760								
G2366265-3 DUP		**L1811895-1**						
otal Kjeldahl Nitrogen		2.56	2.35		mg/L	8.2	20	12-AUG-16
WG2366265-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
KN-WT	Water							
Batch R3524760								
WG2366265-2 LCS								
Total Kjeldahl Nitrogen			102.7		%		75-125	12-AUG-16
WG2366265-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	12-AUG-16
WG2366265-4 MS		**L1811895-1**						
Total Kjeldahl Nitrogen			99.6		%		70-130	12-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
'act: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen	1	10-AUG-16 09:00	11-AUG-16 14:00	0.25	29	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1811895 were received on 10-AUG-16 13:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

Report To	Nick Pora, ORGAWORLD CANADA LTD. 5123 Hawthorne Road Ottawa, ON K1G 3Y3	**Date Received** **Report Date** **Report Revision** **Version**	
Client Phone	613-822-2056		

Certificate of Analysis

Lab Work Order #	L1851386
Project P.O. #	
Job Reference	STORM WATER POND
Legal Site Description	
C of C Numbers	

Case Narrative/Comments

Work Order Qualifiers:

Temperature - 11.9 °

P. Stastny

Peter Stastny

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 31-OCT-16
Report Date: 07-NOV-16 12:31 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1851386
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

P. Stathy

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1851386-1 STORM WATER POND Sampled By: JESSICA BLACK on 31-OCT-16 @ 13:00 Matrix: WATER							
Field Tests							
Temperature, Client	28.0		-50	Deg. C		02-NOV-16	R3586100
Physical Tests							
Conductivity	713		3.0	umhos/cm		02-NOV-16	R3586842
Oxygen, Dissolved	9.88	PEHR	0.050	mg/L		01-NOV-16	R3585121
pH	7.79		0.10	pH units		02-NOV-16	R3585879
Total Suspended Solids	96.7	DLHC	4.0	mg/L	04-NOV-16	05-NOV-16	R3588620
Anions and Nutrients							
Unionized ammonia	0.0219		0.00080	mg/L		02-NOV-16	
Ammonia, Total (as N)	0.434		0.020	mg/L		02-NOV-16	R3586069
Nitrate and Nitrite as N	<0.11		0.11	mg/L		04-NOV-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		03-NOV-16	R3588151
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		03-NOV-16	R3588151
Total Kjeldahl Nitrogen	4.76		0.15	mg/L	02-NOV-16	02-NOV-16	R3586481
Phosphorus, Total	0.421		0.0030	mg/L	03-NOV-16	04-NOV-16	R3588538
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.7		1.0	mg/L		01-NOV-16	R3585676
Microbiological Tests							
E. Coli	360	DLM	10	CFU/100mL		02-NOV-16	R3586277
Total Metals							
Arsenic (As)-Total	0.00096		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Boron (B)-Total	0.029		0.010	mg/L	02-NOV-16	02-NOV-16	R3586208
Cadmium (Cd)-Total	0.000014		0.000010	mg/L	02-NOV-16	02-NOV-16	R3586208
Chromium (Cr)-Total	0.00791		0.00050	mg/L	02-NOV-16	02-NOV-16	R3586208
Cobalt (Co)-Total	0.00185		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Copper (Cu)-Total	0.0044		0.0010	mg/L	02-NOV-16	02-NOV-16	R3586208
Lead (Pb)-Total	0.00120		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		02-NOV-16	R3585921
Nickel (Ni)-Total	0.00570		0.00050	mg/L	02-NOV-16	02-NOV-16	R3586208
Zinc (Zn)-Total	0.0140		0.0030	mg/L	02-NOV-16	02-NOV-16	R3586208
Aggregate Organics							
BOD	19.9		2.0	mg/L	01-NOV-16	06-NOV-16	R3589424
BOD Carbonaceous	20.5		2.0	mg/L	01-NOV-16	06-NOV-16	R3589427
COD	86		10	mg/L		02-NOV-16	R3585977
Oil and Grease, Total	<2.0		2.0	mg/L	01-NOV-16	01-NOV-16	R3585960
Phenols (4AAP)	0.0012		0.0010	mg/L		02-NOV-16	R3586834

Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1851386-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1851386-1
Matrix Spike	Nitrate (as N)	MS-B	L1851386-1
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1851386-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 □C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

N-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

O2 DIS-WT	Water	Dissolved oxygen	APHA 4500-O
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Water	pH	MOEE E3137A-R511

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1□C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
N-T-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

"* ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3589427								
WG2423828-2 DUP		**L1850598-1**						
BOD Carbonaceous		31.1	30.2		mg/L	2.9	20	06-NOV-16
WG2423828-3 LCS								
BOD Carbonaceous			96.0		%		85-115	06-NOV-16
WG2423828-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	06-NOV-16
BOD-WT	Water							
Batch R3589424								
WG2423827-2 DUP		**L1851398-1**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	06-NOV-16
WG2423827-3 LCS								
BOD			96.0		%		85-115	06-NOV-16
WG2423827-1 MB								
BOD			<2.0		mg/L		2	06-NOV-16
C-DIS-ORG-WT	Water							
Batch R3585676								
WG2424229-8 DUP		**L1851333-1**						
Dissolved Organic Carbon		10.2	11.6		mg/L	13	20	01-NOV-16
WG2424229-6 LCS								
Dissolved Organic Carbon			98.5		%		80-120	01-NOV-16
WG2424229-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	01-NOV-16
WG2424229-7 MS		**L1851333-1**						
Dissolved Organic Carbon			97.0		%		70-130	01-NOV-16
COD-T-WT	Water							
Batch R3585977								
WG2424291-3 DUP		**L1851386-1**						
COD		86	91		mg/L	5.4	20	02-NOV-16
WG2424291-2 LCS								
COD			107.0		%		85-115	02-NOV-16
WG2424291-1 MB								
COD			<10		mg/L		10	02-NOV-16
WG2424291-4 MS		**L1851386-1**						
COD			90.9		%		75-125	02-NOV-16
CN-WAD-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-MF-WT	Water							
Batch R3586277								
WG2423366-2 DUP		**WG2423366-4**						
E. Coli		0	0		CFU/100mL	0.0	65	02-NOV-16
WG2423366-1 MB								
E. Coli			0		CFU/100mL		1	02-NOV-16
C-WT	Water							
Batch R3586842								
WG2424538-4 DUP		**WG2424538-3**						
Conductivity		713	714		umhos/cm	0.1	10	02-NOV-16
WG2424538-2 LCS								
Conductivity			99.2		%		90-110	02-NOV-16
WG2424538-1 MB								
Conductivity			<3.0		umhos/cm		3	02-NOV-16
:VAA-WT	Water							
Batch R3585921								
WG2424373-3 DUP		**L1851483-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-NOV-16
WG2424373-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	02-NOV-16
WG2424373-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	02-NOV-16
WG2424373-4 MS		**L1851483-2**						
Mercury (Hg)-Total			101.0		%		70-130	02-NOV-16
ET-T-CCMS-WT	Water							
Batch R3586208								
WG2424180-4 DUP		**WG2424180-3**						
Arsenic (As)-Total		0.0022	0.0021		mg/L	4.9	20	02-NOV-16
Boron (B)-Total		0.14	0.14		mg/L	2.0	20	02-NOV-16
Cadmium (Cd)-Total		0.00036	0.00034		mg/L	4.6	20	02-NOV-16
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-NOV-16
Cobalt (Co)-Total		0.0034	0.0033		mg/L	1.5	20	02-NOV-16
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-NOV-16
Lead (Pb)-Total		0.0011	0.0011		mg/L	2.9	20	02-NOV-16
Nickel (Ni)-Total		0.0150	0.0159		mg/L	6.2	20	02-NOV-16
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	02-NOV-16
2424180-2 LCS								
Arsenic (As)-Total			99.1		%		80-120	02-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3586208								
WG2424180-2 LCS								
Boron (B)-Total			93.6		%		80-120	02-NOV-16
Cadmium (Cd)-Total			99.1		%		80-120	02-NOV-16
Chromium (Cr)-Total			98.2		%		80-120	02-NOV-16
Cobalt (Co)-Total			98.4		%		80-120	02-NOV-16
Copper (Cu)-Total			98.8		%		80-120	02-NOV-16
Lead (Pb)-Total			100.6		%		80-120	02-NOV-16
Nickel (Ni)-Total			98.7		%		80-120	02-NOV-16
Zinc (Zn)-Total			93.9		%		80-120	02-NOV-16
WG2424180-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	02-NOV-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	02-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	02-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-NOV-16
WG2424180-5 MS		**WG2424180-3**						
Arsenic (As)-Total			102.2		%		70-130	02-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	02-NOV-16
Cadmium (Cd)-Total			103.7		%		70-130	02-NOV-16
Chromium (Cr)-Total			101.2		%		70-130	02-NOV-16
Cobalt (Co)-Total			97.0		%		70-130	02-NOV-16
Lead (Pb)-Total			99.3		%		70-130	02-NOV-16
Nickel (Ni)-Total			92.5		%		70-130	02-NOV-16
NH3-WT	Water							
Batch R3586069								
WG2424383-7 DUP		**L1851986-1**						
Ammonia, Total (as N)		1.34	1.34		mg/L	0.0	20	02-NOV-16
WG2424383-6 LCS								
Ammonia, Total (as N)			99.7		%		85-115	02-NOV-16
WG2424383-5 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	02-NOV-16
WG2424383-8 MS		**L1851986-1**						

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IH3-WT	Water							
Batch R3586069								
WG2424383-8 MS		**L1851986-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	02-NOV-16
IO2-IC-WT	Water							
Batch R3588151								
WG2425387-4 DUP		**WG2425387-3**						
Nitrite (as N)		0.017	0.016		mg/L	1.2	25	03-NOV-16
WG2425387-2 LCS								
Nitrite (as N)			103.1		%		70-130	03-NOV-16
WG2425387-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	03-NOV-16
WG2425387-5 MS		**WG2425387-3**						
Nitrite (as N)			101.6		%		70-130	03-NOV-16
IO3-IC-WT	Water							
Batch R3588151								
WG2425387-4 DUP		**WG2425387-3**						
Nitrate (as N)		5.23	5.23		mg/L	0.0	25	03-NOV-16
WG2425387-2 LCS								
Nitrate (as N)			99.8		%		70-130	03-NOV-16
WG2425387-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	03-NOV-16
WG2425387-5 MS		**WG2425387-3**						
Nitrate (as N)			N/A	MS-B	%		-	03-NOV-16
O2-DIS-WT	Water							
Batch R3585121								
WG2423841-5 DUP		**L1851147-1**						
Oxygen, Dissolved		9.87	9.83		mg/L	0.4	25	01-NOV-16
OGG-TOT-WT	Water							
Batch R3585960								
WG2423704-2 LCS								
Oil and Grease, Total			91.6		%		70-130	01-NOV-16
WG2423704-3 LCSD		**WG2423704-2**						
Oil and Grease, Total		91.6	88.9		%	3.0	40	01-NOV-16
WG2423704-1 MB								
and Grease, Total			<2.0		mg/L		2	01-NOV-16
T-COL-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
-T-COL-WT	Water							
Batch R3588538								
WG2425147-3 DUP		**L1851221-1**						
Phosphorus, Total		0.0195	0.0174		mg/L	11	20	04-NOV-16
WG2425147-2 LCS								
Phosphorus, Total			118.5		%		80-120	04-NOV-16
WG2425147-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	04-NOV-16
WG2425147-4 MS		**L1851221-1**						
Phosphorus, Total			78.3		%		70-130	04-NOV-16
H-WT	Water							
Batch R3585879								
WG2424242-3 DUP		**WG2424242-2**						
pH		7.43	7.45	J	pH units	0.02	0.2	02-NOV-16
2424242-1 LCS								
			7.05		pH units		6.9-7.1	02-NOV-16
HENOLS-4AAP-WT	Water							
Batch R3586834								
WG2424467-7 DUP		**L1850190-1**						
Phenols (4AAP)		0.0026	0.0027		mg/L	2.8	20	02-NOV-16
WG2424467-6 LCS								
Phenols (4AAP)			107.7		%		85-115	02-NOV-16
WG2424467-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-NOV-16
WG2424467-8 MS		**L1850190-1**						
Phenols (4AAP)			114.8		%		75-125	02-NOV-16
OLIDS-TSS-WT	Water							
Batch R3588620								
WG2426119-3 DUP		**L1851130-2**						
Total Suspended Solids		65.3	62.0		mg/L	5.2	20	05-NOV-16
WG2426119-2 LCS								
Total Suspended Solids			99.0		%		85-115	05-NOV-16
WG2426119-1 MB								
Total Suspended Solids			<2.0		mg/L		2	05-NOV-16
KN-WT	Water							
Batch R3586481								
WG2424297-3 DUP		**L1850691-1**						
l Kjeldahl Nitrogen		8.81	9.10		mg/L	3.3	20	02-NOV-16
WG2424297-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
KN-WT	Water							
Batch R3586481								
WG2424297-2 LCS								
Total Kjeldahl Nitrogen			111.9		%		75-125	02-NOV-16
WG2424297-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-NOV-16
WG2424297-4 MS		**L1850691-1**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	02-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen	1	31-OCT-16 13:00	01-NOV-16 18:00	0.25	29	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1851386 were received on 31-OCT-16 14:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

An ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1851386-COFC

14

Report To		Report Format / Distribution		Select Service Level Below (Rus
Company:	ORGAWORLD	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received
Contact:	Nick Pora	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received b
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if receiv
	Ottawa, Ontario K1G 3Y3	Select Distribution:	☑ EMAI ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency
Phone:	613-822-2056 ext #143	Email 1 or Fax	npora@orgaworld.ca	Specify Date Required for E2,E or P
	613-822-2056 ext#142 (Greg Jurchuk)	Email 2	gjurchuk@orgaworld.ca	
Invoice To	Same as Report To ☑ Yes ☐ No	**Invoice Distribution**		Indicate Filtered (F), Preserved (F
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAI ☐ MAIL ☐ FAX	
Company:	ORGAWORLD	Email 1 or Fax	npora@orgaworld.ca	
Contact:	Greg Jurchuk	Email 2	gjurchuk@orgaworld.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1851386

ALS Contact: Alison **Sampler:** Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O&G AVM
	Storm Water Pond	31-Oct-16	1:00pm	Water	R	R	R	R	R	R

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)	SAMPLE CONDI
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temp 28 deg C	Frozen ☐
Are samples for human drinking water use? ☐ Yes ☑ No		Ice packs Yes ☑ No ☐
		Cooling Initiated ☑
		INITIAL COOLER TEMPERATURES °C
		11.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPM
Released by:	Date: 31 OCT 16	Time: 1:30PM	Received by:	Date: 31/Oct/16	Time: 2:20	Received by:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report co

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 15-NOV-16
Report Date: 21-NOV-16 14:24 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1858237

Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers: 14-11201601
Legal Site Desc:

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858237-1 STORM WATER POND Sampled By: JESSICA BLACK on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	10.0		-50	Deg. C		14-NOV-16	R3597879
Physical Tests							
Conductivity	811		3.0	umhos/cm		19-NOV-16	R3599094
Oxygen, Dissolved	9.48	PEHR	0.050	mg/L		16-NOV-16	R3596487
pH	7.78		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	27.9		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Anions and Nutrients							
Unionized ammonia	0.0179		0.00040	mg/L		17-NOV-16	
Ammonia, Total (as N)	1.33	DLHC	0.040	mg/L		17-NOV-16	R3597203
Nitrate and Nitrite as N	<0.11		0.11	mg/L		21-NOV-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	4.49		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.239		0.0030	mg/L	17-NOV-16	18-NOV-16	R3597491
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.8		1.0	mg/L		16-NOV-16	R3597475
acteriological Tests							
E. Coli	40		10	CFU/100mL		17-NOV-16	R3597315
Total Metals							
Arsenic (As)-Total	0.00070		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Boron (B)-Total	0.032		0.010	mg/L	17-NOV-16	17-NOV-16	R3597519
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597519
Chromium (Cr)-Total	0.00216		0.00050	mg/L	17-NOV-16	17-NOV-16	R3597519
Cobalt (Co)-Total	0.00062		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Copper (Cu)-Total	0.0017		0.0010	mg/L	17-NOV-16	17-NOV-16	R3597519
Lead (Pb)-Total	0.00043		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		17-NOV-16	R3597021
Nickel (Ni)-Total	0.00233		0.00050	mg/L	17-NOV-16	17-NOV-16	R3597519
Zinc (Zn)-Total	0.0049		0.0030	mg/L	17-NOV-16	17-NOV-16	R3597519
Aggregate Organics							
BOD	8.8		2.0	mg/L	16-NOV-16	21-NOV-16	R3599576
BOD Carbonaceous	9.4		2.0	mg/L	16-NOV-16	21-NOV-16	R3599579
COD	69		10	mg/L		20-NOV-16	R3599056
Oil and Grease, Total	<2.0		2.0	mg/L	16-NOV-16	16-NOV-16	R3596577
Phenols (4AAP)	0.0037		0.0010	mg/L		17-NOV-16	R3597693

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1858237-1
Matrix Spike	Zinc (Zn)-Total	MS-B	L1858237-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1858237-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

O2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

Reference Information

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1□C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

14-11201601

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3599579								
WG2433904-6 DUP		**L1857961-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	21-NOV-16
WG2433904-7 LCS								
BOD Carbonaceous			102.0		%		85-115	21-NOV-16
WG2433904-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	21-NOV-16
BOD-WT	Water							
Batch R3599576								
WG2433902-2 DUP		**L1857529-4**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	21-NOV-16
WG2433902-3 LCS								
BOD			93.9		%		85-115	21-NOV-16
.G2433902-1 MB								
BOD			<2.0		mg/L		2	21-NOV-16
C-DIS-ORG-WT	Water							
Batch R3597475								
WG2434305-3 DUP		**L1857475-5**						
Dissolved Organic Carbon		6.2	6.5		mg/L	3.7	20	16-NOV-16
WG2434305-2 LCS								
Dissolved Organic Carbon			97.9		%		80-120	16-NOV-16
WG2434305-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-NOV-16
WG2434305-4 MS		**L1857475-5**						
Dissolved Organic Carbon			91.1		%		70-130	16-NOV-16
COD-T-WT	Water							
Batch R3599056								
WG2436599-3 DUP		**L1859400-6**						
COD		18	23	J	mg/L	4	20	20-NOV-16
WG2436599-2 LCS								
COD			105.2		%		85-115	20-NOV-16
WG2436599-1 MB								
COD			<10		mg/L		10	20-NOV-16
WG2436599-4 MS		**L1859400-6**						
COD			87.5		%		75-125	20-NOV-16
EC-MF-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3597315								
WG2433785-2 DUP		**WG2433785-4**						
E. Coli		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433785-1 MB								
E. Coli			0		CFU/100mL		1	17-NOV-16
EC-WT	Water							
Batch R3599094								
WG2435533-4 DUP		**WG2435533-3**						
Conductivity		1330	1330		umhos/cm	0.1	10	19-NOV-16
WG2435533-2 LCS								
Conductivity			101.9		%		90-110	19-NOV-16
WG2435533-1 MB								
Conductivity			<3.0		umhos/cm		3	19-NOV-16
T-CVAA-WT	Water							
Batch R3597021								
WG2434521-3 DUP		**L1858464-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-NOV-16
WG2434521-2 LCS								
Mercury (Hg)-Total			98.6		%		80-120	17-NOV-16
WG2434521-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	17-NOV-16
WG2434521-4 MS		**L1858476-1**						
Mercury (Hg)-Total			99.2		%		70-130	17-NOV-16
MET-T-CCMS-WT	Water							
Batch R3597519								
WG2434327-4 DUP		**WG2434327-3**						
Arsenic (As)-Total		0.00030	0.00031		mg/L	3.0	20	17-NOV-16
Boron (B)-Total		0.210	0.215		mg/L	2.2	20	17-NOV-16
Cadmium (Cd)-Total		0.000084	0.000088		mg/L	4.2	20	17-NOV-16
Chromium (Cr)-Total		0.00096	0.00097		mg/L	1.2	20	17-NOV-16
Cobalt (Co)-Total		0.00017	0.00017		mg/L	0.7	20	17-NOV-16
Copper (Cu)-Total		0.0013	0.0013		mg/L	1.6	20	17-NOV-16
Lead (Pb)-Total		0.00017	0.00017		mg/L	0.7	20	17-NOV-16
Nickel (Ni)-Total		0.00110	0.00109		mg/L	1.4	20	17-NOV-16
Zinc (Zn)-Total		0.0455	0.0461		mg/L	1.2	20	17-NOV-16
WG2434327-2 LCS								
Arsenic (As)-Total			96.9		%		80-120	17-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3597519								
WG2434327-2 LCS								
Boron (B)-Total			103.0		%		80-120	17-NOV-16
Cadmium (Cd)-Total			94.8		%		80-120	17-NOV-16
Chromium (Cr)-Total			93.5		%		80-120	17-NOV-16
Cobalt (Co)-Total			94.6		%		80-120	17-NOV-16
Copper (Cu)-Total			92.3		%		80-120	17-NOV-16
Lead (Pb)-Total			99.5		%		80-120	17-NOV-16
Nickel (Ni)-Total			94.3		%		80-120	17-NOV-16
Zinc (Zn)-Total			90.5		%		80-120	17-NOV-16
WG2434327-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	17-NOV-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	17-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	17-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	17-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-NOV-16
WG2434327-5 MS		**WG2434327-3**						
Arsenic (As)-Total			92.4		%		70-130	17-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	17-NOV-16
Cadmium (Cd)-Total			88.1		%		70-130	17-NOV-16
Chromium (Cr)-Total			89.7		%		70-130	17-NOV-16
Cobalt (Co)-Total			86.1		%		70-130	17-NOV-16
Copper (Cu)-Total			81.9		%		70-130	17-NOV-16
Lead (Pb)-Total			85.3		%		70-130	17-NOV-16
Nickel (Ni)-Total			83.6		%		70-130	17-NOV-16
Zinc (Zn)-Total			N/A	MS-B	%		-	17-NOV-16
NH3-WT	Water							
Batch R3597203								
WG2434644-3 DUP		**L1858244-2**						
Ammonia, Total (as N)		133	132		mg/L	0.3	20	17-NOV-16
VG2434644-2 LCS								
Ammonia, Total (as N)			98.8		%		85-115	17-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3597203								
WG2434644-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	17-NOV-16
WG2434644-4 MS		**L1858244-2**						
Ammonia, Total (as N)			N/A	MS-B	%		-	17-NOV-16
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrite (as N)			102.4		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-NOV-16
/G2435860-5 MS		**WG2435860-3**						
Nitrite (as N)			102.5		%		70-130	18-NOV-16
NO3-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrate (as N)			100.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrate (as N)			102.5		%		70-130	18-NOV-16
O2-DIS-WT	Water							
Batch R3596487								
WG2434123-1 DUP		**L1858237-1**						
Oxygen, Dissolved		9.48	9.56		mg/L	0.8	25	16-NOV-16
OGG-TOT-WT	Water							
Batch R3596577								
WG2433872-2 LCS								
Oil and Grease, Total			93.3		%		70-130	16-NOV-16
WG2433872-3 LCSD		**WG2433872-2**						
Oil and Grease, Total		93.3	89.8		%	3.8	40	16-NOV-16
VG2433872-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	16-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3597491								
WG2434352-3 DUP		**L1857606-1**						
Phosphorus, Total		0.0917	0.0951		mg/L	3.7	20	17-NOV-16
WG2434352-2 LCS								
Phosphorus, Total			104.1		%		80-120	18-NOV-16
WG2434352-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-NOV-16
WG2434352-4 MS		**L1857606-1**						
Phosphorus, Total			91.3		%		70-130	17-NOV-16
PH-WT	Water							
Batch R3596954								
WG2434422-6 DUP		**WG2434422-5**						
pH		6.96	6.97	J	pH units	0.01	0.2	17-NOV-16
/G2434422-4 LCS								
pH			7.02		pH units		6.9-7.1	17-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3597693								
WG2434828-7 DUP		**L1857251-20**						
Phenols (4AAP)		0.0018	0.0019		mg/L	8.7	20	17-NOV-16
WG2434828-6 LCS								
Phenols (4AAP)			92.0		%		85-115	17-NOV-16
WG2434828-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	17-NOV-16
WG2434828-8 MS		**L1857251-20**						
Phenols (4AAP)			89.9		%		75-125	17-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3599510								
WG2435300-3 DUP		**L1858237-1**						
Total Suspended Solids		27.9	30.1		mg/L	7.6	20	21-NOV-16
WG2435300-2 LCS								
Total Suspended Solids			98.0		%		85-115	21-NOV-16
WG2435300-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
TKN-WT	Water							
Batch R3597465								
WG2434411-3 DUP		**L1857896-1**						
Total Kjeldahl Nitrogen		0.70	0.81		mg/L	14	20	17-NOV-16
WG2434411-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3597465								
WG2434411-2 LCS								
Total Kjeldahl Nitrogen			100.6		%		75-125	17-NOV-16
WG2434411-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	17-NOV-16
WG2434411-4 MS		**L1857896-1**						
Total Kjeldahl Nitrogen			114.1		%		70-130	17-NOV-16

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen							
	1	14-NOV-16 10:00	16-NOV-16 17:00	0.25	55	hours	EHTR-FM
Bacteriological Tests							
E. coli							
	1	14-NOV-16 10:00	16-NOV-16 16:45	48	55	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1858237 were received on 15-NOV-16 15:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the JS EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1858237-COFC

COC Number: 14 - 11201601

Page 1 of 1

6E

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)		R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No		P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX		E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143	Email 1 or Fax npora@orgaworld.ca		Specify Date Required for E2,E or P:
	613-822-2056 ext#142 (Greg Jurchuk)	Email 2 gjurchuk@orgaworld.ca		
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca		
Contact:	Greg Jurchuk	Email 2 gjurchuk@orgaworld.ca		
Project Information		Oil and Gas Required Fields (client use)		
ALS Quote #:		Approver ID:	Cost Center:	
Job #:	Storm Water Pond	GL Account:	Routing Code:	
PO / AFE:		Activity Code:		
LSD:		Location:		
ALS Lab Work Order # (lab use only)	L1858237 16B	ALS Contact: Andrew	Sampler: Jessica Black	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-m-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O&G AVM	METALS As,Ba,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBODS	Temperature	E.Coli	Number of Containers
	Storm Water Pond	14-Nov-16	1000hrs	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temp 28 deg C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☑			

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
8.9			6.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 14Nov16	Time: 1000hrs	Received by: Tammy Andrews	Date: NOV15/16	Time: 3:00	Received by:	Date: 16-Nov-16	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 06-SEP-16
Report Date: 12-SEP-16 15:06 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1824380
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1824380-1 STORM WATER POND Sampled By: JESSICA BLACK on 06-SEP-16 @ 12:45 Matrix: WATER							
Field Tests							
Temperature, Client	16.3		-50	Deg. C		07-SEP-16	R3542622
Physical Tests							
Conductivity	920		3.0	umhos/cm		09-SEP-16	R3544128
Oxygen, Dissolved	7.70	PEHR	0.050	mg/L		07-SEP-16	R3542950
pH	7.82		0.10	pH units		09-SEP-16	R3544127
Total Suspended Solids	21.0	DLHC	4.0	mg/L	09-SEP-16	11-SEP-16	R3545535
Anions and Nutrients							
Unionized ammonia	<0.00040		0.00040	mg/L		09-SEP-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		08-SEP-16	R3543691
Nitrate and Nitrite as N	<0.11		0.11	mg/L		09-SEP-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		08-SEP-16	R3544653
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		08-SEP-16	R3544653
Total Kjeldahl Nitrogen	1.95		0.15	mg/L	08-SEP-16	08-SEP-16	R3544545
Phosphorus, Total	0.174		0.0030	mg/L	08-SEP-16	08-SEP-16	R3543227
Organic / Inorganic Carbon							
Dissolved Organic Carbon	15.4		1.0	mg/L		07-SEP-16	R3544074
Bacteriological Tests							
E. Coli	50	DLM	10	CFU/100mL		08-SEP-16	R3543866
Total Metals							
Arsenic (As)-Total	0.00113		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Boron (B)-Total	0.039		0.010	mg/L	07-SEP-16	08-SEP-16	R3543156
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	07-SEP-16	08-SEP-16	R3543156
Chromium (Cr)-Total	0.00093		0.00050	mg/L	07-SEP-16	08-SEP-16	R3543156
Cobalt (Co)-Total	0.00039		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Copper (Cu)-Total	<0.0010		0.0010	mg/L	07-SEP-16	08-SEP-16	R3543156
Lead (Pb)-Total	0.00019		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		08-SEP-16	R3543598
Nickel (Ni)-Total	0.00152		0.00050	mg/L	07-SEP-16	08-SEP-16	R3543156
Zinc (Zn)-Total	0.0030		0.0030	mg/L	07-SEP-16	08-SEP-16	R3543156
Aggregate Organics							
BOD	15.9		2.0	mg/L	07-SEP-16	12-SEP-16	R3546202
BOD Carbonaceous	17.6		2.0	mg/L	07-SEP-16	12-SEP-16	R3546209
COD	68		10	mg/L		08-SEP-16	R3544112
Oil and Grease, Total	<2.0		2.0	mg/L	07-SEP-16	07-SEP-16	R3543231
Phenols (4AAP)	0.0031		0.0010	mg/L		08-SEP-16	R3543610

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Nitrate (as N)	MS-B	L1824380-1
Matrix Spike	Phenols (4AAP)	MS-B	L1824380-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

Reference Information

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3546209								
WG2383527-6 DUP		**L1824176-1**						
BOD Carbonaceous		16.7	16.4		mg/L	1.8	20	12-SEP-16
WG2383527-7 LCS								
BOD Carbonaceous			98.0		%		85-115	12-SEP-16
WG2383527-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	12-SEP-16
BOD-WT	Water							
Batch R3546202								
WG2383523-2 DUP		**L1824344-2**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	12-SEP-16
WG2383523-3 LCS								
BOD			99.0		%		85-115	12-SEP-16
WG2383523-1 MB								
BOD			<2.0		mg/L		2	12-SEP-16
C-DIS-ORG-WT	Water							
Batch R3544074								
WG2383870-3 DUP		**L1824954-1**						
Dissolved Organic Carbon		2.9	2.6		mg/L	11	20	07-SEP-16
WG2383870-2 LCS								
Dissolved Organic Carbon			93.4		%		80-120	07-SEP-16
WG2383870-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	07-SEP-16
WG2383870-4 MS		**L1824954-1**						
Dissolved Organic Carbon			96.0		%		70-130	07-SEP-16
COD-T-WT	Water							
Batch R3544112								
WG2384805-3 DUP		**L1824307-2**						
COD		21	21		mg/L	0.5	20	08-SEP-16
WG2384805-2 LCS								
COD			100.1		%		85-115	08-SEP-16
WG2384805-1 MB								
COD			<10		mg/L		10	08-SEP-16
WG2384805-4 MS		**L1824307-2**						
COD			105.9		%		75-125	08-SEP-16
EC-MF-WT	Water							

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3543866								
WG2383171-2 DUP		**WG2383171-4**						
E. Coli		0	0		CFU/100mL	0.0	65	08-SEP-16
WG2383171-1 MB								
E. Coli			0		CFU/100mL		1	08-SEP-16
EC-WT	Water							
Batch R3544128								
WG2383959-4 DUP		**WG2383959-3**						
Conductivity		141	141		umhos/cm	0.2	10	09-SEP-16
WG2383959-2 LCS								
Conductivity			101.4		%		90-110	09-SEP-16
WG2383959-1 MB								
Conductivity			<3.0		umhos/cm		3	09-SEP-16
HG-T-CVAA-WT	Water							
Batch R3543598								
WG2384064-3 DUP		**L1824572-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-16
WG2384064-2 LCS								
Mercury (Hg)-Total			99.4		%		80-120	08-SEP-16
WG2384064-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	08-SEP-16
WG2384064-4 MS		**L1824572-3**						
Mercury (Hg)-Total			97.4		%		70-130	08-SEP-16
MET-T-CCMS-WT	Water							
Batch R3543156								
WG2383521-4 DUP		**WG2383521-3**						
Arsenic (As)-Total		0.00038	0.00037		mg/L	3.1	20	07-SEP-16
Boron (B)-Total		0.017	0.015		mg/L	8.3	20	07-SEP-16
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-16
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-16
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-16
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-16
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-16
Zinc (Zn)-Total		0.0032	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383521-2 LCS								
Arsenic (As)-Total			98.8		%		80-120	07-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3543156								
WG2383521-2 LCS								
Boron (B)-Total			89.0		%		80-120	07-SEP-16
Cadmium (Cd)-Total			100.2		%		80-120	07-SEP-16
Chromium (Cr)-Total			96.9		%		80-120	07-SEP-16
Cobalt (Co)-Total			99.2		%		80-120	07-SEP-16
Copper (Cu)-Total			96.8		%		80-120	07-SEP-16
Lead (Pb)-Total			98.9		%		80-120	07-SEP-16
Nickel (Ni)-Total			96.6		%		80-120	07-SEP-16
Zinc (Zn)-Total			92.0		%		80-120	07-SEP-16
WG2383521-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Boron (B)-Total			<0.010		mg/L		0.01	07-SEP-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	07-SEP-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	07-SEP-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	07-SEP-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-SEP-16
WG2383521-5 MS		**WG2383521-3**						
Arsenic (As)-Total			92.8		%		70-130	07-SEP-16
Boron (B)-Total			83.9		%		70-130	07-SEP-16
Cadmium (Cd)-Total			95.2		%		70-130	07-SEP-16
Chromium (Cr)-Total			92.7		%		70-130	07-SEP-16
Cobalt (Co)-Total			93.3		%		70-130	07-SEP-16
Copper (Cu)-Total			93.8		%		70-130	07-SEP-16
Lead (Pb)-Total			93.5		%		70-130	07-SEP-16
Nickel (Ni)-Total			90.5		%		70-130	07-SEP-16
Zinc (Zn)-Total			88.7		%		70-130	07-SEP-16
NH3-WT	Water							
Batch R3543691								
WG2384091-3 DUP		**L1824541-1**						
Ammonia, Total (as N)		0.049	0.049		mg/L	1.1	20	08-SEP-16
WG2384091-2 LCS								
Ammonia, Total (as N)			96.5		%		85-115	08-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3543691								
WG2384091-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	08-SEP-16
WG2384091-4 MS		**L1824541-1**						
Ammonia, Total (as N)			92.1		%		75-125	08-SEP-16
NO2-IC-WT	Water							
Batch R3544653								
WG2383997-14 DUP		**WG2383997-13**						
Nitrite (as N)		0.287	0.282		mg/L	1.9	25	08-SEP-16
WG2383997-12 LCS								
Nitrite (as N)			100.5		%		70-130	08-SEP-16
WG2383997-11 MB								
Nitrite (as N)			<0.010		mg/L		0.01	08-SEP-16
WG2383997-15 MS		**WG2383997-13**						
Nitrite (as N)			91.5		%		70-130	08-SEP-16
NO3-IC-WT	Water							
Batch R3544653								
WG2383997-14 DUP		**WG2383997-13**						
Nitrate (as N)		7.76	7.81		mg/L	0.6	25	08-SEP-16
WG2383997-12 LCS								
Nitrate (as N)			100.9		%		70-130	08-SEP-16
WG2383997-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	08-SEP-16
WG2383997-15 MS		**WG2383997-13**						
Nitrate (as N)			N/A	MS-B	%		-	08-SEP-16
O2-DIS-WT	Water							
Batch R3542950								
WG2383584-1 DUP		**L1824380-1**						
Oxygen, Dissolved		7.70	7.65		mg/L	0.7	25	07-SEP-16
OGG-TOT-WT	Water							
Batch R3543231								
WG2383430-2 LCS								
Oil and Grease, Total			96.6		%		70-130	07-SEP-16
WG2383430-3 LCSD		**WG2383430-2**						
Oil and Grease, Total		96.6	93.3		%	3.5	40	07-SEP-16
WG2383430-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	07-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3543227								
WG2383906-3 DUP		**L1824553-2**						
Phosphorus, Total		0.0084	0.0099		mg/L	16	20	08-SEP-16
WG2383906-2 LCS								
Phosphorus, Total			103.5		%		80-120	08-SEP-16
WG2383906-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	08-SEP-16
WG2383906-4 MS		**L1824553-2**						
Phosphorus, Total			82.8		%		70-130	08-SEP-16
PH-WT	Water							
Batch R3544127								
WG2383956-3 DUP		**WG2383956-2**						
pH		7.59	7.60	J	pH units	0.01	0.2	09-SEP-16
WG2383956-1 LCS								
pH			6.99		pH units		6.9-7.1	09-SEP-16
PHENOLS-4AAP-WT	Water							
Batch R3543610								
WG2384168-3 DUP		**L1824857-1**						
Phenols (4AAP)		0.0218	0.0217		mg/L	0.1	20	08-SEP-16
WG2384168-2 LCS								
Phenols (4AAP)			107.5		%		85-115	08-SEP-16
WG2384168-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	08-SEP-16
WG2384168-4 MS		**L1824857-1**						
Phenols (4AAP)			N/A	MS-B	%		-	08-SEP-16
SOLIDS-TSS-WT	Water							
Batch R3545535								
WG2384910-3 DUP		**L1824254-7**						
Total Suspended Solids		2.8	3.2		mg/L	13	20	11-SEP-16
WG2384910-2 LCS								
Total Suspended Solids			97.8		%		85-115	11-SEP-16
WG2384910-1 MB								
Total Suspended Solids			<2.0		mg/L		2	11-SEP-16
TKN-WT	Water							
Batch R3544545								
WG2384122-3 DUP		**L1824380-1**						
Total Kjeldahl Nitrogen		1.95	1.94		mg/L	0.1	20	08-SEP-16
WG2384122-2 LCS								

Quality Control Report

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3544545								
WG2384122-2 LCS								
Total Kjeldahl Nitrogen			100.4		%		75-125	08-SEP-16
WG2384122-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	08-SEP-16
WG2384122-4 MS		**L1824380-1**						
Total Kjeldahl Nitrogen			102.2		%		70-130	08-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen							
	1	06-SEP-16 12:45	07-SEP-16 16:00	0.25	27	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1824380 were received on 06-SEP-16 13:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1824380-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD (#23523)	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Greg Jurchuk	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	6123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 x143 -Nick Pora 613-822-2056 x142 (Greg Jurchuk	Email 1 or Fax Email 2	n pora@orgaworld.ca g jurchuk@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax Email 2	n pora@orgaworld.ca g jurchuk@orgaworld.ca	
Contact:	Greg Jurchuk	Oil and Gas Required Fields (client use)		
Project Information		Approver ID:	Cost Center:	
ALS Quote #:		GL Account:	Routing Code:	
Job #:	Storm Water Pond	Activity Code:		
PO / AFE:		Location:		
LSD:				
ALS Lab Work Order # (lab use only)	L1824380	ALS Contact: Andrew	Sampler: Jessica Black	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD, CBOD	PH, CONDUCTIVITY, TSS, NO2, NO3	TKN-TP, PHENOL, NH3-UN-ION-LAB, COD	METALS & HG	As, Ba, Cd, Cr, Co, Cu, Pb, Ni, Zn	TOTAL O&G	DOC	DISSOLVED OXYGEN	E.COLI					Number of Containers
1	Storm Water Pond 07A	06-SEP-16	18:45	Water	R	R	R	R	R	R	R	R	R					10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C	
10.9					16.3

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Greg Jurchuk	Sept. 6/16			sept/6/16	1:40		SEP 7/16	930

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

001105

Appendix E
2010 – 2015 Analytical Data

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TB-007	GW-45804-111011-TB-013	GW-45804-051412-MB-008	GW-45804-052312-MB-001	GW-45804-111212-MB-003	
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012	
			Original	Duplicate	Original	Original	Original	Original	Original	Original	
Parameters:	***Units***	***TLP***[1]									
Metals											
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	-	0.0056	0.0061	0.0052	-	0.0054	
Boron (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	-	ND(0.050)	
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	
Chromium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)	
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	0.00146	-	0.00229	
Copper (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)	
Iron (dissolved)	mg/L	46.3	16.6	17.2	3.56	1.50	0.897	1.62	-	5.78	
Lead (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)	
Magnesium (dissolved)	mg/L	-	82.9	79.6	-	-	-	-	-	-	
Manganese (dissolved)	mg/L	17.1	11.0	10.9	1.14	0.649	0.539	0.956	-	2.17	
Mercury (dissolved)	mg/L	-	-	-	-	-	-	ND(0.00010)	-	ND(0.00010)	
Molybdenum (dissolved)	mg/L	-	0.0124	0.0116	0.0530	0.0344	0.0096	0.0037	-	0.0053	
Nickel (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0020)	-	ND(0.0020)	
Silver (dissolved)	mg/L	-	-	-	NO(0.00010)	-	-	-	-	-	
Zinc (dissolved)	mg/L	-	ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	-	ND(0.0030)	
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	500	490	490	307	197	177	254	-	396	
Ammonia-N	mg/L	4.0	0.899	0.828	0.593	0.335	0.410	1.06	-	1.66	
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	-	7.5	
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	51	-	65	
Chloride	mg/L	-	66.1	66.6	109	47.5	37.9	99.8	-	70.7	
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	
Color (apparent)	TCU	-	220	249	69.2	151	29.5	-	107	43.1 J	
Conductivity	umho/cm	-	1750	1760	-	-	-	-	-	-	
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	9.9	6.4	7.0	6.5	9.5	-	9.2	
Escherichia coli	cfu/100mL	25.6	0	0	3	9	ND(2)	-	13	6	
Fecal coliform bacteria	cfu/100mL	-	0	0	11	14	2	-	6	10	
Nitrate (as N)	mg/L	13	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.030)	ND(0.10)	-	ND(0.10)	
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	NO(0.10)	ND(0.10)	ND(0.030)	ND(0.10)	-	NO(0.10)	
pH, lab	s.u.	-	7.65	7.59	-	-	-	7.78	-	7.78	
Phenol	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)	
Phosphorus	mg/L	7.2	0.127	0.067	1.50	5.46	3.13	2.88	-	1.57	
Sulfide	mg/L	-	-	-	-	-	-	-	-	357	
Total coliform bacteria	cfu/100mL	-	0	0	700	50	70	-	470	100	
Total dissolved solids (TDS)	mg/L	-	1310	1320	1010	896	482	700	-	1110	
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	2.29	-	2.95	
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	3970	-	4620	
Turbidity	NTU	-	63.0	64.0	-	-	-	-	24.0	7.50 J	
Un-ionized ammonia	mg/L	-	0.000415	0.000362	0.00545	0.000111	0.00367	-	-	0.194	
Field Parameters											
Conductivity, field	mS/cm	-	1.09	1.09	0.5	1.82	0.701	1.16	1.24	1.32	
Dissolved oxygen (DO), field	mg/L	-	2.29	2.29	-	6.87	-	-	-	3.01	
Oxidation reduction potential (ORP), field	millivolts	-	-85	-85	-	-143	-	-	-	-113	
pH, field	s.u.	-	6.53	6.53	7.47	6.13	7.62	6.65	6.24	6.58	
Temperature, field	Deg C	-	3.7	3.7	16.5	11.1	9.5	12.96	12.73	12.3	
Turbidity, field	NTU	-	207	207	-	-	-5	-	-	-5	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	890	440	930	700	-	460	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	500	440	930	700	-	460	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	2840	1520	3410	2650	-	1710	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	8300	4100	10600	9000	-	8300	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	ND(100)	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	-	-	-	

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TB-007	GW-45804-111011-TB-013	GW-45804-051412-MB-008	GW-45804-052312-MB-001	GW-45804-111212-MB-003	
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012	
			Original	Duplicate	Original	Original	Original	Original	Original	Original	
Semi-Volatiles											
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.068	
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034	
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	0.024	
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)	
Acridine	µg/L	-	-	-	-	-	-	-	-	-	
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	0.020	
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0180	0.0097	0.0276	0.0086	-	0.024	
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.041	
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.055	
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)	
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	
Chrysene	µg/L	-	-	-	-	-	-	-	-	0.113	
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)	
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.034	
Fluorene	µg/L	-	-	-	-	-	-	-	-	0.040	
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)	
Naphthalene	µg/L	-	-	-	-	-	-	-	-	0.047	
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	0.056	
Pyrene	µg/L	-	-	-	-	-	-	-	-	0.056	

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-05	MW1-02	MW1-08	MW1-02	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052215-TS-004	GW-45804-111415-TS-009	GW-45804-052814-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111515 TS-010
Sample Date:		5/22/2015	11/14/2015	5/28/2014	11/25/2014	11/25/2014	5/28/2015	11/15/2015
		Original	Original	Original	Original	Duplicate	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	0.0048	0.0031	0.0041	0.0016	0.0015	0.0034	0.00148
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.017
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00061
Cobalt (dissolved)	mg/L	0.00077	0.00070	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	3.03	1.66	2.78	2.54	2.54	3.42	3.00
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	--	--
Manganese (dissolved)	mg/L	1.43	1.09	1.23	0.916	0.901	1.07	0.988
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0109	0.0042	0.0045	0.0026	0.0027	0.0017	0.00160
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Silver (dissolved)	mg/L	-	-	-	-	-	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	0.0036	0.0045	ND(0.0030)	0.0058	ND(0.0030)	0.0024
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	208	185	234 J	234	236	209	222
Ammonia-N	mg/L	1.12	0.440	2.08 J	1.22	1.32	0.844	0.492
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	49	53	45 J	24	15	38	21
Chloride	mg/L	90	50.2	85.2 J	50	50	75.5	52.2
Color (apparent)	color unit	-	-	146 J	145	136		
Color (apparent)	TCU	27.0	34.9	-	-	-	49.5	103
Conductivity	umho/cm	-	-	-	-	-	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.2	7.6	8.4 J	7.4	7.3	10.7	7.6
Escherichia coli	cfu/100mL	20	11	0 J	0	2	1	0
Fecal coliform bacteria	cfu/100mL	40	15	0 J	0 J	4 J	1	0
Nitrate (as N)	mg/L	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.74	7.31	7.77 J	7.50	7.58	7.74	7.72
Phenol	mg/L	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)	0.0101	0.0022
Phosphorus	mg/L	3.27	3.32	0.174 J	0.206	0.209	1.67	0.162
Sulfide	mg/L	337	251	194 J	141	127	89.7	80.5
Total coliform bacteria	cfu/100mL	20	966	5 J	290	320	892	120
Total dissolved solids (TDS)	mg/L	812	597	644 J	513	511	468	441
Total kjeldahl nitrogen (TKN)	mg/L	2.53	1.37	2.58 J	1.44	1.54	1.95	0.99
Total suspended solids (TSS)	mg/L	2690	3220	5.6 J	7.6	6.4	2800	23.1
Turbidity	NTU	58.0	48.8	15.7 J	29.4	28.2	40.0	46.4
Un-ionized ammonia	mg/L	0.000445	0.000151	0.0173 J	0.00896	0.00753	0.00483	0.0287
Field Parameters								
Conductivity, field	mS/cm	1.3	0.857	1.17	0.307	0.307	0.597	0.594
Dissolved oxygen (DO), field	mg/L	4.46	7.02	0	3.32	3.32	8.32	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-175	-53	-53	-82	-119
pH, field	s.u.	6.05	6.18	7.38	7.47	7.47	7.24	8.39
Temperature, field	Deg C	15.9	10.0	15.65	8.11	8.11	14.87	11.3
Turbidity, field	NTU	-5	857	3.1	-	-	0	33.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	530	780	ND(250) J	ND(250)	ND(250)	530	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	530	780	ND(250) J	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	1920	3160	ND(250) J	ND(250)	ND(250)	2470	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	10600	20000	-	-	-	--	--
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	-	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	-	-	-	-	3000	ND(350)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-05	MW1-02	MW1-08	MW1-02	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-052814-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015 TS-010
Sample Date:		5/22/2015	11/14/2015	5/28/2014	11/25/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Duplicate	Original	Original
Semi-Volatiles								
1-Methylnaphthalene	µg/L	0.040	-	-	-	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	--	--
2-Methylnaphthalene	µg/L	0.028	-	-	-	-	--	--
Acenaphthene	µg/L	ND(0.020)	-	-	-	-	--	--
Acenaphthylene	µg/L	ND(0.020)	-	-	-	-	--	--
Acridine	µg/L	ND(4.0)	-	-	-	-	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-	-	--	--
Benzo(a)pyrene	µg/L	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.033	-	-	-	-	--	--
Benzo(h)quinoline (Quinoline)	µg/L	ND(0.040)	-	-	-	-	--	--
Benzo(g,h,i)perylene	µg/L	0.027	-	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-	-	--	--
Carcinogenic potency equivalent	µg/L	ND(0.050)	-	-	-	-	--	--
Chrysene	µg/L	0.070	-	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-	-	--	--
Fluoranthene	µg/L	0.030	-	-	-	-	--	--
Fluorene	µg/L	ND(0.30)	-	-	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-	-	--	--
Naphthalene	µg/L	0.049	-	-	-	-	--	--
Phenanthrene	µg/L	0.061	-	-	-	-	--	--
Pyrene	µg/L	0.040	-	-	-	-	--	--

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-05	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011910-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-008	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:			1/19/2016	5/19/2016	11/2/2016	5/15/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	0.00012	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	0.00122	0.00059
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	0.0039	0.0036
Iron (dissolved)	mg/L	46.3	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	26.5	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	0.0070	0.0091	0.0077	0.0110	-	0.177	0.0352	0.0074
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0064	0.0120	0.0077	0.0104	-	0.0122	0.0098	0.0095
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0052	0.0050
Zinc (dissolved)	mg/L	-	0.103	0.0253	0.0127	0.0414	-	0.0126	0.0090	0.0100
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	209	261	314	281	294	-	273	329
Ammonia-N	mg/L	4.0	ND(0.050)	0.071	0.090	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	ND(10)	19
Chloride	mg/L	-	ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	-	ND(2.0)	2.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	32.7	66.3	15.1	25.2	9.9	-	11.5	-
Conductivity	umhos/cm	-	465	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	38.6	3.5	1.5	2.2	4.8	10.0	-	3.9	5.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	NO(2)	-	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	NO(2)	-	ND(2)	ND(2)
Nitrate (as N)	mg/L	1.3	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	0.31
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	8.00	-	-	-	-	-	8.00	7.83
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.110	0.039	0.033	0.033	0.038	-	ND(0.030)	0.054
Sulfate	mg/L	-	-	-	-	-	-	-	-	216
Total coliform bacteria	cfu/100mL	-	1	2	30	210	2	-	ND(2)	10
Total dissolved solids (TDS)	mg/L	-	258	456	576	515	554	-	515	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.43	0.43
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	24.4	-
Turbidity	NTU	-	6.10	-	-	-	-	-	4.80	-
Un-ionized ammonia	mg/L	-	ND(0.000057)	0.00045	0.0095	ND(0.000076)	ND(0.00058)	-	-	ND(0.000040)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-05	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011910-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-008	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:			1/19/2010	5/19/2010	11/2/2010	5/15/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Field Parameters										
Conductivity, field	mS/cm	-	0.801	0.678	0.971	0.95	0.77	-	-	1.21
Dissolved oxygen (DO), field	mg/L	-	-	5.69	4.3	9.19	-	-	-	6.66
Oxidation reduction potential (ORP), field	millivolts	-	-	14	-77	213	-	-	-	248
pH, field	s.u.	-	6.78	7.38	8.68	6.96	7.68	-	-	6.50
Temperature, field	Deg C	-	7.8	12.12	10.9	6.14	10.5	-	-	11.6
Turbidity, field	NTU	-	255	-	-	3.5	94.4	-	-	953
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	-	ND(250)	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.037
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Chrysene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111912-MB-009	GW-45804-052313-TB-001	GW-45804-111413-TB-006	GW-45804-052914-MB-011	GW-45804-052914-MB-011	GW-45804-112514-TB-010	GW-45804-111015-TB-010
Sample Date:		11/19/2012	5/23/2013	11/14/2013	5/29/2014	5/29/2014	11/25/2014	11/10/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	0.018
Cadmium (dissolved)	mg/L	-	0.00022	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	0.000035
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00102
Cobalt (dissolved)	mg/L	-	0.00295	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	ND(0.000010)
Copper (dissolved)	mg/L	-	0.0031	0.0038	0.0009	-	0.0027	0.00376
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.000092)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	--
Manganese (dissolved)	mg/L	-	0.0381	0.0035	0.0019	-	0.0047	0.00972
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0173	0.0067	0.0123	-	0.0051	0.00905
Nickel (dissolved)	mg/L	-	0.0064	0.0045	0.0048	-	0.0038	0.00453
Zinc (dissolved)	mg/L	-	0.0153	0.0071	0.0105	-	0.0047	0.0094
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	263	310	282	-	325	324
Ammonia-N	mg/L	-	ND(0.050)	0.105	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	34	16	-	13	ND(10)
Chloride	mg/L	-	2.7	ND(2.0)	ND(2.0)	-	ND(10)	ND(2.5)
Color (apparent)	color unit	-	-	-	9.9	-	7.0	-
Color (apparent)	TCU	17.1	245.J	14.5	-	-	-	58.5
Conductivity	umhos/cm	-	-	-	-	-	-	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	ND(3.6)	5.9	2.2	-	5.6	5.2
Escherichia coli	cfu/100mL	-	ND(2)	0	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	ND(2)	0	0	-	0	0
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.050)
pH, lab	su	-	7.98	7.79	7.71	-	7.90	7.79
Phenol	mg/L	-	ND(0.0010)	0.0019	0.0018	-	ND(0.0010)	0.0027
Phosphorus	mg/L	-	0.073	ND(0.030)	0.052	-	0.031	0.041
Sulfate	mg/L	-	147	119	109	-	106	228
Total coliform bacteria	cfu/100mL	-	ND(100)	1	5	-	270	30
Total dissolved solids (TDS)	mg/L	588	448	446	402	-	457	588
Total kjeldahl nitrogen (TKN)	mg/L	-	0.18	0.41	ND(0.43)	-	0.29	0.53
Total suspended solids (TSS)	mg/L	59.2	194	65.2	17.2	-	ND(2.0)	74.2
Turbidity	NTU	19.1	8.88	0.58	2.22	-	0.62	31.9
Un-ionized ammonia	mg/L	-	ND(0.0000028)	0.000034	ND(0.00046)	-	-	ND(0.0070)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111512-MB-009	GW-45804-052313-TB-001	GW-45804-111413-TB-006	GW-45804-052914-MB-011	GW-45804-052914-MB-011	GW-45804-112514-TB-010	GW-45804-111013-TB-010
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Field Parameters								
Conductivity, field	mS/cm	-	1.96	0.832	0.686	0.686	0.681	0.673
Dissolved oxygen (DO), field	mg/L	-	6.41	8.15	6.91	6.91	6.02	3.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	94	94	87	55
pH, field	s.u.	-	5.30	6.16	7.53	7.53	7.51	6.74
Temperature, field	Deg C	-	13.0	10.1	13.12	13.12	9.16	13.08
Turbidity, field	NTU	-	325	230	35.6	35.6	-	44.1
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250) J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	-	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
Acenaphthene	µg/L	-	-	-	-	-	-	--
Acenaphthylene	µg/L	-	-	-	-	-	-	--
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	--
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	--
Benzo(j,k)fluoranthene	µg/L	-	-	-	-	-	-	--
Chrysene	µg/L	-	-	-	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	--
Fluoranthene	µg/L	-	-	-	-	-	-	--
Fluorene	µg/L	-	-	-	-	-	-	--
ndeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	--
Naphthalene	µg/L	-	-	-	-	-	-	--
Phenanthrene	µg/L	-	-	-	-	-	-	--
Pyrene	µg/L	-	-	-	-	-	-	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-02	MW3-05	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-06
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MMD-005	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0048	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	62.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0987	0.021	0.022a	0.0053	0.0071	0.0016	0.0036	0.0066
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135	0.0147	0.0132	0.0152	0.0328
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0021
Zinc (dissolved)	mg/L	0.0199	0.0482	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0147	ND(0.0050)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300	279	276	316	322	278	276	256
Ammonia-N	mg/L	0.123	0.077	0.078	0.073	0.058	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	15
Chloride	mg/L	35.1	28.4	31.6	27.5	27.4	29.8	55.7	43.9
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	10.2	16.9	19.7	38.3	42.8	34.4	15.2	52.4
Conductivity	umhos/cm	1080	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.8	1.7	3.5	9.0	3.1	2.5	ND(5.0)
Escherichia coli	cfu/100mL	0	0	0	0	0	0	2	0
Fecal coliform bacteria	cfu/100mL	0	0	0	1	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	7.97	-	-	-	-	-	-	7.96
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.378	0.105	0.090	0.093	0.079	0.075	ND(0.030)	0.240
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	3	1	10	120	430	1	60	0
Total dissolved solids (TDS)	mg/L	736	618	690	766	778	462	1040	700
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.20
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	303
Turbidity	NTU	2.70	-	-	-	-	-	-	149
Un-ionized ammonia	mg/L	0.0000030	0.00118	0.00119	0.000095	0.000076	ND(0.00012)	ND(0.000049)	-
Field Parameters									
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	4.42	-	-	1.47	1.47	-	1.47	2.87
Oxidation reduction potential (ORP), field	millivolts	-	38	38	394	394	-	120	51
pH, field	s.u.	6.05	7.75	7.75	6.82	6.82	7.09	6.68	6.67
Temperature, field	Deg C	8.6	12.5	12.5	8.4	8.4	8.61	8.7	9.81
Turbidity, field	NTU	424	-	-	-	-	150	99	504

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MMD-005	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(290)	ND(290)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00073
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-05	MW3-08	MW3-05	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-112812-MB-018	GW-45804-052213-YS-008	GW-45804-111413-TB-014	GW-45804-052914-MB-018	GW-45804-112914-TB-014	GW-45804-052815-TB-015	GW-45804-111615 TB-018
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/16/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.024
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00085
Cobalt (dissolved)	mg/L	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00046
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.000290
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0273	0.0014	0.0042	0.0055	ND(0.0010)	0.0012	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0203	0.0148	0.0165	0.0459	0.0200	0.121	0.0152
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)	0.0028	0.0043	0.00222
Zinc (dissolved)	mg/L	ND(0.0030)	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0013
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	309	275	295	262	283	256	279
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.091	ND(0.113)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	11	30	12	ND(10)	ND(10)	ND(10)
Chloride	mg/L	55.4	46	43.1	46.8	52.5	59.8	44.1
Color (apparent)	color unit	-	-	-	10.4	13.3	-	-
Color (apparent)	TCU	45.5	34.0	50.7	-	-	11.2	17.2
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	2.2	2.9	2.7	1.5	1.7	3.4
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	1	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0	1	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.76	7.57	7.62	7.62	7.52	7.81	7.62
Phenol	mg/L	ND(0.0010)	0.0009	0.0012	0.0045	ND(0.0010)	0.0017	0.0019
Phosphorus	mg/L	0.301	0.038	0.166	0.074	ND(0.030)	0.042	0.035
Sulfate	mg/L	495	292	445	222	498	474	413
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5	50	32	170
Total dissolved solids (TDS)	mg/L	1130	714	1020	613	994	862	884
Total Kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	1.54	ND(0.52)	0.18	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L	642	99.0	209	108	72.8	116	42.0
Turbidity	NTU	11.8	13.5	6.82	4.84	44.8	6.42	36.7
Un-Ionized ammonia	mg/L	ND(0.00942)	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00039	0.00103	ND(0.0017)
Field Parameters								
Conductivity, field	mS/cm	1.20	1.16	1.46	0.946	434	0.934	1.03
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73	8.64	8.98	0
Oxidation reduction potential (ORP), field	millivolts	16	-	-	105	80	175	40
pH, field	s.u.	7.58	5.09	6.16	7.24	7.48	7.52	8.51
Temperature, field	Deg C	9.8	11.2	10.4	8.09	8.44	12.5	12.08
Turbidity, field	NTU	473	393	25	184	-	211	0.3

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-05	MW3-08	MW3-05	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052210-TB-008	GW-45804-111413-TB-014	GW-45804-052914-MB-016	GW-45804-112614-TB-014	GW-45804-052815-TB-015	GW-45804-111015 TB-016
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	-	--	-	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	--	-	--	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	-	--	-	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(290)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	0.094	--	-	-	--	--
2-Methylnaphthalene	µg/L	-	0.212	-	-	-	--	--
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	--	--
Acenaphthylene	µg/L	-	ND(0.020)	-	--	-	--	--
Acridine	µg/L	-	ND(4.0)	-	--	-	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	ND(0.020)	-	--	-	--	--
Benzo(a)pyrene	µg/L	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	--	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-	--	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	--	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	--	-	-	--	--
Chrysene	µg/L	-	ND(0.020)	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-	-	--	--
Fluoranthene	µg/L	-	ND(0.020)	-	--	-	--	--
Fluorene	µg/L	-	ND(0.020)	-	--	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	--	-	--	--
Naphthalene	µg/L	-	0.113	-	--	-	--	--
Phenanthrene	µg/L	-	ND(0.020)	-	-	-	--	--
Pyrene	µg/L	-	ND(0.020)	-	-	-	--	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-05	MW4-05	MW4-02	MW4-08	MW4-08	MW4-08	MW4-05	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MMO-006	GW-45804-110911-TB-003	GW-45804-051412-MB-001	GW-45804-052512-MB-006	GW-45804-111212-MB-010	GW-45804-052215-TB-007	GW-45804-111413-TB-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/25/2012	11/12/2012	5/22/2015	11/14/2015
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	0.052	-	0.072	0.056	0.058
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	-	ND(0.00010)	0.00020	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	0.00122	-	0.00073	0.00056	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0014	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	0.320	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	-	0.320	0.416	0.220
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0289	0.0180	0.0235	0.0192	-	0.0461	0.0204	0.0195
Nickel (dissolved)	mg/L	-	-	-	0.0110	-	0.0053	0.0083	0.0053
Zinc (dissolved)	mg/L	0.0891	0.0131	0.0090	ND(0.0030)	-	0.0053	0.0105	0.0041
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	367	416	378	388	-	367	405	372
Ammonia-N	mg/L	0.088	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)	-	23	13	21
Chloride	mg/L	64.6	73.6	70.4	61.3	-	72.3	78	69.2
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	20.3	36.5	77.5	-	91.7	39.4 J	29.7	61.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0	-	1.7	1.6	2.0
Escherichia coli	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(10)	0
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	0.13
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	ND(0.10)
pH, lab	S.U.	-	-	-	7.54	-	7.67	7.60	7.58
Phenol	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.166	0.098	0.479	0.100	-	0.228	0.098	0.109
Sulfate	mg/L	-	-	-	-	-	697	731	691
Total coliform bacteria	cfu/100mL	0	40	2	-	16	2	ND(100)	ND(10)
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530	-	1540	1450	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21	-	ND(0.15)	ND(0.15)	0.18
Total suspended solids (TSS)	mg/L	-	-	-	24.6	-	1370	100	381
Turbidity	NTU	-	-	-	-	22.0	4.60 J	10.3	6.56
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	-	-	ND(0.00049)	ND(0.0000023)	ND(0.0000019)
Field Parameters									
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03	1.75	1.99	0.96
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	4.39	6.26	7.73
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	18	47	-
pH, field	S.U.	7.44	5.95	7.00	6.43	8.27	7.57	5.20	6.20
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.51	12.0	13.4	10.4
Turbidity, field	NTU	-	455	399	-	-	355	594	56

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-05	MW4-05	MW4-02	MW4-08	MW4-08	MW4-08	MW4-06	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MMO-006	GW-45804-110911-TB-003	GW-45804-051412-MB-001	GW-45804-052812-MB-006	GW-45804-111212-MB-010	GW-45804-052215-TB-007	GW-45804-111413-TB-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/28/2012	11/12/2012	5/22/2015	11/14/2015
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	329	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.010)	ND(0.0050)	0.0061
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052014-MB-005	GW-45804-112514-YS-001	GW-45804-052515 TS-016	GW-45804 111015-TS-012
Sample Date:		5/28/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original
Parameters:	***Units***				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.052	0.052	0.060	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.270	0.0951	0.157	0.154
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)
Molybdenum (dissolved)	mg/L	0.0201	0.0203	0.0199	0.0242
Nickel (dissolved)	mg/L	0.0061	0.0051	0.0055	0.0052
Zinc (dissolved)	mg/L	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	360	338	343	349
Ammonia-N	mg/L	ND(0.057)	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	68.1	69	77.6	82.6
Color (apparent)	color unit	17.3	10.9	-	-
Color (apparent)	TCU	-	-	2.4	1.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(1.0)	1.1	1.5	2.3
Escherichia coli	cfu/100mL	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.32	0.18
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.40	7.66	7.77	7.63
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0058	0.0029
Phosphorus	mg/L	ND(0.030)	0.032	ND(0.030)	ND(0.030)
Sulfide	mg/L	521	665	665	755
Total coliform bacteria	cfu/100mL	0	0	9	1
Total dissolved solids (TDS)	mg/L	1370	1390	1300	1380
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.21)	ND(0.15)	ND(0.15)	0.56
Total suspended solids (TSS)	mg/L	7.2	10.0	8.5	2.4
Turbidity	NTU	0.22	4.22	ND(0.44)	0.69
Un-ionized ammonia	mg/L	0.00024	ND(0.00042)	ND(0.00015)	ND(0.0016)
Field Parameters					
Conductivity, field	mS/cm	2.04	-	1.42	1.4
Dissolved oxygen (DO), field	mg/L	0.58	-	2.21	0
Oxidation reduction potential (ORP), field	millivolts	99	-	186	-7
pH, field	s.u.	7.11	7.07	8.93	8.15
Temperature, field	Deg C	12.62	8.5	15.83	10.14
Turbidity, field	NTU	57	-	0	0.6

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-06	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052014-MB-005	GW-45804-112514-YS-001	GW-45804-052515 TS-016	GW-45804 111015-TS-012
Sample Date:		5/20/2014	11/25/2014	5/26/2015	11/10/2015
		Original	Original	Original	Original
Parameters:	***Units***				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-		
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F 2 less naphthalene	µg/L	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(390)	ND(380)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	--	--
Acenaphthene	µg/L	-	-	--	--
Acenaphthylene	µg/L	-	-	--	--
Acridine	µg/L	-	-	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--
Chrysene	µg/L	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--
Fluoranthene	µg/L	-	-	--	--
Fluorene	µg/L	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--
Naphthalene	µg/L	-	-	--	--
Phenanthrene	µg/L	-	-	--	--
Pyrene	µg/L	-	-	--	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051610-MS-009	GW-45804-110210-TB-011	GW-45804-051711-MMD-007	GW-45804-110911-TB-002	GW-45804-051412-MB-002	GW-45804-052312-MS-005	GW-45804-111212-MS-008	GW-45804-052213-TB-009
Sample Date:		5/19/2016	11/2/2016	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	0.058	-	0.059	0.065
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00010	-	0.00011	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	0.00231	-	0.00195	0.00287
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.400	0.487	0.301	0.761	0.699	-	ND(0.050)	0.347
Lead (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.292	0.372	-	0.422	0.317
Mercury (dissolved)	mg/L	-	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0360	0.0317	-	0.0225	0.0462
Nickel (dissolved)	mg/L	-	-	-	-	0.0058	-	0.0110	0.0068
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0030)	-	0.0073	0.0054
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	459	427	376	387	351	-	396	393
Ammonia-N	mg/L	0.117	0.084	0.031	0.052	ND(0.050)	-	ND(0.050)	0.066
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	ND(10)	-	13	21
Cyanide	mg/L	81.4	203	87.3	88.4	78.0	-	80.4	66
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	25.4	93.5	139	88.4	-	271	11.2 J	33.5
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.0	2.7	3.1	1.7	-	1.8	1.6
Escherichia coli	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	0.13	-	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)
pH, lab	s.u.	-	-	-	-	7.67	-	7.74	7.73
Phenol	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0040
Phosphorus	mg/L	0.974	1.05	1.23	1.49	0.672	-	0.293	0.506
Sulfide	mg/L	-	-	-	-	-	-	718	796
Total coliform bacteria	cfu/100mL	0	4	3	2	-	0	10	ND(10)
Total dissolved solids (TDS)	mg/L	1950	1920	1700	1730	1740	-	1600	1540
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.19	-	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	-	-	-	-	5260	-	528	1710
Turbidity	NTU	-	-	-	-	-	67.0	2.60 J	84.6
Un-ionized ammonia	mg/L	0.00085	0.000021	0.00030	0.00014	-	-	ND(0.0085)	0.0000073

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051610-MS-009	GW-45804-110210-TB-011	GW-45804-051711-MMD-007	GW-45804-110911-TB-002	GW-45804-051412-MB-002	GW-45804-052312-MS-005	GW-45804-111212-MS-008	GW-45804-052213-TB-009
Sample Date:		5/19/2016	11/2/2016	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Field Parameters									
Conductivity, field	mS/cm	1.96	2.41	2.65	2.46	2.13	2.1	1.98	1.98
Dissolved oxygen (DO), field	mg/L	-	3.39	-	-	-	-	5.47	8.74
Oxidation reduction potential (ORP), field	millivolts	-	5	-	-	-	-	-78	-5
pH, field	s.u.	7.46	6.00	7.3	7.04	6.27	6.27	6.70	5.54
Temperature, field	Deg C	11.4	11.4	7.68	11.4	10.32	13.00	10.3	14.5
Turbidity, field	NTU	-	-	-	-5	-	-	640	-5
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1520	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	3900	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0309	0.0159	0.0090	0.0074	0.0121	-	ND(0.010)	0.0063
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.039)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804 052815-TS-012	GW45804-111015-TS 015
Sample Date:		11/14/2015	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.070	0.058	0.071	0.064	0.10
Cadmium, (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00144	0.00061	0.00145	0.00085	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)
Iron (dissolved)	mg/L	1.66	0.221	0.362	0.280	0.13
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.218	0.182	0.234	0.169	0.137
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0351	0.0445	0.0397	0.0415	0.0532
Nickel (dissolved)	mg/L	0.0023	0.0022	ND(0.0020)	0.0022	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0095	0.0091	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	350	399	326	310	346
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.131)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	42	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	67.4	73.5	69	63.7	71.4
Color (apparent)	color unit	-	12.0	16.9	-	-
Color (apparent)	TCU	117	-	-	17.7	7.8
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.0	2.0	1.7	1.5	1.9
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	0.24	ND(0.50)	0.10	0.24
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)
pH, lab	S.U.	7.58	7.48	7.72	7.75	7.73
Phenol	mg/L	ND(0.0010)	0.0018	ND(0.0010)	0.0036	0.0036
Phosphorus	mg/L	0.75	0.070	0.097	0.045	ND(0.030)
Sulfate	mg/L	702	845	710	755	716
Total coliform bacteria	cfu/100mL	ND(10)	5	0	0	1
Total dissolved solids (TDS)	mg/L	1480	1390	1490	1380	1310
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	ND(0.15)	ND(0.15)	0.46	0.20
Total suspended solids (TSS)	mg/L	2650	110	61.2	23.3	19.4
Turbidity	NTU	19.4	22.0	9.33	13.8	5.22
Un-ionized ammonia	mg/L	ND(0.000016)	ND(0.000016)	ND(0.000016)	0.00041	ND(0.0019)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804 052815-TS-012	GW45804-111015-TS 015
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Field Parameters						
Conductivity, field	mS/cm	2.01	2	0.059	1.69	1.69
Dissolved oxygen (DO), field	mg/L	6.45	8.95	8.44	1.62	1.62
Oxidation reduction potential (ORP), field	millivolts	-	10	19	191	191
pH, field	su	6.97	7.2	7.21	6.99	6.99
Temperature, field	Deg C	11.2	9.02	10.23	14.98	14.98
Turbidity, field	NTU	556	54.5	-	34.3	34.3
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	280	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	280	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	300	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (SHS)	µg/L	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	580	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	0.038	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0064	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-05	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011510-TS-002	GW-45804-051610-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MW5-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-052112-MB-005	GW-45804-052112-MB-006	GW-45804-052112-MB-008
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	5/21/2012	5/21/2012	5/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	***Units***	***TLP***[1]											
Metals													
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0010	ND(0.0010)	-	-	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L		-	-	-	-	-	-	0.054	0.056	-	-	-
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	-
Calcium (dissolved)	mg/L		-	-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L		-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00080)	ND(0.00080)	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	-
Iron (dissolved)	mg/L	48.3	1.99	4.88	4.19	5.18	3.92	3.83	6.27	6.24	-	-	-
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-	-
Magnesium (dissolved)	mg/L	-	116	-	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.65	3.25	2.99	3.59	3.42	3.47	4.73	4.79	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)	-	-	-
Molybdenum (dissolved)	mg/L	-	0.024	0.018	0.022	0.0095	0.0133	0.0129	0.0068	0.0068	-	-	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0050)	ND(0.0050)	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.139	ND(0.030)	ND(0.030)	0.0093	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0087	-	-	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
General Chemistry													
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	533	360	408	487	485	541	534	522	517	477	-	-
Ammonia-N	mg/L	4.0	0.698	0.693	0.331	3.90	5.77	4.78	7.39	6.85	9.99	10.3	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	45	35	-	-	-
Chloride	mg/L	-	94.4	147	88.5	103	108	108	-	-	104	-	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	23.1	25.9	128	102	29.2	23.8	10.9	13.0	25.8	-	-
Conductivity	umhos/cm	-	2150	-	-	-	-	-	-	-	2170	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.6	5.5	6.6	10.0	10.0	10.0	11.0	9.4	8.0	-	-
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)	ND(2)	0	0	0	0	-
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	ND(2)	0	0	0 J	0 J	-
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	-
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	-
Petroleum Products	mg/L	-	-	-	-	-	-	-	ND(1.0)	ND(1.0)	-	-	-
pH, lab	s.u.	-	7.68	-	-	-	-	-	7.56	7.53	7.08	-	-
Phenol	mg/L	-	-	-	-	-	-	-	0.0010	0.0010	-	-	-
Phosphorus	mg/L	7.2	0.11	1.20	0.758	0.187	0.482	0.519	0.638	0.631	0.706	-	-
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	3	0	6	10	4	ND(2)	0	0	1	0	-
Total dissolved solids (TDS)	mg/L	-	1750	1620	1350	1740	1610	1610	1900	1760	1790	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	10.8	9.87	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	300 J	270 J	-	-	-
Turbidity	NTU	-	4.10	-	-	-	-	-	116	156	18.6	-	-
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	-	-
Field Parameters		-											
		-											
Conductivity, field	mS/cm	-	2.56	0.967	2.45	2.87	2.48	-	2.51	2.51	2.56	2.56	-
Dissolved oxygen (DO), field	mg/L	-	-	-	4.92	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-57	-	-	-	-	-	-	-	-
pH, field	s.u.	-	9.54	6.93	5.72	6.52	7.15	7.15	6.57	6.57	5.23	5.23	-
Temperature, field	Deg C	-	9.6	11.6	14.9	6.8	13.7	13.7	7.52	7.52	8.4	8.4	-
Turbidity, field	NTU	-	0	-	-	266	852	-	-5	-5	-5	-5	-
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	12500	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	ND(2500)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	12400	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	36900	4400	2010	990	1770	1640	2470 J	610 J	4700	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-05	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011510-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-006
Sample Date:			1/15/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***	***TLP***[1]										
Petroleum hydrocarbons F4 gravimetric - silica gel (SHR)	µg/L	-	104000	13800	4500	-	4500	4100	6300	-	10300	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	49300	4400	2630	550	2370	2200	3190 J	610 J	4700	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-	-	-	-	-
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	0.27	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	0.24	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	0.25	0.141	0.023	0.100	0.151	0.074	0.069	-	-
Benz(a)anthracene	µg/L	-	-	0.90	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.848	0.529	0.0435	0.244 J	0.470 J	0.234	0.218	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.54	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.35	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.88	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.64	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.51	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.75	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.41	-	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-003	GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TB-002	GW-45804-022713-TB-004	GW-45804-052213-TB-013	GW-45804-080713-TB-004	GW-45804-111413-TB-011
Sample Date:		5/14/2012	5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013
		Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***										
Metals											
Aluminum (dissolved)	mg/L	-	-	-	ND(0.10)	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	ND(0.050)	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	0.0019	0.0012	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	0.15	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.067	0.064	-	ND(0.50)	0.073	0.057	0.055	0.064	0.074	0.080
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.000090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	-	-	-	282	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	0.0015	-	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0008	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	ND(0.0050)	0.00033	0.00063	0.00055	0.00121	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.88	5.85	-	5.55	5.70	7.31	7.34	7.47	4.73	5.00
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	92.0	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.88	3.85	-	3.40	4.27	4.40	4.65	4.29	3.45	3.38
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0093	0.0094	-	0.014	0.0158	0.0110	0.0109	0.0163	0.0103	0.0102
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	-	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	ND(0.50)	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	19	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	ND(0.0040)	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	10	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.0010)	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	101	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	3.31	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	ND(0.0030)	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	ND(0.020)	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	ND(0.10)	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	ND(0.050)	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.0060	ND(0.0030)	-	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	ND(0.040)	-	-	-	-	-	-
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	488	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	ND(10)	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	ND(10)	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	442	436	-	490	525	488	494	483	495	596
Ammonia-N	mg/L	10.1	10.0	-	8.95	3.35	12.1	12.8	10.3	15.3	18.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	30	25	-	44	59	57	58	38	55	55
Chloride	mg/L	116	116	-	176	143	149	149	320	144	149
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	-	106	57.4	52.1 J	55.0	46.4	29.0	86.5	130
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	9.4	-	8.1	8.3	12.1	11.1	8.3	9.5	8.8
Escherichia coli	cfu/100mL	-	-	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0
Fecal coliform bacteria	cfu/100mL	-	-	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.010)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.010)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.58	7.58	-	7.75	7.57	7.54	7.66	7.58	7.41	7.51
Phenol	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0012
Phosphorus	mg/L	0.580	0.408	-	0.651	0.188	0.474	0.628	0.332	0.148	0.404
Sulfate	mg/L	-	-	-	-	424	872	872	581	773	630
Total coliform bacteria	cfu/100mL	-	-	ND(10)	0	2	ND(2)	2	100	10	ND(10)
Total dissolved solids (TDS)	mg/L	1720	1710	-	1740	1430	2030	2020	1510	1920	1760
Total kjeldahl nitrogen (TKN)	mg/L	11.8	12.2	-	10.2	3.98	13.5	14.1	10.8	16.8	20.3
Total suspended solids (TSS)	mg/L	380	246	-	304	88.0	700 J	1400 J	650	16.4	390
Turbidity	NTU	-	-	26.0	29.0	6.90 J	39.0 J	20.7 J	19.2	28.0	50.0
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity, field	mS/cm	2.45	-	3.06	2.21	1.94	2.85	-	2.84	2.54	2.55
Dissolved oxygen (DO), field	mg/L	-	-	-	5.69	3.04	5.71	-	5.71	5.69	7.15
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-87	-	-	-87	-101	-
pH, field	s.u.	8.26	-	8.17	7.87	8.37	7.31	7.31	5.75	8.55	5.24
Temperature, field	Deg C	10.23	-	10.17	16.54	14.8	7.8	7.8	11.5	17.4	13.3
Turbidity, field	NTU	-	-	-	463	199	939	-	618	2.2	243
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	-	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270
Petroleum hydrocarbons F4 (C34-C50)	ug/L	660	640	-	1600	510	ND(420)	ND(250)	730	ND(250)	1010

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-003	GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-005	GW-45804-022713-TB-002	GW-45804-022713-TB-004	GW-45804-052213-TB-013	GW-45804-080713-TB-004	GW-45804-111413-TB-011
Sample Date:		5/14/2012	5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013
		Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***										
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	ND(2500)	2700	-	4400	ND(2500)	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	-	ND(100)	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	690	840	-	2140	510	ND(420)	ND(250)	990	ND(250)	1280
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	-	-	-	-	-
Semi-Volatiles											
1+2-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	ug/L	-	-	-	ND(0.20)	NO(0.020)	-	-	ND(0.027)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	ND(0.28)	-	-	-	-	-	-
2-Methylnaphthalene	ug/L	-	-	-	ND(0.20)	NO(0.020)	-	-	ND(0.020)	-	-
Acenaphthene	ug/L	-	-	-	0.26	0.096	-	-	0.142	-	-
Acenaphthylene	ug/L	-	-	-	0.23	0.086	-	-	0.162	-	-
Acridine	ug/L	-	-	-	-	-	-	-	ND(4.0)	-	-
Anthracene	ug/L	ND(0.020)	0.023	-	ND(0.20)	0.060	ND(0.20)	ND(0.20)	0.049	ND(0.020)	0.023
Benzo(a)anthracene	ug/L	-	-	-	0.31	0.220	-	-	0.181	-	-
Benzo(a)pyrene	ug/L	0.0225 J	0.0282 J	-	0.28	0.137	0.11 J	0.31 J	0.159	ND(0.0050)	0.0634
Benzo(b)fluoranthene	ug/L	-	-	-	0.33	0.184	-	-	0.199	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	ug/L	-	-	-	-	-	-	-	ND(0.040)	-	-
Benzo(ghi)perylene	ug/L	-	-	-	0.23	0.117	-	-	0.113	-	-
Benzo(k)fluoranthene	ug/L	-	-	-	0.20	0.162	-	-	0.167	-	-
Carcinogenic potency equivalent	ug/L	-	-	-	-	-	-	-	0.257	-	-
Chrysene	ug/L	-	-	-	0.35	0.226	-	-	0.196	-	-
Dibenz[a,h]anthracene	ug/L	-	-	-	ND(0.20)	0.038	-	-	0.029	-	-
Fluoranthene	ug/L	-	-	-	1.02	0.548	-	-	0.525	-	-
Fluorene	ug/L	-	-	-	ND(0.20)	0.084	-	-	ND(0.13)	-	-
Indeno[1,2,3-cd]pyrene	ug/L	-	-	-	ND(0.20)	0.120	-	-	0.117	-	-
Naphthalene	ug/L	-	-	-	ND(0.20)	NO(0.020)	-	-	0.024 J	-	-
Phenanthrene	ug/L	-	-	-	0.29	0.153	-	-	0.132	-	-
Pyrene	ug/L	-	-	-	0.85	0.490	-	-	0.458	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-02	MW5-09	MW5-05	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID.		GW-45804-042114-TS-008	GW-45804-052014-MS-012	GW-45804-053014-MS-012	GW-45804-062114-TS-008	GW-45804-112814-TS-015	GW-45804-040215-TS-007	GW 45804-052815-TS-004	GW-45804-081215-TS-008	GW-45804-111015-TS-007
Sample Date.		4/21/2014	5/20/2014	5/30/2014	6/21/2014	11/26/2014	4/8/2015	6/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Antimony (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	-	--	--	--	--
Beryllium (dissolved)	mg/L	-	-	-	-	-	--	--	--	--
Bismuth (dissolved)	mg/L	-	-	-	-	-	--	--	--	--
Boron (dissolved)	mg/L	ND(0.050)	0.065	-	0.036	0.066	ND(0.10)	ND(0.10)	0.10	0.12
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	ND(0.000010)	ND(0.000010)	ND(0.000090)	ND(0.000060)	ND(0.000010)	ND(0.000010)
Calcium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	6.73	6.53	-	4.66	7.52	14.5	7.65	10.9	4.86
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Manganese (dissolved)	mg/L	3.08	3.26	-	2.92	2.45	5.33	3.60	3.86	2.94
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0061	0.0066	-	0.0144	0.0339	0.0156	0.0071	0.0204	0.00889
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	-	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Potassium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Selenium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Silicon (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Silver (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Sodium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Strontium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Thallium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Tin (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Titanium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Tungsten (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Uranium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Vanadium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.020)	ND(0.030)	ND(0.010)	ND(0.010)
Zirconium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	--	--	-	--
Alkalinity, carbonate	mg/L	-	-	-	-	-	--	--	-	--
Alkalinity, hydroxide	mg/L	-	-	-	-	-	--	--	-	--
Alkalinity, total (as CaCO3)	mg/L	660	-	742 J	573 J	445	446	517	596	506
Ammonia-N	mg/L	36.4	30.4	-	26.0 J	6.91	33.1	33.7	51.2	24.8
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	-	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(43)	49	-	34 J	33	65	34	45	32
Chloride	mg/L	209	-	231 J	207 J	244	1160	174	693	165
Color (apparent)	color unit	163 J	-	269 J	102 J	101	-	-	-	-
Color (apparent)	TCU	-	-	-	-	-	74.4	34.2	161	151
Conductivity	umho/cm	-	-	-	-	-	--	--	-	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.5	7.1	-	8.4 J	9.2	5.4	7.7	8.5	7.8
Escherichia coli	cfu/100mL	0	0	-	0 J	0	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	-	1 J	0	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	-	-	-	-	-	--	--	-	--
pH, lab	s.u.	7.31	-	7.52 J	7.43 J	7.45	7.37	7.75	7.51	7.62
Phenol	mg/L	0.0076	0.0011	-	0.0011 J	0.0010	ND(0.0015)	0.0036	ND(0.00022)	0.00016
Phosphorus	mg/L	0.183	0.198	-	0.169 J	0.105	0.912	0.355	0.131	0.133
Sulfate	mg/L	297	-	421 J	411 J	172	227	980	505	675
Total coliform bacteria	cfu/100mL	0	0	-	2 J	0	96	ND(100)	100	0
Total dissolved solids (TDS)	mg/L	1480	-	1640 J	1420 J	1130	2470	1580	2300	1710
Total kjeldahl nitrogen (TKN)	mg/L	26.9	26.0	-	25.9 J	9.21	9.19	37.8	26.3	26.3
Total suspended solids (TSS)	mg/L	21.5	-	17.6 J	9.6 J	20.8	1020	530	25.3	10.6
Turbidity	NTU	87.0	51.0	-	46.7 J	11.6	43.0	47.0	130	63.3
Un-ionized ammonia	mg/L	-	-	-	-	-	0.0307	0.203	0.292	0.923
Field Parameters										
Conductivity, field	mS/cm	2.57	2.86	2.86	2.57	1.107	2.879	2.49	2.84	2.54
Dissolved oxygen (DO), field	mg/L	4.86	0	0	1.06	3.93	--	--	6.44	0.1
Oxidation reduction potential (ORP), field	millivolts	-132	-168	-140	-139	-53	--	--	-125	-144
pH, field	s.u.	7.15 D 7.15	7.31	7.4	8.53	6.92	7.36	7.39	7.35	8.06
Temperature, field	Deg C	9.9 D 9.86	9.44	9.5	19.99	10.56	3.89	11.54	22.72	15.28
Turbidity, field	NTU	22.9	5.7	52.2	44	-	--	294	173	4.3
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	ug/L	120	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	--	-	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	510	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	500	--	-	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	1500	530	ND(250)	ND(250)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-02	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-042114-TB-008	GW-45804-052014-MB-012	GW-45804-053014-MB-012	GW-45804-082114-TB-008	GW-45804-112814-TB-015	GW-45804-060215-TB-007	GW 45804-053015-TB-004	GW-45804-081215-TB-008	GW-45804 111015-TB-007	
Sample Date:		4/21/2014	5/20/2014	5/30/2014	8/21/2014	11/28/2014	6/8/2015	5/25/2015	8/12/2015	11/10/2015	
		Original	Original	Original	Original	Original	Original	Original	Original	Original	
Parameters:	***Units***										
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	-	-	-	-	-	--	--	-	--	
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	--	--	-	ND(100)	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	-	-	-	--	--	-	--	
Total Petroleum Hydrocarbons (C6-C50)	ug/L	ND(380)	ND(380)	-	ND(350) J	ND(350)	2010	530	ND(380)	ND(380)	
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	--	--	--	ND(250)	
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	--	--	--	ND(250)	
Semi-Volatiles											
1+2-Methylnaphthalene	ug/L	-	-	-	-	-	--	--	--	--	
1-Methylnaphthalene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	-	-	--	--	-	--	
2-Methylnaphthalene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Acenaphthene	ug/L	0.184	--	-	-	--	--	--	-	--	
Acenaphthylene	ug/L	ND(0.197)	--	-	-	--	--	--	-	--	
Acridine	ug/L	ND(4.0)	-	-	-	-	--	--	-	--	
Anthracene	ug/L	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.20)	0.047	ND(0.020)	ND(0.020)	
Benzo(a)anthracene	ug/L	ND(0.020)	-	-	--	-	--	--	--	--	
Benzo(a)pyrene	ug/L	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.0050)	ND(0.0050)	
Benzo(b)fluoranthene	ug/L	ND(0.020)	-	-	--	-	--	--	--	--	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	--	-	--	--	-	--	
Benzo(b)pyridine (Quinoline)	ug/L	ND(0.040)	-	-	-	-	--	--	-	--	
Benzo(g,h,i)perylene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Benzo(k)fluoranthene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Carcinogenic potency equivalent	ug/L	ND(0.050)	--	-	-	--	--	--	-	--	
Chrysene	ug/L	ND(0.020)	--	-	-	--	--	--	-	--	
Dibenz(a,h)anthracene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Fluoranthene	ug/L	0.121	-	-	-	-	--	--	-	--	
Fluorene	ug/L	0.043	-	-	-	-	--	--	-	--	
Indeno(1,2,3-cd)pyrene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Naphthalene	ug/L	ND(0.050)	-	-	-	-	--	--	-	--	
Phenanthrene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--	
Pyrene	ug/L	0.079	-	-	-	-	--	--	-	--	

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-008	GW-45804-110210-YS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-006	GW-45804-081611-TB-004	GW-45804-111011-TB-005
Sample Date:		1/14/2016	5/18/2016	8/19/2016	11/2/2016	2/15/2011	5/17/2011	8/16/2011	11/10/2011
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Metals									
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0032	0.0098	0.0101	0.0196	ND(0.010)	0.0026
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.058	ND(0.050)	0.179	0.252	ND(0.050)	0.058	2.89	0.151
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	98.1	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.462	0.570	0.858	1.81	0.797	1.50	1.66	1.11
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	0.0033	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.190	0.0074	0.0256	ND(0.0030)	ND(0.0050)	ND(0.0030)	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	175	631	442	510	466	583	452	477
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1	15.8	23.0
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	6.5	40.6	2.5	12.6
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-
Chloride	mg/L	29.7	38.8	93.4	166	63.7	82.1	67.6	74.1
Color (apparent)	TCU	6.1	161	53.2	187	239	102	114	17.0
Conductivity	umho/cm	1930	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	286	9.0	99.0	16.7	25.9	9.3	7.7
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2
Fecal coliform bacteria	cfu/100mL	0	50	80	5000	80	160	20	10
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-
Petroleum Products	s.u.	7.90	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-
Phosphorus	mg/L	ND(0.050)	0.672	0.751	0.319	0.439	0.570	0.127	0.134
Sulfide	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	80	360	16000	13700	1510	290	210
Total dissolved solids (TDS)	mg/L	1720	1990	1700	1640	1330	2290	1660	1610
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-
Turbidity	NTU	1.06	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0545	0.0623	0.0355
Field Parameters									
Conductivity, field	mS/cm	3.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	-	-	0	2.46
Oxidation reduction potential (ORP), field	millivolts	23	-341	-368	-292	-333	-	-279	-238
pH, field	s.u.	6.40	7.51	6.18	6.79	6.47	6.26	6.86	6.97
Temperature, field	Deg C	4.8	14.07	22.3	17.3	11.0	15.99	21.7	17.5
Turbidity, field	NTU	185	-	-	-	-	-	188	15.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-008	GW-45804-110210-YS-004	GW-45804-021511-MB-004	ISW-45804-051711-MMD-006	GW-45804-081811-TB-004	ISW-45804-111011-TB-005
Sample Date:		1/14/2016	5/18/2016	8/19/2016	11/2/2016	2/15/2011	5/17/2011	8/16/2011	11/10/2011
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***						
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	ND(0.10)	-
Antimony (dissolved)	mg/L	-	-	-	-	ND(0.050)	-
Arsenic (dissolved)	mg/L	0.0073	-	-	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	-	-	-	-	0.11	-
Beryllium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Bismuth (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Boron (dissolved)	mg/L	ND(0.050)	-	-	0.084	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	ND(0.00010)	-	-	ND(0.00010)	ND(0.00080)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	292	-
Chromium (dissolved)	mg/L	0.0026	-	-	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00080	-	-	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	-	-	1.45	ND(0.30)	3.24
Lead (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	88.9	-
Manganese (dissolved)	mg/L	0.535	-	-	1.21	1.12	1.17
Mercury (dissolved)	mg/L	ND(0.00010)	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0021	-	-	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	0.0041	-	-	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	ND(0.50)	-
Potassium (dissolved)	mg/L	-	-	-	-	24	-
Selenium (dissolved)	mg/L	-	-	-	-	ND(0.0040)	-
Silicon (dissolved)	mg/L	-	-	-	-	ND(10)	-
Silver (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-
Sodium (dissolved)	mg/L	-	-	-	-	54.2	-
Strontium (dissolved)	mg/L	-	-	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	-	-	ND(0.0020)	-
Tin (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Titanium (dissolved)	mg/L	-	-	-	-	ND(0.020)	-
Tungsten (dissolved)	mg/L	-	-	-	-	ND(0.10)	-
Uranium (dissolved)	mg/L	-	-	-	-	ND(0.050)	-
Vanadium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Zinc (dissolved)	mg/L	ND(0.0030)	-	-	0.0052	ND(0.030)	ND(0.0050)
Zirconium (dissolved)	mg/L	-	-	-	-	ND(0.040)	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	442	-
Alkalinity, carbonate	mg/L	-	-	-	-	ND(10)	-
Alkalinity, hydroxide	mg/L	-	-	-	-	ND(10)	-
Alkalinity, total (as CaCO3)	mg/L	364	286	285	264	445	466
Ammonia-N	mg/L	98.9	10.6	10.6	7.89	108	30.4
Biochemical oxygen demand (carbonaceous)	mg/L	149	ND(2.8)	ND(2.8)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	524	-	-	11	42	114
Chloride	mg/L	-	92.9	95.9	106	87.3	157
Color (apparent)	TCU	310	61.2	48.9	60.4	34.4	169
Conductivity	umhos/cm	-	1810	1820	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	104	5.6	7.3	6.2	8.7	38.0
Escherichia coli	cfu/100mL	2870	28	41	1	30	19
Fecal coliform bacteria	cfu/100mL	150000	100 J	400 J	1	125	20
Nitrate (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	ND(2.0)	-	-	ND(0.20)	-	-
Petroleum Products	s.u.	7.95	7.37	7.74	7.37	7.75	7.82
Phenol	mg/L	0.0990	-	-	ND(0.0010)	0.0030	0.0260
Phosphorus	mg/L	1.36	0.150	0.143	0.079	0.310	0.138
Sulfide	mg/L	-	-	-	-	-	1060
Total coliform bacteria	cfu/100mL	98000	98000	98000	21	190	110
Total dissolved solids (TDS)	mg/L	1180	1560	1570	1530	1790	2240
Total kjeldahl nitrogen (TKN)	mg/L	127	-	-	9.54	110	40.6
Total suspended solids (TSS)	mg/L	10.0	-	-	6.8	7.2	17.0
Turbidity	NTU	200	7.00	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	-	0.000764	0.000763	-	-	0.668
Field Parameters							
Conductivity, field	mS/cm	2.52	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	-	-	-	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	-	-	-	123	-271	-546
pH, field	s.u.	8.9	8.39	8.39	8.6	8.2	7.70
Temperature, field	Deg C	11.87	13.3	13.3	15.79	24.2	16.5
Turbidity, field	NTU	59.3	169	169	52.3	4.3	9
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	49	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	110	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	110	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***						
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.026)	-
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.026)	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-
Anthracene	µg/L	ND(0.020)	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.010)	-	-	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Chrysene	µg/L	-	-	-	-	ND(0.020)	-
Dibenzo(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	ND(0.053)	-
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-WS-016
Sample Date:			5/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]						
Metals								
Arsenic (dissolved)	mg/L	-	0.0045	0.0025	0.0012	0.0063	ND(0.0010)	0.0019
Boron (dissolved)	mg/L	-	0.076	0.115	0.158	0.150	0.151	0.112
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	0.00027	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00227	0.00095	ND(0.00050)	0.00351	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0028	ND(0.0010)	0.0022	ND(0.0010)
Iron (dissolved)	mg/L	48.5	34.5	4.66	ND(0.050)	12.8	ND(0.050)	0.298
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	2.24	1.21	0.179	0.711	0.0299	0.530
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0543	0.0196	0.0177	0.0270	0.0150	0.0239
Nickel (dissolved)	mg/L	-	0.0030	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030
Zinc (dissolved)	mg/L	-	0.0095	0.0146	0.0074	0.0063	ND(0.0030)	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	633	362	484	409	987	476	480
Ammonia-N	mg/L	4.0	6.98	11.8	9.32	13.7	22.1	34.9
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2
Chemical oxygen demand (COD)	mg/L	-	74	27	30	55	ND(41)	14
Chloride	mg/L	-	157	141	135	164	194	140
Color (apparent)	color unit	-	-	-	-	-	16.8 J	15.9
Color (apparent)	TCU	-	76.5	29.9 J	8.2	121	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	14.8	ND(7.8)	5.8	13.0	5.4	3.6
Escherichia coli	cfu/100mL	25.6	ND(2)	ND(2)	ND(2)	ND(2)	50	0
Fecal coliform bacteria	cfu/100mL	-	ND(2) J	ND(2)	2	ND(2)	50	0
Nitrate (as N)	mg/L	1.5	0.21	5.82	2.15	0.18	0.64	0.54
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.26	7.82	7.30	7.37	7.23	7.42
Phenol	mg/L	-	ND(0.0010)	ND(0.0080)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)
Phosphorus	mg/L	7.2	0.097	0.318	ND(0.030)	1.13	ND(0.030)	0.092
Sulfate	mg/L	-	1060	797	907	969	887	934
Total coliform bacteria	cfu/100mL	-	2	30	300	200	4200	50
Total dissolved solids (TDS)	mg/L	-	2160	1860	1860	1910	2040	1840
Total Kjeldahl nitrogen (TKN)	mg/L	-	11.4	13.5	9.62	14.3	23.0	31.9
Total suspended solids (TSS)	mg/L	-	153	386	10.0	226	6.8	3.6
Turbidity	NTU	-	386	22.0	0.71	65.3	13.8	0.95
Un-ionized ammonia	mg/L	-	0.00228	0.00241	0.00211	0.00858	0.0486	0.152
Field Parameters								
Conductivity, field	mS/cm	-	2.89	2.62	2.37	2.67	3.09	2.82
Dissolved oxygen (DO), field	mg/L	-	3.22	2.93	3.73	8.15	3.7	0.61
Oxidation reduction potential (ORP), field	millivolts	-	-73	-	38	-	59	-52
pH, field	s.u.	-	6.32	5.74	5.80	6.26	7.0 7.00	7.06
Temperature, field	Deg C	-	5.4	18.5	22.32 D 22.3	15.5	8.31 D 8.3	17.67
Turbidity, field	NTU	-	329	97.5	24	73.9	38.6	37.5
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	360	ND(250)	2130	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	350	ND(250)	2110	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	920	ND(250)	7090	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	51400	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	1280	ND(250)	9210	ND(380)	ND(399)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-050513-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-WS-010
Sample Date:			5/5/2015	5/23/2013	8/7/2015	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]						
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	0.048	0.59	ND(0.020)	0.67	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	0.097	1.26	0.0179	1.74	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)quinoline (Quinoline)	µg/L	-	-	-	-	-	ND(0.540)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.090)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-005	GW-45804-052515-TS-007	GW-45504-081315-TS-008	GW-45804-110915-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015	11/9/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	0.0136	0.0146	0.0067	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.161	0.157	0.079	ND(0.10)	0.13	0.17	0.12
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00186	0.00174	0.00095	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	4.76	4.85	10.7	11.6	ND(0.50)	1.23	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	1.18	1.23	1.62	2.02	0.888	1.41	0.0538
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000014	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0263	0.0281	0.0161	0.0090	0.0071	0.0135	0.0148
Nickel (dissolved)	mg/L	0.0045	0.0050	ND(0.0020)	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0052	0.0111	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	507 J	519 J	485	434	307	451	367
Ammonia-N	mg/L	25.9 J	25.7 J	19.8	16.2	ND(0.450)	11.3	1.38
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	33 J	32 J	26	41	18	25	15
Chloride	mg/L	114 J	115 J	111	133	137	185	136
Color (apparent)	color unit	39.4 J	35.6 J	101	--	--	--	--
Color (apparent)	TCU	--	--	--	127	9.4	76.7	8.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.8 J	5.8 J	6.7	5.1	4.3	6.3	5.0
Escherichia coli	ctu/100mL	0 J	0 J	0	ND(2)	0	0	0
Fecal coliform bacteria	ctu/100mL	0 J	0 J	0	ND(2)	0	0	0
Nitrate (as N)	mg/L	0.31 J	0.34 J	ND(0.50)	2.51	11.0	0.17	5.38
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.50)	0.111	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.15 J	7.15 J	7.86	7.64	7.47	7.77	7.28
Phenol	mg/L	ND(0.0096) J	ND(0.0010) J	ND(0.0010)	ND(0.0034)	0.0027	0.0017	ND(0.0010)
Phosphorous	mg/L	0.066 J	0.062 J	0.151	1.47	ND(0.030)	0.046	ND(0.030)
Sulfate	mg/L	592 J	586 J	695	1000	1010	769	705
Total coliform bacteria	ctu/100mL	0 J	0 J	1	4	20	20	15
Total dissolved solids (TDS)	mg/L	1430 J	1410 J	1560	1960	1920	1690	1520
Total kjeldahl nitrogen (TKN)	mg/L	28.1 J	28.0 J	21.7	17.2	0.39	9.49	1.88
Total suspended solids (TSS)	mg/L	15.2 J	10.4 J	230	2630	5.8	26.3	6.4
Turbidity	NTU	21.7 J	16.3 J	43.0	40.1	ND(1.34)	3.88	4.34
Un-ionized ammonia	mg/L	1.50 J	1.49 J	0.668	0.665	0.00109	0.164	0.0147
Field Parameters								
Conductivity, field	mS/cm	2.46	2.46	1.4	1.661	2.51	2.65	2.13
Dissolved oxygen (DO), field	mg/L	0.36	0.36	4.14	--	2.12	1.35	0
Oxidation reduction potential (ORP), field	millivolts	-96	-96	-75	--	247	-90	14
pH, field	s.u.	8.02	8.02	7.07	7.46	6.83	7.55	7.56
Temperature, field	Deg C	22.61	22.61	13.19	5.94	16.08	19.45	15.25
Turbidity, field	NTU	16.2	16.2	-	--	0	16.4	4.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250) J	ND(250)	1330	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250) J	ND(250)	1310	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250) J	290	4490	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380) J	ND(380)	5920	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	ND(100)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-005	GW-45804-052515-TS-007	GW-45504-081315-TS-008	GW-45804-110915-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/13/2015	11/9/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***							
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	--	ND(250)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020) J	0.026	0.83	ND(0.020)	0.020	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050) J	0.0063	2.26	0.0072	0.0264	0.0117
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	-	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TB-003	GW-45804-051810-MB-002	GW-45804-051810-MMD-004	GW-45804-110210-TB-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:			1/13/2010	5/18/2010	5/18/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	***Units***	***TLP***[1]								
Metals										
Aluminum (dissolved)	mg/L	..	-	-	-	..	-	-	-	-
Antimony (dissolved)	mg/L	..	-	-	-	..	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	..	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Boron (dissolved)	mg/L	-	-	-	-	..	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	.	-	-	-	.	-	-	-	.
Copper (dissolved)	mg/L	.	-	-	-	-	-	-	-	.
Iron (dissolved)	mg/L	48.3	10.0	6.20	17.3	15.9	24.0	24.7	10.5	10.4
Lead (dissolved)	mg/L	..	-	-	-	..	-	-	-	-
Magnesium (dissolved)	mg/L	-	77.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.41	1.95	2.06	214	3.30	3.30	4.01	4.02
Mercury (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Molybdenum (dissolved)	mg/L	-	0.037	0.059	0.058	0.055	0.026	0.024	0.0249	0.0252
Nickel (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	.	-	-	-	.	-	-	-	.
Silver (dissolved)	mg/L	..	-	-	-	..	-	-	-	-
Sodium (dissolved)	mg/L	..	-	-	-	..	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	..	-	-
vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	.	-	-	-	.	-	-	-	.
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	530	230	444	428	696	710	277	261
Ammonia-N	mg/L	4.0	0.952	1.12	1.82	0.823	0.991	0.832	0.995	1.06
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.0	ND(2.0)	ND(2.0)	ND(2.0)	2.5	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	58.1	106	58.1	71.8	78.7	78.5	107	105
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	36.8	51.3	312	36.2	87.4	58.5	39.3	19.1
Conductivity	umhos/cm	-	1800	-	-	-	-	..	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.4	7.7	13.0	10.8	14.9	15.2	10.5	10.6
Escherichia coli	cfu/100mL	25.5	0	0	0	ND(2)	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	1	0	0	ND(2)	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	..	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	7.77	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	1.36	4.30	1.94	2.81	0.628	0.701	1.09	0.400
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	2	0	30	10	0	0	1	1
Total dissolved solids (TDS)	mg/L	-	1340	1260	1350	1260	1190	1200	1820	1890
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	.	-	-	-	.	-	-	-	.
Turbidity	NTU	.	4.99	-	-	.	-	-	-	.
Un-ionized Ammonia	mg/L	..	0.000325	0.00324	0.00102	0.000267	0.000218	0.000195	0.0000310	0.000103
Field Parameters										
Conductivity, field	mS/cm	-	2.3	1.87	1.54	2.07	2.35	2.35	2.79	2.79
Dissolved oxygen (DO), field	mg/L	-	-	-	-	3	-	..	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-125	-130	-130	-	-
pH, field	s.u.	-	6.22	7.11	6.09	5.99	6.20	6.20	5.73	5.73
Temperature, field	Deg C	-	8.8	9.9	19.3	15.0	4.7	4.7	7.21	7.21
Turbidity, field	NTU	-	-5	-	-	-	-	-	427	427
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	..	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	14300	13900	3120	1860	630	1800	4200	ND(2500)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TB-003	GW-45804-051810-MB-002	GW-45804-081610-MMD-004	GW-45804-110210-TB-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:			1/13/2010	5/18/2010	8/16/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	***Units***	***TLP***[1]								
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	46900	52900	8800	5900	-	5800	12300	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	17600	16800	3670	2340	630	2270	4200	ND(2500)
Total Petroleum Hydrocarbons (C18-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	ND(0.26)	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.20)	ND(0.20)	0.098	0.031	0.069	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	0.44	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.509	0.082	0.252	0.113	0.232	0.0141	0.0021
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.39	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.48	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.42	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.59	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.41	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.36	-	-	-	-	-	-
Naphthalene	µg/L	-	-	0.22	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.91	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.32	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TB-003	GW-45804-110911-TB-008	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	***Units***								
Metals									
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0067	0.0042	-	-	0.0047	-	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	ND(0.050)	-	-	0.056	-	-
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)	-	-
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Cobalt (dissolved)	mg/L	-	-	ND(0.00050)	-	-	ND(0.00050)	-	-
Copper (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Iron (dissolved)	mg/L	8.84	7.95	10.3	-	-	9.57	-	-
Lead (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.37	2.58	3.73	-	-	3.47	-	-
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	-	-	ND(0.00010)	-	-
Molybdenum (dissolved)	mg/L	0.051	0.0250	0.0119	-	-	0.0168	-	-
Nickel (dissolved)	mg/L	-	-	ND(0.0050)	-	-	ND(0.0020)	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.0030)	ND(0.0060)	-	-	ND(0.0030)	-	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	380	465	511	426	-	384	-	-
Ammonia-N	mg/L	3.17	3.16	4.05	2.58	2.74	3.74	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	5.5	5.2	ND(3.0)	-	3.3	-	-
Chemical oxygen demand (COD)	mg/L	-	-	48	-	-	36	-	-
Chloride	mg/L	141	112	-	173	-	152	-	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	44.4	30.2	43.2	23.3	-	-	158	112
Conductivity	umhos/cm	-	-	-	1950	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	18.5	13.1	11.3	-	11.0	-	-
Escherichia coli	cfu/100mL	0	ND(2)	0	0	0	-	0	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0 J	0	-	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Petroleum Products	mg/L	-	-	ND(1.0)	-	-	-	-	-
pH, lab	s.u.	-	-	7.60	7.08	-	7.59	-	-
Phenol	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Phosphorus	mg/L	0.511	0.710	0.475	0.592	-	0.321	-	-
Sulfide	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	1	2	0	0	0	-	2	4
Total dissolved solids (TDS)	mg/L	1580	1580	1560	1510	-	1620	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	5.55	-	-	5.33	-	-
Total suspended solids (TSS)	mg/L	-	-	485	-	-	567	-	-
Turbidity	NTU	-	-	162	27.0	-	-	59.0 J	23.0 J
Un-ionized Ammonia	mg/L	0.0329	0.0184	-	0.0000556	0.0000580	-	-	-
Field Parameters									
Conductivity, field	mS/cm	2.26	2.39	2.36	2.46	2.45	2.34	2.3	-
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-
pH, field	s.u.	7.34	7.29	5.9	5.09	5.09	6.46	6.29	-
Temperature, field	Deg C	19.9	13.7	4.65	6.8	8.8	10.77	11.08	-
Turbidity, field	NTU	-	661	-5	-5	-5	-	-	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	ND(25)	ND(100)	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	290	ND(250)	ND(250)	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	ND(250)	290	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	ug/L	520	1130	450	690	-	ND(250)	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TB-003	GW-45804-110911-TB-008	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	***Units***								
Petroleum Hydrocarbons F4 gravimetric - silica gell (GHH)	ug/L	-	3400	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	520	1420	450	880	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-
Acenaphthene	ug/L	-	-	-	-	-	-	-	-
Acenaphthylene	ug/L	-	-	-	-	-	-	-	-
Acridine	ug/L	-	-	-	-	-	-	-	-
Anthracene	ug/L	0.033	0.021	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	ug/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	ug/L	0.135	0.0923	0.014	-	-	0.0299	-	-
Benzo(b)fluoranthene	ug/L	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	ug/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	-	-	-	-	-	-	-	-
Benzo(j)fluoranthene	ug/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	ug/L	-	-	-	-	-	-	-	-
Chrysene	ug/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L	-	-	-	-	-	-	-	-
Fluoranthene	ug/L	-	-	-	-	-	-	-	-
Fluorene	ug/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	-	-	-	-	-
Naphthalene	ug/L	-	-	-	-	-	-	-	-
Phenanthrene	ug/L	-	-	-	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-05-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005	GW-45804-022713-TB-001	GW-45804-052315-TB-014	GW-45804-052315-TB-015	GW-45804-082713-TB-003
Sample Date:		5/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/27/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***								
Metals									
Aluminum (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Antimony (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.00aa	0.0044	0.0020	0.0035	0.0034	0.0071
Barium (dissolved)	mg/L	0.13	0.13	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Boron (dissolved)	mg/L	ND(0.50)	ND(0.50)	0.068	0.065	ND(0.050)	0.059	0.057	0.076
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	282	273	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00087	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.33	8.05	5.48	4.85	9.39	8.87	8.75	5.33
Lead (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	70.1	68.8	-	-	-	-	-	-
Manganese (dissolved)	mg/L	2.83	2.75	1.99	2.10	4.08	4.27	4.50	3.20
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.024	0.024	0.0115	0.0127	0.0085	0.0130	0.0130	0.0191
Nickel (dissolved)	mg/L	ND(0.020)	ND(0.020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	ND(0.50)	ND(0.50)	-	-	-	-	-	-
Potassium (dissolved)	mg/L	28	29	-	-	-	-	-	-
Selenium (dissolved)	mg/L	ND(0.0040)	ND(0.0040)	-	-	-	-	-	-
Silicon (dissolved)	mg/L	15	15	-	-	-	-	-	-
Silver (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	-	-	-	-	-
Sodium (dissolved)	mg/L	79.1	78.5	-	-	-	-	-	-
Strontium (dissolved)	mg/L	2.74	2.60	-	-	-	-	-	-
Thallium (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	-	-	-	-	-
Tin (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Titanium (dissolved)	mg/L	ND(0.020)	ND(0.020)	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Uranium (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0044	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	ND(0.040)	ND(0.040)	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	562	555	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	567	560	535	528	476	502	491	447
Ammonia-N	mg/L	4.82	5.22	4.95	5.77	3.68	4.49	4.35	7.02
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	3.9 J	8.6 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	53	51	42 J	55 J	63	48	44	36 J
Chloride	mg/L	119	119	120	115	184	180	195	148
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	184	66.6	65.6 J	79.5 J	22.6	34.0	33.7	126
Conductivity	umhos/cm	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	10.2	11.7	12.0	17.6	15.8	16.5	13.9
Escherichia coli	cfu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.96	8.00	7.83	7.63	7.61	7.70	7.67	7.49
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0030	0.0030	ND(0.0010)
Phosphorus	mg/L	0.756	0.527	0.564	0.716	0.882	0.726	0.703	0.093
Sulfate	mg/L	-	-	435	430	587	622	589	662
Total coliform bacteria	cfu/100mL	0	0	20 J	ND(2) J	ND(2)	ND(100)	ND(100)	10
Total dissolved solids (TDS)	mg/L	1430	1410	1370	1360	1660	1650	1640	1780
Total kjeldahl nitrogen (TKN)	mg/L	8.61	8.74	8.21	8.74	5.26	5.52	5.98	6.98
Total suspended solids (TSS)	mg/L	484	594	466	773	2680	846	748	25.8
Turbidity	NTU	54.9	30.6	9.30 J	5.79 J	32.0	20.5 J	40.0 J	34.0
Un-ionized Ammonia	mg/L	-	-	0.0917	0.0883	0.0088	0.00156	0.00151	0.0151
Field Parameters									
Conductivity, field	mS/cm	1.82	-	2.29	-	2.47	-	2.38	2.32
Dissolved oxygen (DO), field	mg/L	8.1	-	8.24	-	8.86	-	5.54	5.45
Oxidation reduction potential (ORP), field	millivolts	-	-	-132	-	-	-	-131	-119
pH, field	s.u.	7.7	-	7.75	7.75	7.76	6.11	6.01	6.53
Temperature, field	Deg C	18.2a	-	15.1	15.1	6.8	12.3	12.3	20.7
Turbidity, field	NTU	8.92	-	840	-	-5	-	-5	0
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(25)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	480	520	630 J	ND(250) J	ND(630)	490	420	ND(250)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005	GW-45804-022713-TB-001	GW-45804-052315-TB-014	GW-45804-052315-TB-015	GW-45804-082713-TB-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***								
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	2500	ND(2500)	3000	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	460	520	630 J	ND(250) J	ND(630)	490	420	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.26)	ND(0.28)	ND(0.026)	ND(0.026)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	ND(4.0)	-
Anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.20)	ND(0.20)	0.036	0.037	-	0.033	0.022	-
Benzo(a)pyrene	µg/L	ND(0.10)	ND(0.10)	0.049	0.042	ND(0.10)	0.0342	0.0252	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.049	0.046	-	0.047	0.035	-
Benzo(b+j)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(h)quinoline (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	ND(0.20)	ND(0.20)	0.051	0.071	-	0.054	0.044	-
Benzo(k)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.033	0.034	-	0.026	0.024	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	ND(0.060)	-
Chrysene	µg/L	ND(0.20)	ND(0.20)	0.046	0.053	-	0.041	0.031	-
Dibenz(a,h)anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	ND(0.20)	0.34	0.129	0.145	-	0.104 J	0.080 J	-
Fluorene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	0.021	-	ND(0.13)	ND(0.097)	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.20)	ND(0.20)	0.025	0.032	-	0.029	0.024	-
Naphthalene	µg/L	ND(0.20)	ND(0.20)	0.034	0.034	-	0.026 J	0.023 J	-
Phenanthrene	µg/L	ND(0.20)	ND(0.20)	0.072 J	0.094 J	-	0.052	0.056	-
Pyrene	µg/L	ND(0.20)	0.36	0.154	0.178	-	0.131	0.101	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-46804-080713-TS-008	GW-46804-111418-TS-010	GW-46804-042114-TS-007	GW-46804-053014-MB-013	GW-46804-082114-TS-007	GW-46804-112814-TS-009	GW-46804-042215-TS-004	GW-46804-052815-TS-005	GW-46804-081215-TS-004	
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original	
Parameters:	***Units***										
Metals											
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Antimony (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Arsenic (dissolved)	mg/L	0.0060	0.0029	0.0012	0.0024	0.0040	0.0017	ND(0.0010)	0.0018	ND(0.00010)	
Barium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Boron (dissolved)	mg/L	0.075	0.067	ND(0.050)	0.075	0.092	0.066	ND(0.050)	0.079	ND(0.010)	
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	
Calcium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Chromium (dissolved)	mg/L	0.0017	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)	
Iron (dissolved)	mg/L	5.90	6.07	5.19	5.62	5.81	5.12	10.7	9.11	ND(0.010)	
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000030)	
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Manganese (dissolved)	mg/L	3.20	3.74	4.90	5.02	3.17	3.31	3.97	4.47	ND(0.00050)	
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	
Molybdenum (dissolved)	mg/L	0.0199	0.0107	0.0049	0.0064	0.0151	0.0083	0.0022	0.0055	ND(0.000050)	
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Potassium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Selenium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Silicon (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Silver (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Sodium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Strontium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Thallium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Tin (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Titanium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Uranium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)	0.0070	ND(0.0030)	ND(0.0030)	0.0019	
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--	--
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	--	--	--	--
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	--	--	--	--
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	446	511	474	475 J	534 J	545	522	489	ND(10)	
Ammonia-N	mg/L	6.93	7.12	5.37	7.80 J	10.4 J	8.37	2.57	5.15	ND(0.050)	
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	2.8	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	149 J	51	ND(58)	163 J	48 J	38	45	41	ND(10)	
Chloride	mg/L	147	143	178	178 J	160 J	126	149	356	ND(0.50)	
Color (apparent)	color unit	-	-	151 J	230 J	82.2 J	159	--	--	--	--
Color (apparent)	TCU	80.0	176	-	-	-	-	54.2	75.0	ND(1.0)	
Conductivity	umho/cm	-	-	-	-	-	-	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.7	11.6	9.6	8.2 J	7.7 J	10.9	7.8	10.7	ND(1.0)	
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0	
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0	
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.020)	
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.010)	
Petroleum Products	mg/L	-	-	-	-	-	-	--	--	--	--
pH, lab	s.u.	7.50	7.81	7.30	7.68 J	7.51 J	7.84	7.71	7.69	7.18	
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J	0.0010 J	ND(0.0010)	ND(0.0029)	0.0027	0.0021	
Phosphorus	mg/L	0.116	0.636	0.046	0.127 J	0.079 J	0.088	0.938	0.073	ND(0.030)	
Sulfate	mg/L	575	546	477	564 J	457 J	425	465	579	ND(0.50)	
Total coliform bacteria	cfu/100mL	10	ND(2)	0	ND(2) J	0 J	0	12	10	1	
Total dissolved solids (TDS)	mg/L	1770	1560	1450	1510 J	1490 J	1360	1410	1600	ND(10)	
Total kjeldahl nitrogen (TKN)	mg/L	7.01	7.89	6.21	7.43 J	9.80 J	9.06	6.49	11.6	ND(0.15)	
Total suspended solids (TSS)	mg/L	23.6	905	24.5	39.0 J	12.0 J	16.4	1480	21.4	ND(2.0)	
Turbidity	NTU	32.0	53.9	11.7	95.0 J	52.2 J	52.6	27.4	96.0	ND(0.10)	
Un-Ionized Ammonia	mg/L	0.0149	0.00316	0.0215	0.0364 J	1.30 J	0.0257	0.0261	0.0477	-	
Field Parameters											
Conductivity, field	mS/cm	-	2.24	2.36	2.39	2.34	0.576	1.245	2.47	0.661	
Dissolved oxygen (DO), field	mg/L	-	9.06	5.89	0	2.02	3.03	--	1.04	0.91	
Oxidation reduction potential (ORP), field	millivolts	-	-	-146	-176	-154	-103	--	-66	-252	
pH, field	s.u.	6.63	8.21	7.34 D 7.34	7.52	8.64	7.14	7.44	7.18	7.59	
Temperature, field	Deg C	20.7	12.5	7.2 D 7.7	10.58	20.31	11.26	4.4	13.32	19.3	
Turbidity, field	NTU	-	64	33.6	30.1	46.1	-	--	0	252	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)	280	ND(250)	ND(250)	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)	260	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1240	ND(250)	ND(250) J	ND(250) J	ND(250)	1390	ND(250)	ND(250)	

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Organworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040215-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1530	ND(380)	ND(380) J	ND(380) J	ND(380)	1540	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--	--	--
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acenaphthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acridine	µg/L	-	-	ND(4.0)	-	-	-	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.056	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	ND(0.050)	-	-	-	--	--	-
Chrysene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Fluorene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Naphthalene	µg/L	-	-	ND(0.050)	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09
Sample ID:		GW 45804-111015-TB-017
Sample Date:		11/10/2015
		Original
Parameters:	***Units***	
Metals		
Aluminum (dissolved)	mg/L	--
Antimony (dissolved)	mg/L	--
Arsenic (dissolved)	mg/L	0.0015
Barium (dissolved)	mg/L	--
Beryllium (dissolved)	mg/L	--
Bismuth (dissolved)	mg/L	--
Boron (dissolved)	mg/L	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)
Calcium (dissolved)	mg/L	--
Chromium (dissolved)	mg/L	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0020)
Iron (dissolved)	mg/L	5.82
Lead (dissolved)	mg/L	ND(0.00050)
Magnesium (dissolved)	mg/L	--
Manganese (dissolved)	mg/L	4.17
Mercury (dissolved)	mg/L	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00540
Nickel (dissolved)	mg/L	ND(0.0050)
Phosphorus (dissolved)	mg/L	--
Potassium (dissolved)	mg/L	--
Selenium (dissolved)	mg/L	--
Silicon (dissolved)	mg/L	--
Silver (dissolved)	mg/L	--
Sodium (dissolved)	mg/L	--
Strontium (dissolved)	mg/L	--
Thallium (dissolved)	mg/L	--
Tin (dissolved)	mg/L	--
Titanium (dissolved)	mg/L	--
Tungsten (dissolved)	mg/L	--
Uranium (dissolved)	mg/L	--
Vanadium (dissolved)	mg/L	--
Zinc (dissolved)	mg/L	ND(0.010)
Zirconium (dissolved)	mg/L	--
General Chemistry		
Alkalinity, bicarbonate	mg/L	--
Alkalinity, carbonate	mg/L	--
Alkalinity, hydroxide	mg/L	--
Alkalinity, total (as CaCO3)	mg/L	469
Ammonia-N	mg/L	3.05
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36
Chloride	mg/L	199
Color (apparent)	color unit	
Color (apparent)	TCU	222
Conductivity	umho/cm	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.5
Escherichia coli	cfu/100mL	0
Fecal coliform bacteria	cfu/100mL	0
Nitrate (as N)	mg/L	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)
Petroleum Products	mg/L	--
pH, lab	s.u.	7.70
Phenol	mg/L	0.0029
Phosphorus	mg/L	0.101
Sulfate	mg/L	680
Total coliform bacteria	cfu/100mL	0
Total dissolved solids (TDS)	mg/L	1690
Total kjeldahl nitrogen (TKN)	mg/L	8.47
Total suspended solids (TSS)	mg/L	16.2
Turbidity	NTU	86.2
Un-ionized Ammonia	mg/L	0.255
Field Parameters		
Conductivity, field	mS/cm	2.29
Dissolved oxygen (DO), field	mg/L	0.57
Oxidation reduction potential (ORP), field	millivolts	-167
pH, field	s.u.	0 8.11
Temperature, field	Deg C	13.66
Turbidity, field	NTU	3.3
Petroleum Products		
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09
Sample ID:		GW 45804-111015-TB-017
Sample Date:		11/10/2015
		Original
Parameters:	***Units***	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(350)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)
Semi-Volatiles		
1+2-Methylnaphthalene	ug/L	--
1-Methylnaphthalene	µg/L	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--
2-Methylnaphthalene	µg/L	--
Acenaphthene	µg/L	--
Acenaphthylene	µg/L	--
Acridine	µg/L	--
Anthracene	ug/L	ND(0.020)
Benzo(a)anthracene	ug/L	--
Benzo(a)pyrene	ug/L	ND(0.0050)
Benzo(b)fluoranthene	ug/L	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	--
Benzo(b)pyridine (Quinoline)	ug/L	--
Benzo(g,h,i)perylene	ug/L	--
Benzo(k)fluoranthene	ug/L	--
Carcinogenic potency equivalent	µg/L	--
Chrysene	µg/L	--
Dibenz(a,h)anthracene	µg/L	--
Fluoranthene	ug/L	--
Fluorene	ug/L	--
Indeno(1,2,3-cd)pyrene	ug/L	--
Naphthalene	ug/L	--
Phenanthrene	ug/L	--
Pyrene	ug/L	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TB-000	GW-45804-021511-MB-003	GW-45804-051611-MMO-003	GW-45804-081611-TB-001
Sample Date:			5/18/2010	5/18/2010	5/19/2010	8/19/2010	11/2/2010	2/15/2011	5/16/2011	8/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Metals										
Arsenic (dissolved)	mg/L	-	0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	46.3	22.9	23.6	10.8	11.1	7.64	7.87	6.33	6.79
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	8.78	7.90	7.77	7.70	5.83	6.44	4.06	4.38
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0062	ND(0.010)
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	533	264	266	186	192	152	189	202	190
Ammonia-N	mg/L	4.6	2.35	2.26	1.59	1.21	0.855	0.906	0.552	0.836
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	107	106	78.7	78.4	40.1	44.3	58.9	90.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	83.8	97.8	520	498	367	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.0	8.9	8.7	10.2	8.6	10.9	9.0	11.2
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0	1
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	0	10
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	0	0	1	0	10	20
Total dissolved solids (TDS)	mg/L	-	970	990	926	892	570	880	778	958
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	-	0.00799	0.00789	0.00108	0.000871	0.000398	0.000132	0.000262	0.00404
Field Parameters										
Conductivity, field	mS/cm	-	1.423	1.423	0.99	0.99	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L	-	1.89	1.89	0	0	0	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-123	-123	-152	-152	-143	-128	-	-165
pH, field	s.u.	-	7.05	7.05	6.20	6.20	6.17	6.17	6.43	7.17
Temperature, field	Deg C	-	13.82	13.82	19.2	19.2	14.3	4.7	6.88	18.1
Turbidity, field	NTU	-	-	-	-	-	-	-	14.5	89.1

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TB-009	GW-45804-021611-MB-003	GW-45804-051611-MMD-003	GW-45804-051611-TB-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/16/2011	5/16/2011	5/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MS-005	GW-45804-051512-MS-008	GW-45804-111213-MS-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
		Duplicate	Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.011	0.0092	-	0.0071	0.0087	0.0087	0.0074	0.0091
Boron (dissolved)	mg/L	-	-	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Caomium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.41	5.39	-	7.59	7.12	8.77	11.6	7.17
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.31	4.37	-	5.45	4.72	7.35	8.51	4.03
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0079	-	0.0049	0.0041	0.0063	0.0044	0.0090
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0056
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183	212	272	309	201
Ammonia-N	mg/L	0.555	0.598	0.517	0.642	0.814	0.939	1.08	1.11
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	26	30	45	44	36
Chloride	mg/L	51.0	38.9	37.7	-	81.5	62.4	111	92
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	289	103	75.3	14.2	277	322 J	75.9	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2	11.0	9.9	13.5	17.9
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	ND(1.0)	-	-	-	-
pH, lab	SU	-	-	-	7.61	7.67	7.74	7.60	7.52
Phenol	mg/L	-	-	-	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	-	0.046	ND(0.030)	ND(0.030)	ND(0.030)
Sulfide	mg/L	-	-	-	-	-	328	278	317
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2	10
Total dissolved solids (TDS)	mg/L	984	946	946	812	748	960	900	794
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.47	1.61	1.66	2.08	1.66
Total suspended solids (TSS)	mg/L	-	-	-	13.0	7.0	15.0	32.0	14.0
Turbidity	NTU	-	-	-	77.0	81.0	8.50 J	106	59.0
Un-ionized ammonia	mg/L	0.00410	0.00166	0.00171	-	-	0.197	0.00556	0.000496
Field Parameters									
Conductivity, field	mS/cm	-	0.75	-	1.05	1.21	1	1.62	1.28
Dissolved oxygen (DO), field	mg/L	-	1.55	-	-	1.66	9.47	1.62	2.38
Oxidation reduction potential (ORP), field	millivolts	-	-153	-	-	-139	-419	-109	-
pH, field	s.u.	-	7.10	7.10	5.78	6.64	6.84	7.48	6.15
Temperature, field	Deg C	-	12.0	12.0	8	12.98	16.3	5.6	14.3
Turbidity, field	NTU	-	13.4	-	464	94.3	129	74.4	117

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081811-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MS-005	GW-45804-051513-MS-008	GW-45804-111213-MS-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/18/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
		Duplicate	Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.030
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.025
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	0.070
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	0.054
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	0.022
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-008	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-008	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052815-TS-002
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/28/2015
		Original	Original	Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	***Units***									
Metals										
Arsenic (dissolved)	mg/L	0.0100	0.0100	0.0031	0.0062	0.0101	0.0091	0.0063	0.0064	0.0067
Boron (dissolved)	mg/L	0.055	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00096	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0026	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.03	6.22	2.69	5.16	3.91	4.80	7.30	7.22	4.77
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.73	2.79	1.78	2.99	1.96	2.41	4.09	4.03	2.48
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0081	0.0052	0.0080	0.0042	0.0049	0.0047	0.0029	0.0026	0.0041
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.0147	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	179	183	341	224 J	202 J	209	306	308	228
Ammonia-N	mg/L	1.28	0.674	0.667	1.30 J	1.49 J	1.03	0.969	1.03	1.01
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.5	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	27	62	ND(34)	54 J	30 J	36	29	25	32
Chloride	mg/L	66	81.9	71.1	67.2 J	62.7 J	52	84.7	87.7	78.5
Color (apparent)	color unit	-	-	5944 J	269 J	136 J	203	-	-	-
Color (apparent)	TCU	208	80.0	-	-	-	-	132	133	225
Dissolved organic carbon (DOC) (dissolved)	mg/L	19.6	9.3	7.7	6.8 J	11.3 J	9.3	7.0	7.0	11.6
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0 J	0 J	0	ND(2)	2	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0 J	1 J	0	ND(2)	ND(2)	2
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	--	--	--
pH, lab	s.u.	7.44	7.11	7.25	7.89 J	7.54 J	7.32	7.77	7.72	7.84
Phenol	mg/L	ND(0.0010)	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)	ND(0.0027)	ND(0.0025)	0.0034
Phosphorus	mg/L	ND(0.030)	1.54	ND(0.030)	0.043 J	ND(0.030) J	0.039	0.363	0.357	ND(0.030)
Sulfate	mg/L	195	171	272	193 J	109 J	136	174	185	90.1
Total coliform bacteria	cfu/100mL	100	7	7	0 J	7 J	300	178	128	50
Total dissolved solids (TDS)	mg/L	630	524	928	650 J	492 J	479	635	676	491
Total kjeldahl nitrogen (TKN)	mg/L	2.31	0.91	ND(1.57)	2.15 J	2.10 J	1.32	1.48	1.58	1.72
Total suspended solids (TSS)	mg/L	3.2	2750	53.5	4.0 J	ND(2.0) J	3.6	448	390	8.3
Turbidity	NTU	18.7	106	47.0	34.0 J	7.03 J	19.8	52.0	53.0	24.8
Un-ionized ammonia	mg/L	0.00423	0.000291	0.00164	0.00788 J	0.017 J	0.00646	0.0113	0.0127	0.00653
Field Parameters										
Conductivity, field	mS/cm	1.06	0.868	1.78	1.19	0.718	0.517	0.661	0.681	0.609
Dissolved oxygen (DO), field	mg/L	4.82	7.53	4.52	0	0.21	3.82	--	--	2.3
Oxidation reduction potential (ORP), field	millivolts	174	-	401	-154	-147	-96	--	--	-43
pH, field	s.u.	6.91	6.19	7.06 D 7.06	7.43	6.77	7.41	7.99	7.89	7.34
Temperature, field	Deg C	17.7	12.7	9.34 D 9.3	9.98	18.75	11.08	5.1	5.1	13.59
Turbidity, field	NTU	32.1	250	28.1	39.8	26.9	-	--	--	0

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-008	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-005	GW-45804-040815-TS-005	GW-45804-040815 TS-006	GW-45804-052815-TS-002
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/28/2015
		Original	Original	Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	***Units***									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)	990 J	370 J	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	ug/L	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)	1260 J	ND(380) J	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	-	--	--	-
Semi-Volatiles										
1-Methylnaphthalene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	-	-	-	--	--	--
2-Methylnaphthalene	ug/L	-	-	ND(0.020)	--	--	-	--	--	--
Acenaphthene	ug/L	-	-	0.037	--	--	-	--	--	--
Acenaphthylene	ug/L	-	-	ND(0.020)	--	--	-	--	--	--
Acridine	ug/L	-	-	ND(4.0)	--	--	-	--	--	--
Anthracene	ug/L	ND(0.020)	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.20)	ND(0.020)
Benzo(a)anthracene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(a)pyrene	ug/L	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.078	ND(0.050)	ND(0.0050)
Benzo(b)fluoranthene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	ug/L	-	-	ND(0.040)	-	-	-	--	--	--
Benzo(g,h,i)perylene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(k)fluoranthene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Carcinogenic potency equivalent	ug/L	-	-	ND(0.060)	--	--	-	--	--	--
Chrysene	ug/L	-	-	ND(0.020)	--	--	-	--	--	--
Dibenz(a,h)anthracene	ug/L	-	-	ND(0.020)	--	--	-	--	--	--
Fluoranthene	ug/L	-	-	ND(0.020)	--	--	-	--	--	--
Fluorene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L	-	-	ND(0.020)	-	-	-	--	--	--
Naphthalene	ug/L	-	-	ND(0.050)	-	-	-	--	--	-
Phenanthrene	ug/L	-	-	ND(0.020)	-	-	-	--	--	-
Pyrene	ug/L	-	-	ND(0.020)	-	-	-	--	--	-

001156

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09
Sample ID:		GW-45804-061316-TS-002	GW-45804-110916-TS-005
Sample Date:		6/13/2016	11/9/2016
		Original	Original
Parameters:	***Units***		
Metals			
Arsenic (dissolved)	mg/L	0.00806	0.00851
Boron (dissolved)	mg/L	0.045	0.042
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.00050)	0.00068
Cobalt (dissolved)	mg/L	0.00011	0.00013
Copper (dissolved)	mg/L	ND(0.00020)	ND(0.00020)
Iron (dissolved)	mg/L	4.92	4.74
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	2.92	2.71
Mercury (dissolved)	mg/L	0.000013	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00467	0.00375
Nickel (dissolved)	mg/L	0.00056	0.00052
Zinc (dissolved)	mg/L	0.0023	0.0016
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	282	254
Ammonia-N	mg/L	1.15	1.00
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	32	32
Chloride	mg/L	86.8	56.9
Color (apparent)	color unit	--	--
Color (apparent)	TCU	247	207
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	10.1
Escherichia coli	cfu/100mL	12	0
Fecal coliform bacteria	cfu/100mL	40	0
Nitrate (as N)	mg/L	0.022	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.010)
Nitrite/Nitrate	mg/L	--	--
pH, lab	s.u.	7.93	7.58
Phenol	mg/L	0.0021	0.0036
Phosphorus	mg/L	ND(0.030)	0.048
Sulfate	mg/L	102	88.2
Total coliform bacteria	cfu/100mL	50	2
Total dissolved solids (TDS)	mg/L	565	374
Total kjeldahl nitrogen (TKN)	mg/L	1.87	1.50
Total suspended solids (TSS)	mg/L	ND(2.0)	ND(2.0)
Turbidity	NTU	18.6	18.3
Un-ionized ammonia	mg/L	0.0170	0.0265
Field Parameters			
Conductivity, field	mS/cm	2.56	0.602
Dissolved oxygen (DO), field	mg/L	1.46	3.92
Oxidation reduction potential (ORP), field	millivolts	-179	-138
pH, field	s.u.	7.62	7.96
Temperature, field	Deg C	17.26	13.49
Turbidity, field	NTU	0	1.9

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09
Sample ID:		GW-45804-061316-TS-002	GW-45804-110916-TS-005
Sample Date:		6/13/2016	11/9/2016
		Original	Original
Parameters:	***Units***		
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C36)	µg/L	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	ND(250)
Semi-Volatiles			
1-Methylnaphthalene	µg/L	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--
2-Methylnaphthalene	µg/L	--	--
Acenaphthene	µg/L	--	--
Acenaphthylene	µg/L	--	--
Acridine	µg/L	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	--
Benzo(g,h,i)perylene	µg/L	-	--
Benzo(k)fluoranthene	µg/L	-	--
Carcinogenic potency equivalent	µg/L	--	--
Chrysene	µg/L	--	--
Dibenz(a,h)anthracene	µg/L	--	--
Fluoranthene	µg/L	--	--
Fluorene	µg/L	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	--
Naphthalene	µg/L	-	--
Phenanthrene	µg/L	-	--
Pyrene	µg/L	-	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030928-TB-007	GW-45804-032315-TB-002	GW-45804-030713-TB-002	GW-45804-111413-TB-001	GW-45804-042114-TB-001	GW-45804-052914-MB-006	GW-45804-082114-TB-004	GW-45804-112614-TB-011	GW-45804-040915 TB-002	GW-45804-052515-TB-009
Sample Date:			9/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015	5/28/2015
			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]										
Metals												
Arsenic (dissolved)	mg/L	-	0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	0.088	0.130
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.000010)	ND(0.00090)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00204	0.0026	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00129	ND(0.00050)
Copper (dissolved)	mg/L	-	0.0043	ND(0.009)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)	0.0020	0.0024
Iron (dissolved)	mg/L	46.3	0.932	19.5	23.6	4.96	4.62	12.2	15.6	2.74	0.765	0.971
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00010)	ND(0.00010)
Manganese (dissolved)	mg/L	17.1	1.82	19.4	17.5	7.70	5.35	13.3	14.6	11.5	3.45	0.548
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.186	0.0164	0.0172	0.0014	0.0232	0.0181	0.0139	0.0177	0.0136	0.0174
Nickel (dissolved)	mg/L	-	0.0073	ND(0.010)	0.0023	0.0102	0.0026	ND(0.010)	ND(0.010)	ND(0.010)	0.0027	0.0045
Zinc (dissolved)	mg/L	-	0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)	ND(0.030)	ND(0.030)	0.0040	ND(0.0030)
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	833	290	388	263	308	207	575	499 J	536	485	381
Ammonia-N	mg/L	4.0	7.45	4.65	8.87	14.3	4.80	13.2	11.2 J	7.20	7.35	1.93
Biochemical oxygen demand (carbonaceous)	mg/L	-	15.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	99	72	68	95	ND(54)	74	76 J	55	56	23
Chloride	mg/L	-	170	219	162	147	185	189	126 J	129	193	187
Color (apparent)	color unit	-	-	-	-	-	120 J	155 J	85.8 J	210	-	-
Color (apparent)	TCU	-	92.8	173 J	362	76.7	-	-	-	-	198	68.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	25.3	39.2	18.6	21.0	10.3	11.1	14.3 J	13.9	5.8	5.5
Escherichia coli	cfu/100mL	25.6	0	4	ND(2)	ND(2)	0	0	0 J	0	ND(2)	0
Fecal coliform bacteria	cfu/100mL	-	ND(0) J	6	10	ND(2)	0	0	0 J	0	ND(2)	0
Nitrate (as N)	mg/L	1.3	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)	0.37	0.2
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)	ND(0.10)	0.361
pH, lab	s.u.	-	7.86	7.73	7.50	7.57	7.55	7.56	7.34 J	7.52	7.48	7.71
Phenol	mg/L	-	0.0016	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0117	ND(0.0010) J	ND(0.0010)	0.0022	0.0020
Phosphorus	mg/L	7.2	0.060	0.062	0.070	0.040	0.096	0.111	0.093 J	0.069	0.096	0.042
Sulfate	mg/L	-	986	531	900	713	452	507	325 J	512	646	883
Total coliform bacteria	cfu/100mL	-	150	1700	10400	10	1	0	ND(10) J	2	30 J	0
Total dissolved solids (TDS)	mg/L	-	1770	1800	2030	1600	1170	1580	1270 J	1470	1620	1470
Total kjeldahl nitrogen (TKN)	mg/L	-	9.95	6.55	8.80	14.8	5.67	13.6	15.0 J	9.81	8.05	2.12
Total suspended solids (TSS)	mg/L	-	72.0	78.0	106	564	32.0	202	647 J	61.0	1240	92.4
Turbidity	NTU	-	61.0	102	43.0	75.0	54.0	132	57.0 J	124	30.9	30.0
Un-ionized ammonia	mg/L	-	0.0198	0.0292	0.0214	0.0536	0.0281	0.101	0.856 J	0.0258	0.000644	0.0170
Field Parameters												
Conductivity, field	mS/cm	-	2.15	2.17	2.53	2.5	2.41	2.55	2.53	0.628	--	2.12
Dissolved oxygen (DO), field	mg/L	-	3.61	3.67	7.86	7.24	6.62	2	6.26	6.19	--	10.14
Oxidation reduction potential (ORP), field	millivolts	-	-176	-	-122	-	-118	-145	-134	-80	--	-26
pH, field	s.u.	-	7.14	7.26	6.85	7.12	7.08 D 7.40	7.3	6.13	7.15	5.68	7.38
Temperature, field	Deg C	-	9.0	17.3	21.59 D 21.6	13.1	9.32 D 10.5	17.06	22.81	11.56	7.4	18.43
Turbidity, field	NTU	-	76.4	150	150	104	148	444	684	-	--	152
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	810 J	ND(250)	300	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	800 J	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)	1110	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	12600 J	-	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3040 J	ND(380)	1410	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Semi-Volatiles												
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acridine	µg/L	-	-	-	-	-	ND(5.0)	-	-	-	--	--
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)	ND(0.20)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Benz(a)pyrene	µg/L	-	0.024	ND(0.0080)	0.0079	0.391	0.0212	0.0435	0.426 J	0.0183	0.011	0.0510
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	0.029	-	-	-	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-	-	-	--	--
Chrysene	µg/L	-	-	-	-	-	0.023	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Fluoranthene	µg/L	-	-	-	-	-	0.041	-	-	-	--	--
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030513-TS-007	GW-45804-052313-TS-003	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MS-005	GW-45804-082114-TS-004	GW-45804-112514-TS-011	GW-45804-040915 TS-002	GW-45804-052515-TS-009
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015	5/28/2015
			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]										
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	0.035	-	-	-	-	-

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-16	MW104-16
Sample ID:		GW-45804-081316-TS-007	GW-45804-111016-TS-008
Sample Date:		8/13/2016	11/10/2016
		Original	Original
Parameters:	***Units***		
Metals			
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0013
Boron (dissolved)	mg/L	0.11	0.13
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.0040	0.0032
Copper (dissolved)	mg/L	0.0107	ND(0.0020)
Iron (dissolved)	mg/L	9.28	7.79
Lead (dissolved)	mg/L	0.00056	ND(0.00050)
Manganese (dissolved)	mg/L	12.5	9.30
Mercury (dissolved)	mg/L	0.000023	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0172	0.0152
Nickel (dissolved)	mg/L	0.0060	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	499	341
Ammonia-N	mg/L	12.2	6.15
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	47	41
Chloride	mg/L	114	66.1
Color (apparent)	color unit		
Color (apparent)	TCU	130	142
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	9.5
Escherichia coli	cfu/100mL	0	0
Fecal coliform bacteria	cfu/100mL	0	0
Nitrate (as N)	mg/L	ND	0.93
Nitrite (as N)	mg/L	0.090	ND(0.050)
pH, lab	s.u.	7.90	7.78
Phenol	mg/L	0.0020	0.0032
Phosphorus	mg/L	0.041	0.086
Sulfate	mg/L	521	385
Total coliform bacteria	cfu/100mL	40	5
Total dissolved solids (TDS)	mg/L	1180	1130
Total kjeldahl nitrogen (TKN)	mg/L	10.9	5.80
Total suspended solids (TSS)	mg/L	35.0	52.0
Turbidity	NTU	8.07	58.1
Un-ionized ammonia	mg/L	0.256	0.190
Field Parameters			
Conductivity, field	mS/cm	1.46	1.82
Dissolved oxygen (DO), field	mg/L	0.17	3.54
Oxidation reduction potential (ORP), field	millivolts	-120	-136
pH, field	s.u.	7.58	8.15
Temperature, field	Deg C	17.46	10.0
Turbidity, field	NTU	280	89
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	--	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	--	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	ug/L	--	--
Total Petroleum Hydrocarbons (C6-C50)	ug/L	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	ug/L	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	ug/L	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	ug/L	--	ND(250)
Semi-Volatiles			
1-Methylnaphthalene	ug/L	--	--
2-Methylnaphthalene	ug/L	--	--
Acenaphthene	ug/L	--	--
Acenaphthylene	ug/L	--	--
Acridine	ug/L	--	--
Anthracene	ug/L	0.021	ND(0.020)
Benzo(a)anthracene	ug/L	--	--
Benzo(a)pyrene	ug/L	0.0199	0.0166
Benzo(b)fluoranthene	ug/L	--	--
Benzo(b)pyridine (Quinoline)	ug/L	--	--
Benzo(g,h,i)perylene	ug/L	--	--
Benzo(k)fluoranthene	ug/L	--	--
Carcinogenic potency equivalent	ug/L	--	--
Chrysene	ug/L	--	--
Dibenz(a,h)anthracene	ug/L	--	--
Fluoranthene	ug/L	--	--
Fluorene	ug/L	--	--
Indeno(1,2,3-cd)pyrene	ug/L	--	--

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-16	MW104-16
Sample ID:		GW-45804-061316-TS-007	GW-45804-111016-TS-008
Sample Date:		6/13/2016	11/10/2016
		Original	Original
Parameters:	***Units***		
Naphthalene	ug/L	-	--
Phenanthrene	ug/L	-	--
Pyrene	ug/L	-	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13	MW10S-13
Sample ID:			GW-45804-030813-YS-008	GW-45804-052313-TB-010	GW-45804-080713-YS-009	GW-45804-111413-TB-002	GW-45804-111413-YS-003	GW-45804-042114-TB-004	GW-45804-042114-YS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-052114-YS-005
Sample Date:			8/3/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	5/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	***Units***	***TLP***[1]										
Metals												
Arsenic (dissolved)	mg/L	-	0.0058	0.0142	0.0078	0.0029	0.0028	0.0092	0.0078	0.0045	0.0049	ND(0.0010)
Boron (dissolved)	mg/L	-	0.073	0.052	0.065	0.076	0.074	0.062	0.061	0.065	0.067	0.058
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	48.5	2.99	5.31	4.56	2.07	2.11	0.246	0.212	0.665	0.695	0.296
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	0.487	0.550	0.630	0.512	0.518	0.443	0.413	0.443	0.532	0.568
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0090	0.0141	0.0106	0.0087	0.0088	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	-	ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0059	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
		-										
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	633	462	365	382	429	427	911	880	600	608	438 J
Ammonia-N	mg/L	4.0	34.3	22.3	28.2	29.5	27.2	76.0	75.5	57.8	57.8	16.3 J
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1	3.1	5.6	3.0 J
Chemical oxygen demand (COD)	mg/L	-	46	15	13	32	30	ND(54)	65	34	30	19 J
Chloride	mg/L	-	173	128	199	164	164	246	245	218	217	114 J
Color (apparent)	color unit	-	-	-	-	-	-	46.9 J	53.9 J	55.5 J	70.7 J	12.4 J
Color (apparent)	TCU	-	27.1	58.3 J	52.9	83.5	73.7	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.5	ND(5.2)	5.1	4.5	4.1	9.3	9.4	5.2	5.2	4.4 J
Escherichia coli	cfu/100mL	25.6	7	ND(2)	ND(2)	0	0	380	380	0	0	0 J
Fecal coliform bacteria	cfu/100mL	-	50 J	ND(2)	ND(2)	0	0	450	490	0	0	0 J
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
pH, lab	s.u.	-	7.82	7.75	7.41	7.54	7.51	7.25	7.26	7.55	7.55	7.41 J
Phenol	mg/L	-	ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0060	0.0103	0.0074	0.0056	0.0023 J
Phosphorus	mg/L	7.2	0.0048	0.0045	0.0035	0.0051	ND(0.0030)	0.067	0.067	0.134	0.107	0.072 J
Sulfate	mg/L	-	970	963	1050	674	678	429	427	649	649	509 J
Total coliform bacteria	cfu/100mL	-	160	110	2	2	ND(10)	4400	4900	2	1	ND(10) J
Total dissolved solids (TDS)	mg/L	-	2400	1680	2140	1610	1600	1610	1600	1740	1730	1290 J
Total kjeldahl nitrogen (TKN)	mg/L	-	38.2	24.5	30.6	25.8	27.2	74.3	75.6	46.4	51.2	19.3 J
Total suspended solids (TSS)	mg/L	-	16.0	31.0	44.4	8.4	6.4	20.0 J	4.4 J	11.6 J	4.0 J	16.8 J
Turbidity	NTU	-	19.0	38.0	36.0	16.2	22.7	51.0	59.0	16.2	26.0	3.47 J
Un-ionized ammonia	mg/L	-	0.141	0.0793	0.0885	0.0296	0.0216	0.174	0.173	0.396	0.396	17.0 J
Field Parameters												
Conductivity, field	mS/cm	-	3.01	2.59	2.75	2.43	-	2.12	-	3.02	3.02	2.02
Dissolved oxygen (DO), field	mg/L	-	2.69	1.21	4.33	6.79	-	4.53	-	5.33	5.33	0.26
Oxidation reduction potential (ORP), field	millivolts	-	-215	-	-191	-	-	-73	-	-318	-318	-275
pH, field	s.u.	-	7.11	6.90	6.53	6.47	6.47	7.4 D 7.03	7.03	7.19	7.19	9.97
Temperature, field	Deg C	-	14.5	19.1	22.6 D 22.55	17.2	17.5	9.3 D 10.47	9.3	18.92	18.92	21.66
Turbidity, field	NTU	-	170	119	34.2	11.2	-	31.8	-	24.6	24.6	108

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-030812-YS-008	GW-45804-052313-TB-010	GW-45804-080713-YS-009	GW-45804-111413-TB-002	GW-45804-111413-YS-003	GW-45804-042114-TB-004	GW-45804-042114-YS-005	GW-45804-052914-MS-007	GW-45804-052914-MSD-008	GW-45804-082114-YS-005
Sample Date:			8/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	***Units***	***TLP***[1]										
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	390 J
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(380)	ND(360)	ND(380)	ND(380)	ND(380) J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Semi-Volatiles												
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	ND(4.0)	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b,j)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	ND(0.060)	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-

Table E 4.2

Unconfined Shallow Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45554 040815-TS-001	GW-45804-052715-TS 010	GW-45804-081315-TS-001	GW-45804-110515-TS 006
Sample Date:		11/26/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	0.0011	ND(0.0010)	ND(0.010)	0.0011	ND(0.0010)
Boron (dissolved)	mg/L	0.073	0.066	ND(0.10)	ND(0.10)	0.11
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0090)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00078	ND(0.0050)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	2.75	1.35	7.40	4.59	7.61
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.580	0.889	1.06	0.699	0.869
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0070	0.0161	0.0150	0.0146	0.0161
Nickel (dissolved)	mg/L	ND(0.0020)	0.0035	ND(0.010)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	0.0211	ND(0.0030)	ND(0.030)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	406	270	288	323	379
Ammonia-N	mg/L	19.6	11.3	15.7	15.2	5.71
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	11	27	16	14	14
Chloride	mg/L	111	135	175	225	155
Color (apparent)	color unit	97.7	--	--	--	--
Color (apparent)	TCU	--	21.4	40.9	133	94.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.2	2.6	3.6	4.4	4.5
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
ph, lab	s.u.	7.78	7.76	7.53	7.85	7.48
Phenol	mg/L	ND(0.0010)	ND(0.0053)	0.0057	ND(0.0010)	0.0026
Phosphorus	mg/L	0.099	0.253	0.156	0.088	0.073
Sulfate	mg/L	738	1350	1360	1240	799
Total coliform bacteria	cfu/100mL	10	1730	2	100	1
Total dissolved solids (TDS)	mg/L	1480	2480	2200	2250	1530
Total kjeldahl nitrogen (TKN)	mg/L	20.7	15.5	14.9	13.8	5.81
Total suspended solids (TSS)	mg/L	21.3	402	293	16.0	15.0
Turbidity	NTU	20.9	9.71	21.0	17.0	110
Un-ionized ammonia	mg/L	0.0553	0.131	0.135	0.376	0.135
Field Parameters						
Conductivity, field	mS/cm	0.695	2.212	3.15	3.26	2.39
Dissolved oxygen (DO), field	mg/L	2.72	--	4.34	0.44	0.91
Oxidation reduction potential (ORP), field	millivolts	-71	--	-8	-142	-150
pH, field	s.u.	6.99	7.47	7.25	7.60	7.73
Temperature, field	Deg C	15.4	12.8	20.6	22.91	19.0
Turbidity, field	NTU	-	--	412	41.8	11.9

Table E-4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804 040816-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110515-TS-006
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(390)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	--	ND(250)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	--	--	--	--
Acenaphthene	µg/L	-	--	--	--	--
Acenaphthylene	µg/L	-	--	--	--	--
Acridine	µg/L	-	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.00850)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	--	--	--	--
Chrysene	µg/L	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	--	--	--	--
Fluoranthene	µg/L	-	--	--	--	--
Fluorene	µg/L	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	--	--	--	--
Naphthalene	µg/L	-	--	--	--	--
Phenanthrene	µg/L	-	--	--	--	--
Pyrene	µg/L	-	--	--	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052615-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014
Sample Date:			5/26/2015	8/12/2015	11/10/2015	11/10/2015
Sample Type:			Original	Original	Original	Duplicate
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	0.0011	0.00190	0.0012	0.0011
Boron (dissolved)	mg/L	-	0.095	0.165	0.18	0.18
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	48.3	2.54	1.50	3.09	3.20
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	2.44	1.35	1.59	1.62
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0102	0.0164	0.0125	0.0127
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.00205	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	423	449	461	469
Ammonia-N	mg/L	4.0	13.8	2.93	2.90	3.86
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	27	34	38	41
Chloride	mg/L	-	153	112	114	119
Color (apparent)	TCU	-	95.7	71.6	189	143
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.0	9.3	12.7	10.7
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.92	7.94	7.66	7.68
Phenol	mg/L	-	0.0060	ND(0.0017)	0.0024	0.0033
Phosphorus	mg/L	7.2	0.068	0.057	0.060	0.074
Sulfate	mg/L	-	709	423	444	479
Total coliform bacteria	cfu/100mL	-	0	ND(1)	0	0
Total dissolved solids (TDS)	mg/L	-	1370	1100	1170	1180
Total kjeldahl nitrogen (TKN)	mg/L	-	11.9	3.30	3.38	3.91
Total suspended solids (TSS)	mg/L	-	6.8	11.5	7.3	7.9
Turbidity	NTU	-	25.0	14.1	69.2	47.7
Un-ionized ammonia	mg/L	-	0.171	0.0516	0.0823	0.109

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052615-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014
Sample Date:			5/26/2015	8/12/2015	11/10/2015	11/10/2015
Sample Type:			Original	Original	Original	Duplicate
Parameters	**Units**	**TLP[1]**				
Field Parameters						
Conductivity, field	mS/cm	-	2.07	3.92	1.32	1.32
Dissolved oxygen (DO), field	mg/L	-	1.98	0.51	3.12	3.12
Oxidation reduction potential (ORP), field	millivolts	-	43	-122	-134	-134
pH, field	s.u.	-	7.76	7.35	8.01	8.01
Temperature, field	Deg C	-	13.75	17.5	12.9	12.9
Turbidity, field	NTU	-	0	149	13.8	13.8
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	540	420
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	540	420
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	540	420
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	0.021	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002
Sample Date:			8/13/2015	8/13/2015	11/10/2015
Sample Type:			Original	Duplicate	Original
Parameters	**Units**	**TLP[1]**			
Metals					
Arsenic (dissolved)	mg/L	-	0.0140	0.0138	ND(0.0010)
Boron (dissolved)	mg/L	-	0.23	0.24	0.11
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.0321	0.0330	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	48.3	0.45	0.46	0.19
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	4.52	4.57	1.04
Mercury (dissolved)	mg/L	-	0.000038 J	0.000038 J	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.00268	0.00206	0.00068
Nickel (dissolved)	mg/L	-	0.0075	0.0075	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	1810	1820	436
Ammonia-N	mg/L	4.0	51.3	50.7	8.01
Biochemical oxygen demand (carbonaceous)	mg/L	-	1340	1380	4.3
Chemical oxygen demand (COD)	mg/L	-	2480	2840	38
Chloride	mg/L	-	483	480	162
Color (apparent)	TCU	-	1100	1110	119
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	868	1030	10.7
Escherichia coli	cfu/100mL	25.6	1000 J	3000 J	0
Fecal coliform bacteria	cfu/100mL	-	4000	4000	0
Nitrate (as N)	mg/L	1.3	ND(0.20)	ND(0.20)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.050)
pH, lab	s.u.	-	7.11	7.15	7.52
Phenol	mg/L	-	1.07	1.07	0.0029
Phosphorus	mg/L	7.2	1.83	1.59	0.281
Sulfate	mg/L	-	399	391	848
Total coliform bacteria	cfu/100mL	-	100000	130000	40
Total dissolved solids (TDS)	mg/L	-	3800	3620	1630
Total kjeldahl nitrogen (TKN)	mg/L	-	85.7	86.1	7.98
Total suspended solids (TSS)	mg/L	-	12.3	15.6	64.1
Turbidity	NTU	-	463	418	81.3
Un-ionized ammonia	mg/L	-	0.108	--	0.292

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002
Sample Date:			8/13/2015	8/13/2015	11/10/2015
Sample Type:			Original	Duplicate	Original
Parameters	**Units**	**TLP[1]**			
Field Parameters					
Conductivity, field	mS/cm	-	5.44	5.44	2.48
Dissolved oxygen (DO), field	mg/L	-	1.37	1.37	3.33
Oxidation reduction potential (ORP), field	millivolts	-	-362	-362	-215
pH, field	s.u.	-	6.59	6.59	7.99
Temperature, field	Deg C	-	21.6	21.6	16.56
Turbidity, field	NTU	-	182	182	243
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	--	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	-	--	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	-	ND(0.035)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	-	0.0010	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.00015	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.8	-	1.76	3.30	0.455
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	-	0.986	1.43	1.11
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.0438	0.0049	0.0058
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	-	0.0115	0.309	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	-	422	559	558
Ammonia-N	mg/L	-	-	0.2	-	0.245	0.252	0.218
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	-	73.6	393	164
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	-	27.2	132	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	-	4.5	8.0	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	-	ND(0.10)	ND(0.10)	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	-	ND(0.10)	ND(0.10)	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	-	0.033	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	-	806	1580	1360
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	0.0057	0.00152	0.00303
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.972	1.226	1.58	2.05
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	10.92	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	-	6.68	8.02	7.41	7.76
Temperature, field	Deg C	15	AO	-	9.33	9.96	10.6	10.98
Turbidity, field	NTU	5	AO	-	125	-	-	16.5

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	0.111	0.076
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	0.0016	0.0036
Iron (dissolved)	mg/L	0.3	AO	10.6	2.30	-	2.36	1.18
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.31	-	1.23	1.84
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0068	-	0.0030	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	-	0.0036	0.0023
Zinc (dissolved)	mg/L	5	AO	-	0.0080	-	0.0285	0.0095
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	986	559	-	559	541
Ammonia-N	mg/L	-	-	0.2	**0.478**	-	**1.60**	**0.476**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	13	30
Chloride	mg/L	250	AO	-	109	-	-	140
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	7.6	-	84.6	33.2 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	6.9	-	5.0	5.3
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	-	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(10)	-	0	ND(2)
Nitrate (as N)	mg/L	10	AC	0.5	ND(0.30)	-	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	7.74	7.88
Phenol	mg/L	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	-	0.037	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	446
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	-	0	ND(2)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1380	-	1300	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	3.95	0.69
Total suspended solids (TSS)	mg/L	-	-	-	-	-	5.6	2.0
Turbidity	NTU	5	AO	-	-	-	16.9	5.80 J
Un-ionized ammonia	mg/L	-	-	-	0.00171	-	-	0.0217
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.26	0.931	2.02	1.8
Dissolved oxygen (DO), field	mg/L	-	-	-	9.81	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-55
pH, field	s.u.	6.5-8.5	OG	-	7.21	6.55	6.57	8.29
Temperature, field	Deg C	15	AO	-	8.7	13.8	11.48	11.2
Turbidity, field	NTU	5	AO	-	40.7	-	-	113

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110311-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/3/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	-	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.108	0.111	0.079	0.080
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	0.0030	0.0310	0.0134	0.0691
Iron (dissolved)	mg/L	0.3	AO	10.6	1.06	0.733	1.72	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.17	1.11	1.90	1.30
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0043	0.0045	0.0041	0.0048
Nickel (dissolved)	mg/L	-	-	-	0.0066	0.0031	0.0022	0.0026
Zinc (dissolved)	mg/L	5	AO	-	0.0064	0.0146	0.0044	0.0065
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30?-500	OG	986	550	584	570	563
Ammonia-N	mg/L	-	-	0.2	**0.609**	**1.91**	**3.72**	**1.13**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	34	34	23	19
Chloride	mg/L	250	AO	-	143	164	170	186
Color (apparent)	color unit	5	AO	-	-	-	45.7	7.6
Color (apparent)	TCU	5	AO	-	30.1 J	65.4	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	ND(5.2)	8.1	4.4	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.20	0.18	ND(0.10)	**0.59**
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.82	7.43	7.48	7.37
Phenol	mg/L	-	-	-	ND(0.0030)	ND(0.0010)	0.0023	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	325	358	355	345
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1270	1380	1400	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	2.04	3.52	1.18
Total suspended solids (TSS)	mg/L	-	-	-	4.8	7.2	8.4	4.8
Turbidity	NTU	5	AO	-	8.75	13.8	14.5	ND(0.58)
Un-ionized ammonia	mg/L	-	-	-	0.000186	0.000746	0.0128	0.00423
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.97	2.1	2.27	0.626
Dissolved oxygen (DO), field	mg/L	-	-	-	8.32	10.4	6.56	8.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-41	124
pH, field	s.u.	6.5-8.5	OG	-	7.84	6.16	7.13	7.08
Temperature, field	Deg C	15	AO	-	13.5	12.3	11.83	14.3
Turbidity, field	NTU	5	AO	-	198	1	4.3	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112814-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.01	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008
Sample Date:					5/28/2015	5/28/2015	11/10/2015
					Original	Duplicate	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Metals							
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.106	0.103	0.14
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.0010)
Copper (dissolved)	mg/L	-	-	-	0.0154	0.0173	0.0112
Iron (dissolved)	mg/L	0.3	AO	10.6	0.411[b]	0.455[b]	0.29
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.33[b]	1.36[b]	1.54[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0048	0.0051	0.00551
Nickel (dissolved)	mg/L	-	-	-	0.0033	0.0031	ND(0.0050)
Zinc (dissolved)	mg/L	5	AO	-	0.0113 J	0.0064 J	ND(0.010)
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	986	568[b]	575[b]	559[b]
Ammonia-N	mg/L	-	-	0.2	0.636[a]	0.596[a]	0.278[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	25	25	25
Chloride	mg/L	250	AO	-	264[b]	247	83.7
Color (apparent)	color unit	5	AO	-			
Color (apparent)	TCU	5	AO	-	36.6	37.9	43.1
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.5[b]	5.4[b]	6.8[b]
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.34	0.31	0.051
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.67	7.62	7.50
Phenol	mg/L	-	-	-	0.0016 J	0.0037 J	0.0027
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	313	294	62.0
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1295[b]	1395[b]	1440[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	0.85	0.97
Total suspended solids (TSS)	mg/L	-	-	-	3.0	ND(2.0)	4.0
Turbidity	NTU	5	AO	-	9.68[b]	9.71[b]	15.1[b]
Un-ionized ammonia	mg/L	-	-	-	0.00321	0.00326	0.0247
Field Parameters							
Conductivity, field	mS/cm	-	-	-	1.76	--	2.7
Dissolved oxygen (DO), field	mg/L	-	-	-	4.47	--	2.49
Oxidation reduction potential (ORP), field	millivolts	-	-	-	166	--	-2
pH, field	s.u.	6.5-8.5	OG	-	7.23	7.23	7.99
Temperature, field	Deg C	15	AO	-	13.56	13.6	13.44
Turbidity, field	NTU	5	AO	-	0	--	0.9

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008
Sample Date:					5/28/2015	5/28/2015	11/10/2015
					Original	Duplicate	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(360)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	ND(250)
Semi-Volatiles							
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--
Acridine	µg/L	-	-	-	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--
Chrysene	µg/L	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--
Fluorene	µg/L	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--
Pyrene	µg/L	-	-	-	--	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0032	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	6.60	9.16	-	6.52
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.12	1.57	-	1.41
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0059	0.0042	-	0.0049
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	0.110	ND(0.0030)	-	0.0078
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	611	309	-	571
Ammonia-N	mg/L	-	-	0.2	0.157	0.104	-	0.117
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	2500	AO	-	64.0	63.0	-	58.1
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	16.4	127	-	108	232
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	9.3	9.9	-	11.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.462	-	0.031
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	4	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	692	-	1020
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.00083	0.00022	-	0.000126
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.6	1.32	1.36	1.98
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.94	0.5	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-98	-88	-
pH, field	s.u.	6.5-8.5	OG	-	7.2	6.90	6.29	6.69
Temperature, field	Deg C	15	AO	-	15.1	12.2	12	6.74
Turbidity, field	NTU	5	AO	-	-	-	-	29.7

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.01	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	7.17	6.97	7.16	7.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.42	1.37	1.71	1.52
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	0.0033	ND(0.0030)	0.0057
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	966	597	546	666	643
Ammonia-N	mg/L	-	-	0.2	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	27	34	30
Chloride	mg/L	2500	AO	-	56.7	78.7	82.1	94
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	50.1	258	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	11	12.0	9.5	15.1
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.91	7.67	7.46
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	0.0020
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	198	213
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	42	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1000	1030	1080	1090
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.63	0.80	0.50
Total suspended solids (TSS)	mg/L	-	-	-	-	15.0	16.0	42.0
Turbidity	NTU	5	AO	-	-	80.0	6.80 J	30.0
Un-ionized ammonia	mg/L	-	-	-	0.00026	-	0.00078	0.000032
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.82	1.63	2	1.87
Dissolved oxygen (DO), field	mg/L	-	-	-	2.86	1.27	0.87	1.71
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-98	-77	-156	-
pH, field	s.u.	6.5-8.5	OG	-	6.97	6.4	7.32	5.84
Temperature, field	Deg C	15	AO	-	12.8	11.55	12.6	14.9
Turbidity, field	NTU	5	AO	-	73.1	84.5	15.7	58

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052014-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.062	11.1	1.12	5.28[b]
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0936	1.02	0.0934	0.491[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0042	0.0027	0.0010	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	ND(0.0030)	0.0034	0.0035
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	74	309	84	168
Ammonia-N	mg/L	-	-	0.2	0.081	0.055	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	78	34	ND(10)	12
Chloride	mg/L	2500	AO	-	86.8	78.9	60	388[b]
Color (apparent)	color unit	5	AO	-	-	25.3	31.7	-
Color (apparent)	TCU	5	AO	16.4	33.7	-	-	29.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	6.8	3.0	3.5	2.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	ND(2)	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	8.54	7.67	8.30	8.08
Phenol	mg/L	-	-	-	0.0133	0.0032	0.0015	0.0030
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	61.4	191	62	383
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	10	0	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	284	722	288	348
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.40	0.80	ND(0.15)	0.21
Total suspended solids (TSS)	mg/L	-	-	-	177	292	9.6	ND(2.0)
Turbidity	NTU	5	AO	-	8.60	145	6.03	3.83[b]
Un-ionized ammonia	mg/L	-	-	-	0.000039	0.00016	ND(0.0012)	0.0016
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.98	1.91	0.329	0.474
Dissolved oxygen (DO), field	mg/L	-	-	-	11.04	0.15	4.3	0.56
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-122	-154	-186
pH, field	s.u.	6.5-8.5	OG	-	6.22	6.96	7.98	7.94
Temperature, field	Deg C	15	AO	-	11.3	13.6	11.6	14.57
Turbidity, field	NTU	5	AO	-	187	44.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	ND(0.020)	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7
Sample ID:					GW-45804-110915-TS-004
Sample Date:					11/9/2015
					Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Metals					
Arsenic (dissolved)	mg/L	0.025	IMAC	-	0.00015
Boron (dissolved)	mg/L	5	IMAC	-	0.023
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.000010)
Chromium (dissolved)	mg/L	0.05	MAC	-	0.00053
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00010)
Copper (dissolved)	mg/L	-	-	-	ND(0.00020)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.133
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.000050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0470
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.00124
Nickel (dissolved)	mg/L	-	-	-	ND(0.00050)
Silver (dissolved)	mg/L	-	-	-	--
Zinc (dissolved)	mg/L	5	AO	-	0.0013
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	988	195
Ammonia-N	mg/L	-	-	0.2	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	12
Chloride	mg/L	2600	AO	-	87.0
Color (apparent)	color unit	5	AO	-	
Color (apparent)	TCU	5	AO	18.4	48.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.2
Escherichia coli	cfu/100mL	ND	MAC	5	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.020)
Nitrite (as N)	mg/L	1	AO	-	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	8.68[3]
Phenol	mg/L	-	-	-	0.0027
Phosphorus	mg/L	-	-	0.5	8.81[3]
Sulfate	mg/L	500	AO	-	17.4
Total coliform bacteria	cfu/100mL	ND	MAC	-	1[3]
Total dissolved solids (TDS)	mg/L	500	OAO	-	245
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.26
Total suspended solids (TSS)	mg/L	-	-	-	2.7
Turbidity	NTU	5	AO	-	16.8[3]
Un-ionized ammonia	mg/L	-	-	-	ND(0.045)
Field Parameters					
Conductivity, field	mS/cm	-	-	-	0.404
Dissolved oxygen (DO), field	mg/L	-	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-187
pH, field	s.u.	6.5-8.5	OG	-	10.95[3]
Temperature, field	Deg C	15	AO	-	14.06
Turbidity, field	NTU	5	AO	-	2

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7
Sample ID:					GW-45804-110915-TS-004
Sample Date:					11/9/2015
					Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]	
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(360)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)
Semi-Volatiles					
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	--
Acenaphthene	µg/L	-	-	-	--
Acenaphthylene	µg/L	-	-	-	--
Acridine	µg/L	-	-	-	--
Anthracene	µg/L	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	--
Chrysene	µg/L	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--
Fluoranthene	µg/L	-	-	-	--
Fluorene	µg/L	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--
Naphthalene	µg/L	-	-	-	--
Phenanthrene	µg/L	-	-	-	--
Pyrene	µg/L	-	-	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0023	-	0.0018
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00022	0.00020	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	3.58	2.85	-	5.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.52	1.53	-	**2.71**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0695	0.0527	-	0.0168
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0743	ND(0.0030)	-	0.0123
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	986	427	480	-	518
Ammonia-N	mg/L	-	-	0.2	**0.373**	**0.311**	-	**0.476**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	83.5	70.6	-	106
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	143	-	90.6	209
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	8.5	9.7	-	10.3
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	9.5	ND(0.10)	ND(0.10)	-	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	-	0.072
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	10	2
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	1060	-	1460
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.000407	0.00152	-	0.0145
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.52	1.53	1.65	2.31
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.91	2.12	0.02
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-124	-31	-80
pH, field	s.u.	6.5-8.5	OG	-	6.82	7.24	6.14	6.12
Temperature, field	Deg C	15	AO	-	11.9	12.8	7.72	10.59
Turbidity, field	NTU	5	AO	-	-	-	-	4.2

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	0.068	0.078	0.074
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	0.00078	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.8	ND(0.050)	5.77	6.02	5.55
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.321	**2.95**	**2.91**	**2.64**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	291	519	548	507
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	**1.85**	**2.33**	**2.45**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	23	51	36
Chloride	mg/L	250	AO	-	42.8	116	140	94.2
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	5.0	112	73.0	35.0 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.1	10.6	7.6	ND(5.2)
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	0.44	ND(0.10)	ND(0.10)	0.25
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.96	7.60	7.82
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	548	373
Total coliform bacteria	cfu/100mL	ND	MAC	-	340	2	10	140
Total dissolved solids (TDS)	mg/L	500	OAO	-	834	1550	1600	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	2.16	2.43	2.95
Total suspended solids (TSS)	mg/L	-	-	-	-	12.5	14.0	38.7
Turbidity	NTU	5	AO	-	-	79.0	7.60	53.0
Un-ionized ammonia	mg/L	-	-	-	ND(0.00031)	-	0.005	0.00202
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.981	2.37	1.95	2.17
Dissolved oxygen (DO), field	mg/L	-	-	-	-	1.7	0	5.62
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-73	-104	-
pH, field	s.u.	6.5-8.5	OG	-	7.48	6.96	6.17	6.41
Temperature, field	Deg C	15	AO	-	9.0	9.92	9.8	14.5
Turbidity, field	NTU	5	AO	-	62.3	165	29.7	48

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.081	0.099	0.204	0.188
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	6.25	3.06	ND(0.050)	0.176
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	**2.39**	1.34	0.648	**0.0575**[3]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0211	0.0133	0.0301	0.0351
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0034	0.0075	0.0075	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30?-500	OG	988	548	486	488	305
Ammonia-N	mg/L	-	-	0.2	**4.60**	**2.69**	**0.273**	0.099
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	46	19	ND(10)	ND(10)
Chloride	mg/L	250	AO	-	157	103	127	48.9
Color (apparent)	color unit	5	AO	-	-	34.8 J	81.9	
Color (apparent)	TCU	5	AO	-	35.7	-	-	15.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	19.5	4.2	2.5	2.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	0.15	0.40	**0.636**[3]
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.53	7.76	7.54	8.02
Phenol	mg/L	-	-	-	ND(0.0010)	0.0030	0.0015	0.0014
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.030
Sulfate	mg/L	500	AO	-	839	279	333	172
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	16	0	1[3]
Total dissolved solids (TDS)	mg/L	500	OAO	-	1750	1030	1140	**823**[3]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	5.09	2.86	0.42	0.43
Total suspended solids (TSS)	mg/L	-	-	-	28.4	10.0	24.4	28.1
Turbidity	NTU	5	AO	-	63.6	23.5	11.4	3.44
Un-ionized ammonia	mg/L	-	-	-	0.00197	0.0104	0.00365	0.0020
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.32	1.69	0.557	0.961
Dissolved oxygen (DO), field	mg/L	-	-	-	7.89	8.74	10.48	6.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-64	24	144
pH, field	s.u.	6.5-8.5	OG	-	6.24	7.22	7.80	7.73
Temperature, field	Deg C	15	AO	-	11.1	10.44	7.2	17.05
Turbidity, field	NTU	5	AO	-	0	5.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	-	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-110915-TS-012
Sample Date:					11/9/2015
					Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Metals					
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.28
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.0010)
Copper (dissolved)	mg/L	-	-	-	ND(0.0020)
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.10)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.00050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0439
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0818
Nickel (dissolved)	mg/L	-	-	-	ND(0.0050)
Silver (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	998	281
Ammonia-N	mg/L	-	-	0.2	0.365[3]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	14
Chloride	mg/L	250	AO	-	52.5
Color (apparent)	color unit	5	AO	-	
Color (apparent)	TCU	5	AO	-	59.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	4.3
Escherichia coli	cfu/100mL	ND	MAC	5	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0
Nitrate (as N)	mg/L	10	AO	0.5	0.81[3]
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	7.72
Phenol	mg/L	-	-	-	0.0019
Phosphorus	mg/L	-	-	0.5	ND(0.030)
Sulfate	mg/L	500	AO	-	256
Total coliform bacteria	cfu/100mL	ND	MAC	-	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	654[3]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.04
Total suspended solids (TSS)	mg/L	-	-	-	6.0
Turbidity	NTU	5	AO	-	4.96
Un-ionized ammonia	mg/L	-	-	-	0.177
Field Parameters					
Conductivity, field	mS/cm	-	-	-	0.931
Dissolved oxygen (DO), field	mg/L	-	-	-	2.36
Oxidation reduction potential (ORP), field	millivolts	-	-	-	136
pH, field	s.u.	6.5-8.5	OG	-	8.84[3]
Temperature, field	Deg C	15	AO	-	11.35
Turbidity, field	NTU	5	AO	-	2.5

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-110915-TS-012
Sample Date:					11/9/2015
					Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]	
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(360)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	--
Acenaphthene	µg/L	-	-	-	--
Acenaphthylene	µg/L	-	-	-	--
Acridine	µg/L	-	-	-	--
Anthracene	µg/L	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	--
Chrysene	µg/L	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--
Fluoranthene	µg/L	-	-	-	--
Fluorene	µg/L	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--
Naphthalene	µg/L	-	-	-	--
Phenanthrene	µg/L	-	-	-	--
Pyrene	µg/L	-	-	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
- Exceedence of the Tier I Trigger Level
- Exceedence of the ODWQS

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051510-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/15/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0031	ND(0.0010)	-	0.0018	0.0013
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.00004	0.00116	0.00046	-	0.00159	0.00009
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.089	ND(0.050)	1.36	-	0.811	ND(0.050)
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	73.7	-	-	-	-	-
Manganese	mg/L	-	0.0433	0.0357	0.305	-	0.348	0.0346
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.284	0.348	0.435	-	0.388	0.357
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	0.0200	0.0067	0.0894	-	0.149	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	220	201	216	-	188	286
Ammonia-N	mg/L	-	ND(0.050)	0.103	0.096	-	0.110	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	83.1	83.6	79.2	-	122	122
Color (apparent)	TCU	-	8.7	9.9	-	9.1	21.3	12.0
Conductivity	umhos/cm	-	1490	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	3.1	6.7	-	5.2	4.9
Escherichia coli	cfu/100mL	100	0	1	-	1	35	1
Fecal coliform bacteria	cfu/100mL	4800	1	10	-	1	37	2
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(1.0)	0.57	0.94	-	1.32	0.55
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.08	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0044	0.0079	0.0894	-	0.0157	0.0061
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	8	350	-	2100	600	140
Total dissolved solids (TDS)	mg/L	-	1100	1010	1010	-	1170	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	0.52	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	ND(0.000014)	0.0025	0.00035	-	0.00034	ND(0.000094)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051510-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/15/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1850	1283	1480	1750	1840	1740
Dissolved oxygen (DO), field	mg/L	-	-	-	10.51	10.4	11.2	12.6
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	171	-
pH, field	s.u.	6.5-8.5	8.31	7.65	7.27	8.3	7.06	6.96
Temperature, field	Deg C	-	4.0	22	8.1	5.7	12.29	8.8
Turbidity, field	NTU	-	73	-	-	-	6.7	10.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L			-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0093	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	-	ND(0.0010)	0.0027	0.0025	ND(0.010)
Boron	mg/L	0.2	0.149	-	0.089	0.087	0.105	ND(0.10)
Cadmium	mg/L	0.0002	0.00083	-	0.00017	0.00103	0.00061	ND(0.00090)
Chromium	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt	mg/L	0.0009	0.00111	-	0.00233	0.00152	0.00277	ND(0.0050)
Copper	mg/L	0.005	0.0016	-	0.0011	ND(0.0010)	ND(0.0010)	ND(0.010)
Iron	mg/L	0.3	0.231	-	0.118	0.089	0.078	ND(0.50)
Lead	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0050)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0536	-	0.185	0.0636	0.0593	0.028
Mercury	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.275	-	0.558	0.490	0.508	0.567
Nickel	mg/L	0.025	0.0113	-	0.0157	0.0136	0.0258	0.016
Zinc	mg/L	0.03	0.0174	-	ND(0.0030)	ND(0.0030)	0.0053	ND(0.030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	268	-	232	145	179	136
Ammonia-N	mg/L	-	0.073	-	0.100	0.634	0.463	0.105
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	15	-	76	ND(10)	38	10
Chloride	mg/L	-	164	-	94.2	95.8	101	100
Color (apparent)	TCU	-	-	7.2	15.0	9.4 J	8.6	16.3
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.2	-	3.2	2.4	4.5	2.2
Escherichia coli	cfu/100mL	100	-	45	130	ND(10)	10	10
Fecal coliform bacteria	cfu/100mL	4800	-	11	150	ND(10)	3	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	1.10	-	0.34	1.28	1.30	0.33
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.87	-	8.08	8.11	8.14	8.12
Phenol	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	0.0050	ND(0.0010)	0.0035
Phosphorus	mg/L	0.01	0.0157	-	0.0099	0.0143	0.0092	0.0183
Sulfate	mg/L	-	-	-	684	570	696	489
Total coliform bacteria	cfu/100mL	-	-	260	1000	ND(1000)	600	2200
Total dissolved solids (TDS)	mg/L	-	1370	-	1420	1130	1370	1040
Total kjeldahl nitrogen (TKN)	mg/L	-	0.49	-	0.51	0.60	0.66	0.49
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	11.6	-	5.6	12.8	15.2	7.2
Turbidity	NTU	-	-	1.11	2.20	3.45	12.6	4.83
Un-ionized ammonia	mg/L	0.02	-	-	0.000189	0.000171	0.000153	0.0068

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45504-111313-TS-004	SW-45504-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	2110	1920	1510	1590	1770	1560
Dissolved oxygen (DO), field	mg/L	-	-	-	12.19	8.13	10.16	8.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	66			9
pH, field	s.u.	6.5-8.5	5.57	7.06	7.02	9.74	9.35	8.14
Temperature, field	Deg C	-	18.86	17.64	7.2	20.3	2.4	20.43
Turbidity, field	NTU	-	-	-	67.1	58.8	11.5	12.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051510-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/10/2010	11/5/2010	11/11/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.010)	ND(0.0010)	0.0011	0.0035	-
Boron	mg/L	0.2	0.096	0.11	ND(0.10)	-	-	-
Cadmium	mg/L	0.0002	0.00011	ND(0.00090)	ND(0.00010)	0.00052	0.00054	-
Chromium	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0050)	-	-	-
Cobalt	mg/L	0.0009	0.00161	ND(0.0050)	0.0020	-	-	-
Copper	mg/L	0.005	0.0013	ND(0.010)	ND(0.010)	-	-	-
Iron	mg/L	0.3	0.061	ND(0.50)	ND(0.50)	0.221	0.36	-
Lead	mg/L	0.005	ND(0.0010)	ND(0.0050)	ND(0.0010)	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0334	0.139	0.0843	0.0750	0.859	-
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.391	0.338	0.219	0.205	0.141	-
Nickel	mg/L	0.025	0.0165	0.033	0.0196	-	-	-
Zinc	mg/L	0.03	0.0068	ND(0.030)	ND(0.030)	0.0136	0.0490	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	235	187	203	161	217	-
Ammonia-N	mg/L	-	0.081	1.10	ND(0.050)	0.079	0.162	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	4.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	24	12	16	-	-	-
Chloride	mg/L	-	224	87.1	221	89.0	66.8	-
Color (apparent)	TCU	-	9.0	12.4	8.7	17.4	-	23.7
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.0	2.7	3.9	3.6	5.2	-
Escherichia coli	cfu/100mL	100	4	50	1	178	-	3
Fecal coliform bacteria	cfu/100mL	4800	6	110	10	190	-	3
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.56	2.30	0.60	ND(0.10)	0.74	-
Nitrite (as N)	mg/L	0.3	ND(0.10)	0.047	ND(0.050)	ND(0.10)	ND(0.10)	-
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.88	8.14	7.85	-	-	-
Phenol	mg/L	0.005	ND(0.0010)	0.0061	0.0015	-	-	-
Phosphorus	mg/L	0.01	0.0038	0.0235	0.0082	0.0363	0.379	-
Sulfate	mg/L	-	597	583	950	-	-	-
Total coliform bacteria	cfu/100mL	-	1900	2000	500	270	-	2400
Total dissolved solids (TDS)	mg/L	-	1440	1110	1630	1170	780	-
Total kjeldahl nitrogen (TKN)	mg/L	-	0.81	1.34	0.32	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	ND(2.0)	52.8	2.8	-	-	-
Turbidity	NTU	-	4.39	36.0	3.10	-	-	-
Un-ionized ammonia	mg/L	0.02	0.00068	0.0030	ND(0.0032)	0.0025	0.00053	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051510-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010	11/11/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	960	1.53	2.36	1445	1200	1610
Dissolved oxygen (DO), field	mg/L	-	21.17	10.05	6.58	-	12.6	12.04
Oxidation reduction potential (ORP), field	millivolts	-	117	-	46	-	-	-
pH, field	s.u.	6.5-8.5	7.64	8.23	8.51	7.79	7.26	8.56
Temperature, field	Deg C	-	2.57	19.92	9.12	21.3	7.2	6
Turbidity, field	NTU	-	-	106	1.3	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	170	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	450	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(360)	ND(360)	620	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	170	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	450	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	ND(250)	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.022	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0056	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004
Sample Date:			5/17/2011	5/17/2011	11/17/2011	5/14/2012	5/23/2012	11/13/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	Units	PWQO						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)	-	ND(0.0010)
Boron	mg/L	0.2	-	-	-	ND(0.050)	-	ND(0.050)
Cadmium	mg/L	0.0002	0.00077	0.00035	0.00047	ND(0.00010)	-	ND(0.00010)
Chromium	mg/L	-	-	-	-	0.0013	-	ND(0.0010)
Cobalt	mg/L	0.0009	-	-	-	ND(0.00050)	-	ND(0.00050)
Copper	mg/L	0.005	-	-	-	0.0022	-	ND(0.0010)
Iron	mg/L	0.3	0.180	0.184	ND(0.050)	0.317	-	0.157
Lead	mg/L	0.005	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0945	0.0961	0.201	0.186	-	0.123
Mercury	mg/L	0.0002	-	-	-	ND(0.00010)	-	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.288	0.262	0.178	0.0050	-	0.0058
Nickel	mg/L	0.025	-	-	-	0.0021	-	ND(0.0020)
Zinc	mg/L	0.03	0.0178	0.0161	0.0057	0.0273	-	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	190	186	303	215	-	240
Ammonia-N	mg/L	-	0.080	0.073	ND(0.050)	0.068	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	40	-	42
Chloride	mg/L	-	70.0	69.8	182	88.2	-	121
Color (apparent)	TCU	-	23.5	19.0	13.7	-	67.9	29.6
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.4	4.1	5.1	17.6	-	8.0
Escherichia coli	cfu/100mL	100	22	19	0	-	186	11
Fecal coliform bacteria	cfu/100mL	4800	20	30	2	-	254	13
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	1.16	1.16	1.13	ND(0.10)	-	0.11
Nitrite (as N)	mg/L	0.3	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	-	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	7.97	-	8.19
Phenol	mg/L	0.005	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.0090	0.0074	0.0043	0.0788	-	0.0289
Sulfate	mg/L	-	-	-	-	-	-	205
Total coliform bacteria	cfu/100mL	-	1400	1600	130	-	1200	1200
Total dissolved solids (TDS)	mg/L	-	976	940	1390	514	-	762
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.64	-	0.52
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	26.4	-	4.0
Turbidity	NTU	-	-	-	-	-	4.20	0.85
Un-ionized ammonia	mg/L	0.02	0.000125	0.000113	ND(0.000086)	-	-	ND(0.00014)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004
Sample Date:			5/17/2011	5/17/2011	11/17/2011	5/14/2012	5/23/2012	11/13/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	1600	1600	1830	812	973	900
Dissolved oxygen (DO), field	mg/L	-	-	-	17.19	-	-	13.64
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	57
pH, field	s.u.	6.5-8.5	6.8	6.8	7.03	7.04	7.42	7.22
Temperature, field	Deg C	-	11.13	11.13	5.7	19.03	21.28	8.3
Turbidity, field	NTU	-	14.2	14.2	24.7	-	-	35.7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[redacted] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45504-052313-TS-002	SW-45504-052313-TS-003	SW-45504-111313-TS-003	SW-45504-052514-MB-005	SW-45504-112614-TS-001	SW-45504-052715-TS-004
Sample Date:			5/23/2013	5/23/2013	11/13/2013	5/28/2014	11/26/2014	5/27/2015
			Original	Duplicate	Original	Original	Original	Original
Parameters:	Units	PWQO						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	0.0022 J	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009	0.00086	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	0.0027 J	0.0016 J	ND(0.0010)	0.0011	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	3.49 J	3.59 J	0.164	0.355	0.499	0.291
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.120	0.0864	0.0716	0.133	0.0860	0.209
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0057	0.0058	0.0033	0.0080	0.0082	0.0044
Nickel	mg/L	0.025	0.0027	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)
Zinc	mg/L	0.03	0.0094	0.0072	0.0059	0.0046	0.0039	0.0046
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	168	163	240	234	203	238
Ammonia-N	mg/L	-	0.056	0.051	ND(0.050)	0.077	0.102	0.150
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	32	40	34	25	22	29
Chloride	mg/L	-	81.6	82.6	112	119	109	150
Color (apparent)	TCU	-	58.5 J	59.4 J	30.3	37.4	35.2	51.5
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	12.7	12.6	9.2	9.8	8.4	10.9
Escherichia coli	cfu/100mL	100	46 J	20 J	10	70	50	210
Fecal coliform bacteria	cfu/100mL	4800	80 J	150 J	30	100	70	340
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.14	0.14	0.18	0.18	0.43	ND(0.020)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.07	8.07	8.09	8.25	8.01	8.13
Phenol	mg/L	0.005	0.0080 J	0.0090 J	0.0044	0.0020	ND(0.0010)	0.0060
Phosphorus	mg/L	0.01	0.0870	0.0883	0.0313	0.0235	0.0368	0.0430
Sulfate	mg/L	-	119	119	134	188	179	113
Total coliform bacteria	cfu/100mL	-	31000	47000	3000	2900	1500	4000
Total dissolved solids (TDS)	mg/L	-	474	462	606	730	637	696
Total kjeldahl nitrogen (TKN)	mg/L	-	0.81	0.64	1.03	0.66	0.49	1.30
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	69.0	83.0	5.2	5.2	8.0	7.6
Turbidity	NTU	-	3.34	4.31	2.49	3.62	7.32	7.11
Un-ionized ammonia	mg/L	0.02	0.000014	ND(0.000013)	ND(0.000016)	0.0049	0.00174	0.00044

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052514-MB-005	SW-45804-112614-TS-001	SW-45804-052715-TS-004
Sample Date:			5/23/2013	5/23/2013	11/13/2013	5/28/2014	11/26/2014	5/27/2015
			Original	Duplicate	Original	Original	Original	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	750	-	1040	1220	473	0.722
Dissolved oxygen (DO), field	mg/L	-	7.64	-	10.24	10.3	21.98	5.47
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	54	123.1	-
pH, field	s.u.	6.5-8.5	8.78	8.79	8.32	8.21	8.17	7.75
Temperature, field	Deg C	-	19.1	19.1	2.1	17.97	1.83	21.32
Turbidity, field	NTU	-	43.9	-	0	9.2	-	0
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-110915-TS-004	SW-45804-051510-MB-004	SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/9/2015	5/15/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.00030	ND(0.0010)	ND(0.0010)	0.0014	-	ND(0.0010)
Boron	mg/L	0.2	0.037	-	-	-	-	-
Cadmium	mg/L	0.0002	0.000011	0.00031	0.00031	0.00013	-	0.00020
Chromium	mg/L	-	0.00100	-	-	-	-	-
Cobalt	mg/L	0.0009	0.00026	-	-	-	-	-
Copper	mg/L	0.005	ND(0.0010)	-	-	-	-	-
Iron	mg/L	0.3	0.404	0.179	0.166	1.20	-	0.153
Lead	mg/L	0.005	0.00019	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.149	0.110	0.105	0.199	-	0.101
Mercury	mg/L	0.0002	ND(0.000010)	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0102	0.318	0.318	0.0330	-	0.0305
Nickel	mg/L	0.025	0.0022	-	-	-	-	-
Zinc	mg/L	0.03	0.0033	0.0127	0.0040	0.0104	-	0.0062
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	234	214	208	229	-	239
Ammonia-N	mg/L	-	ND(0.050)	0.105	0.153	0.058	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	-	-	-	-	-
Chloride	mg/L	-	120	100	107	74.3	-	69.1
Color (apparent)	TCU	-	31.7	33.1	25.8	-	35.1	39.8
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.4	5.9	5.5	8.2	-	11.2
Escherichia coli	cfu/100mL	100	20	28	198	-	12	31
Fecal coliform bacteria	cfu/100mL	4800	40	120	170	-	23	39
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.48	ND(0.10)	0.51	0.14	-	ND(0.30)
Nitrite (as N)	mg/L	0.3	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.02	-	-	-	-	-
Phenol	mg/L	0.005	0.0017	-	-	-	-	-
Phosphorus	mg/L	0.01	0.021	0.0280	0.0360	0.0018	-	0.0189
Sulfate	mg/L	-	243	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	800	240	260	-	300	1500
Total dissolved solids (TDS)	mg/L	-	988	960	942	572	-	834
Total kjeldahl nitrogen (TKN)	mg/L	-	0.61	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.0	-	-	-	-	-
Turbidity	NTU	-	3.81	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	ND(0.0066)	0.0070	0.0102	0.00034	-	ND(0.00022)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-110915-TS-004	SW-45804-051510-MB-004	SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/9/2015	5/15/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	0.947	1219	1219	970	1060	739
Dissolved oxygen (DO), field	mg/L	-	5.99	-	-	12.49	11.84	9.64
Oxidation reduction potential (ORP), field	millivolts	-	66	-	-	-	-	231
pH, field	s.u.	6.5-8.5	8.90	8.02	8.02	7.55	6.97	7.25
Temperature, field	Deg C	-	8.3	24.6	24.6	8.0	5.54	11.18
Turbidity, field	NTU	-	1	-	-	-	-	3.6
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		ND(250)	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		ND(250)	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0147	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45504-111711-TS-005	SW-45504-051412-MB-003	SW-45504-052312-mb-005	SW-45504-111312-MB-005	SW-45504-052313-TS-001	SW-45504-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	Units	PWQO						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	0.00013	-	ND(0.00010)	0.00012	ND(0.00010)
Chromium	mg/L	-	-	ND(0.0010)	-	0.0011	0.0011	ND(0.0010)
Cobalt	mg/L	0.0009	-	0.00085	-	ND(0.00050)	ND(0.00050)	0.00086
Copper	mg/L	0.005	-	0.0019	-	0.0014	0.0018	ND(0.0010)
Iron	mg/L	0.3	0.523	0.471	-	0.521	0.634	0.369
Lead	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.116	0.167	-	0.149	0.0924	0.108
Mercury	mg/L	0.0002	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0064	0.117	-	0.0265	0.0309	0.0128
Nickel	mg/L	0.025	-	0.0049	-	0.0032	0.0028	0.0053
Zinc	mg/L	0.03	0.0043	0.0094	-	0.0045	0.0052	0.0116
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	242	209	-	246	175	239
Ammonia-N	mg/L	-	ND(0.050)	0.122	-	ND(0.050)	0.076	0.126
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	21	-	51	38	38
Chloride	mg/L	-	81.2	94.0	-	120	84.0	110
Color (apparent)	TCU	-	30.3	-	55.2	34.0	53.8 J	27.6
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	7.0	13.0	-	7.8	12.4	9.8
Escherichia coli	cfu/100mL	100	24	-	77	11	128	10
Fecal coliform bacteria	cfu/100mL	4800	10	-	360	12	140	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.49	-	0.14	0.19	0.37
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	8.06	-	8.24	8.09	8.11
Phenol	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	0.0050	0.0015
Phosphorus	mg/L	0.01	0.0252	0.0435	-	0.0208	0.101	0.0215
Sulfate	mg/L	-	-	-	-	225	145	235
Total coliform bacteria	cfu/100mL	-	290	-	1000	1500	17000	1000
Total dissolved solids (TDS)	mg/L	-	518	738	-	792	518	758
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.61	-	0.57	0.54	0.46
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	20.8	-	19.2	67.0	4.8
Turbidity	NTU	-	-	-	4.50	1.36	5.35	8.96
Un-ionized ammonia	mg/L	0.02	ND(0.000071)	-	-	ND(0.000058)	0.0000144	0.000034

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-111711-TS-005	SW-45804-051412-MB-003	SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	799	1200	7685	999	800	1230
Dissolved oxygen (DO), field	mg/L	-	15.93	-	-	13.97	7.75	8.35
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	98	-	-
pH, field	s.u.	6.5-8.5	8.91	7	7.64	6.87	8.82	8.27
Temperature, field	Deg C	-	8.7	18.31	22.78	5.4	19.2	1.8
Turbidity, field	NTU	-	28.2	-	-	45.7	94.7	4.1
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/15/2010	11/5/2010
			Original	Original	Original	Original	Original	Original
Parameters:	Units	PWQO						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00029	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	0.057	0.061	-	-
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000030)	0.00011	ND(0.00010)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00071	-	-
Cobalt	mg/L	0.0009	0.00051	ND(0.00050)	0.00071	0.00031	-	-
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	-	-
Iron	mg/L	0.3	0.239	0.339	2.495	0.190	0.271	0.475
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00010	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.110	0.0971	0.227	0.122	0.0542	0.0262
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.157	0.0221	0.0512	0.0535	0.0536	0.0230
Nickel	mg/L	0.025	0.0056	0.0031	0.0053	0.0055	-	-
Zinc	mg/L	0.03	ND(0.0030)	0.0057	0.0030	0.0054	0.0056	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	216	214	235	205	135	116
Ammonia-N	mg/L	-	0.071	0.097	0.072	0.057	0.142	0.354
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.3	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	21	24	25	16	-	-
Chloride	mg/L	-	120	109	181	131	100	36.9
Color (apparent)	TCU	-	30.9	31.2	41.0	22.9	21.2	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.3	9.3	9.5	6.3	6.8	9.6
Escherichia coli	cfu/100mL	100	40	70	180	30	5	-
Fecal coliform bacteria	cfu/100mL	4800	50	80	260	40	2	-
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.25	0.61	0.562	0.68	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	0.011	ND(0.050)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.23	8.02	8.18	8.05	-	-
Phenol	mg/L	0.005	0.0044	ND(0.0010)	0.0018	0.0024	-	-
Phosphorus	mg/L	0.01	0.0310	0.0338	0.0418	0.0191	0.0558	0.0243
Sulfate	mg/L	-	305	303	245	625	-	-
Total coliform bacteria	cfu/100mL	-	2700	1800	3000	500	50	-
Total dissolved solids (TDS)	mg/L	-	675	837	751	1,250	936	548
Total kjeldahl nitrogen (TKN)	mg/L	-	0.51	0.45	0.91	0.51	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.8	8.4	14.0	ND(2.0)	-	-
Turbidity	NTU	-	3.24	7.27	10.5	2.93	-	-
Un-ionized ammonia	mg/L	0.02	0.0045	0.00159	0.0029	0.0112	0.0029	0.00078

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010
			Original	Original	Original	Original	Original	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	1440	582	1.16	1.53	1207	910
Dissolved oxygen (DO), field	mg/L	-	10.59	21.46	8.64	8.62	-	12.47
Oxidation reduction potential (ORP), field	millivolts	-	45	98.1	-	74	-	-
pH, field	s.u.	6.5-8.5	9.22	8.13	7.87	9.51	7.6	7.13
Temperature, field	Deg C	-	17.62	2.36	21.97	7.7	21	5.9
Turbidity, field	NTU	-	9.2	-	6.1	0.1	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	ND(250)	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	0.0011	0.0012	0.0012	ND(0.0005)	0.0009
Boron	mg/L	0.2	-	-	-	-	0.011	0.038
Cadmium	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	-	-	-	-	ND(0.002)	0.003
Cobalt	mg/L	0.0009	-	-	-	-	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	-	-	-	-	0.002	0.004
Iron	mg/L	0.3	-	0.129	0.830	0.585	-	-
Lead	mg/L	0.005	-	-	-	-	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.0757	0.132	0.117	-	-
Mercury	mg/L	0.0002	-	-	-	-	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0163	0.0124	0.0119	-	-
Nickel	mg/L	0.025	-	-	-	-	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	-	0.0124	0.0033	ND(0.0030)	ND(0.005)	0.011
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	135	143	138	-	-
Ammonia-N	mg/L	-	-	0.146	0.056	0.053	0.15	0.78
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	7	28
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	19.5	18.7	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	33	88
Chloride	mg/L	-	-	60.6	35.3	35.1	-	-
Color (apparent)	TCU	-	43.4	26.7	25.8	24.9	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	-	11.9	11.2	10.7	5.6	12.4
Escherichia coli	cfu/100mL	100	6	80	44	58	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	4800	15	140	70	80	-	-
Mineral oil and grease	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.62	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	0.2
Nitrite (as N)	mg/L	0.3	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	ND(1.0)	1.9
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
pH, lab	s.u.	6.5-8.5	-	-	-	-	7.95	8.14
Phenol	mg/L	0.005	-	-	-	-	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	-	0.0187	0.0552	0.112	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	30	2900	600 J	300 J	-	-
Total dissolved solids (TDS)	mg/L	-	-	792	474	468	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	1.55	3.48
Total phosphorus	mg/L	-	-	-	-	-	0.12	0.21
Total suspended solids (TSS)	mg/L	-	-	-	-	-	9	40
Turbidity	NTU	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	-	0.00101	0.0040	0.0038	-	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	980	873	677	-	489	1020
Dissolved oxygen (DO), field	mg/L	-	12.91	10.95	10.38	-	16	10.1
Oxidation reduction potential (ORP), field	millivolts	-	-	216	-	-	-	-
pH, field	s.u.	6.5-8.5	8.6	7.37	8.82	9.03	-	-
Temperature, field	Deg C	-	9.68	13.5	7.2	7.2	-	-
Turbidity, field	NTU	-	-	0	57	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0060	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	-	-
Fluoranthene	µg/L	0.0006	-	-	-	ND(0.020)	-	-
Fluorene	µg/L	0.2	-	-	-	0.023	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	-
Naphthalene	µg/L	7	-	-	-	ND(0.020)	-	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	-	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	5/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0027	0.0014	0.0014	-	-	0.0024
Boron	mg/L	0.2	0.044	ND(0.050)	ND(0.050)	-	-	0.041
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.00010)	ND(0.00010)	-	-	ND(0.005)
Chromium	mg/L	-	ND(0.002)	ND(0.0010)	ND(0.0010)	-	-	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	0.00071	0.00089	-	-	ND(0.005)
Copper	mg/L	0.005	0.002	0.0015	0.0014	-	-	ND(0.002)
Iron	mg/L	0.3	-	0.630	0.817	-	-	-
Lead	mg/L	0.005	ND(0.02)	ND(0.0010)	ND(0.0010)	-	-	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.443	0.399	-	-	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0087	0.0085	-	-	-
Nickel	mg/L	0.025	ND(0.01)	0.0025	0.0024	-	-	ND(0.01)
Zinc	mg/L	0.03	0.006	0.0041	ND(0.0030)	-	-	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	87	85	-	-	-
Ammonia-N	mg/L	-	0.09	ND(0.050)	ND(0.050)	-	-	ND(0.01)
Biochemical oxygen demand (BOD)	mg/L	-	8	-	-	-	-	3
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	9.1	8.3	-	-	-
Chemical oxygen demand (COD)	mg/L	-	61	78	72	-	-	40
Chloride	mg/L	-	-	80.3	81.0	-	-	-
Color (apparent)	TCU	-	-	-	-	125	116	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.7	21.2	21.8	-	-	10.3
Escherichia coli	cfu/100mL	100	4	-	-	158	142	28
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	1680 J	890 J	-
Mineral oil and grease	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Nitrate (as N)	mg/L	1.62	0.1	ND(0.10)	ND(0.10)	-	-	0.1
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.10)	ND(0.10)	-	-	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
pH, lab	s.u.	6.5-8.5	8.33	8.49	8.47	-	-	8.21
Phenol	mg/L	0.005	ND(0.001)	ND(0.0010)	ND(0.0010)	-	-	ND(0.001)
Phosphorus	mg/L	0.01	-	0.151	0.154	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	420 J	1100 J	-
Total dissolved solids (TDS)	mg/L	-	-	578	596	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.38	2.19	1.66	-	-	1.73
Total phosphorus	mg/L	-	0.21	-	-	-	-	0.11
Total suspended solids (TSS)	mg/L	-	23	17.2	18.0	-	-	11
Turbidity	NTU	-	-	-	-	14.5	16.3	-
Un-ionized ammonia	mg/L	0.02	-	-	-	-	-	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	6/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1010	1000	-	1020	-	980
Dissolved oxygen (DO), field	mg/L	-	9.4	-	-	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	-	7.6	-	7.14	-	-
Temperature, field	Deg C	-	-	22.73	-	21.02	-	-
Turbidity, field	NTU	-	-	-	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[redacted] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45904-111212-MS-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0006	0.0019	0.001	0.0012	0.0008	ND(0.0010)
Boron	mg/L	0.2	0.047	0.047	0.038	0.049	0.057	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	0.003	0.003	0.076	0.02	0.0013
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	0.00074
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	0.003	0.005	0.004	0.0025
Iron	mg/L	0.3	-	-	-	-	-	0.745
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	0.348
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	-	-	0.0120
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	0.02	0.07	0.02	0.0035
Zinc	mg/L	0.03	0.006	0.008	ND(0.005)	0.016	0.009	0.0059
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	-	155
Ammonia-N	mg/L	-	ND(0.01)	0.24	ND(0.01)	0.31	0.08	0.161
Biochemical oxygen demand (BOD)	mg/L	-	6	ND(3)	3	8	13	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	-	-	14.0
Chemical oxygen demand (COD)	mg/L	-	58	52	39	70	52	82
Chloride	mg/L	-	-	-	-	-	-	47.5
Color (apparent)	TCU	-	-	-	-	-	-	76.6 J
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.8	10.3	8.3	9.2	11.5	12.0
Escherichia coli	cfu/100mL	100	540	330	520	100	100	60
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	-	-	140
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
Nitrate (as N)	mg/L	1.62	ND(0.1)	0.1	ND(0.1)	0.1	ND(0.1)	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(1.0)	ND(0.1)	ND(0.1)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(0.1)	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
pH, lab	s.u.	6.5-8.5	7.76	7.86	7.99	8	8	8.18
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)
Phosphorus	mg/L	0.01	-	-	-	-	-	0.338
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	-	-	1000
Total dissolved solids (TDS)	mg/L	-	-	-	-	-	-	566
Total kjeldahl nitrogen (TKN)	mg/L	-	2.94	1.76	1.26	2.62	3.14	2.00
Total phosphorus	mg/L	-	0.23	0.19	0.12	0.32	0.21	-
Total suspended solids (TSS)	mg/L	-	20	11	9	69	34	60.0
Turbidity	NTU	-	-	-	-	-	-	39.0 J
Un-ionized ammonia	mg/L	0.02	-	-	-	-	-	0.032

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45804-111212-MS-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	1030	947	718	992	810	865
Dissolved oxygen (DO), field	mg/L	-	1.6	2	8.1	11.1	11.9	18.17
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	126
pH, field	s.u.	6.5-8.5	-	-	-	-	-	9.69
Temperature, field	Deg C	-	-	-	-	-	-	8.1
Turbidity, field	NTU	-	-	-	-	-	-	235
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0006	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.026)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	0.03	-	-	-	-	-	0.021
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0009	0.0011	0.0010	0.0012	0.0015
Boron	mg/L	0.2	ND(0.050)	0.03	0.038	ND(0.050)	0.023	0.026
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	0.0017	ND(0.002)	ND(0.002)	ND(0.0013)	ND(0.002)	0.002
Cobalt	mg/L	0.0009	0.00076	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.0027	0.002	0.002	0.0014	0.002	0.002
Iron	mg/L	0.3	0.830	-	-	0.152	-	-
Lead	mg/L	0.005	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.343	-	-	0.203	-	-
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0123	-	-	0.0174	-	-
Nickel	mg/L	0.025	0.0035	ND(0.01)	ND(0.01)	0.0025	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	0.0061	0.003	0.013	ND(0.0030)	ND(0.005)	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	163	-	-	106	-	-
Ammonia-N	mg/L	-	0.171	0.88	0.47	0.797	ND(0.01)	0.02
Biochemical oxygen demand (BOD)	mg/L	-	-	ND(3)	ND(3)	-	ND(3)	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	13.5	-	-	2.8	-	-
Chemical oxygen demand (COD)	mg/L	-	66	34	35	27	27	29
Chloride	mg/L	-	48.5	-	-	90.5	-	-
Color (apparent)	TCU	-	53.3 J	-	-	28.2 J	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.3	5.2	7.2	9.8	8.5	9.2
Escherichia coli	cfu/100mL	100	80	22	76	ND(10)	3	50
Fecal coliform bacteria	cfu/100mL	4800	210	-	-	40	-	-
Mineral oil and grease	mg/L	-	-	ND(1.0)	ND(1.0)	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.2	0.2	0.11	0.4	0.1
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.1)	ND(0.1)	ND(0.10)	0.2	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
Oil and grease, animal and vegetable	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
pH, lab	s.u.	6.5-8.5	8.15	7.72	8.35	8.18	8.09	8.15
Phenol	mg/L	0.005	ND(0.0010)	ND(0.001)	ND(0.001)	0.00096	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.315	-	-	0.0635	-	-
Sulfate	mg/L	-	-	-	-	340	-	-
Total coliform bacteria	cfu/100mL	-	1100	-	-	1000	-	-
Total dissolved solids (TDS)	mg/L	-	566	-	-	718	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.01	1.94	2.06	1.86	1.14	1.52
Total phosphorus	mg/L	-	-	0.13	0.08	-	0.05	0.19
Total suspended solids (TSS)	mg/L	-	44.0	7	14	4.4	5	48
Turbidity	NTU	-	31.0 J	-	-	2.71	-	-
Un-ionized ammonia	mg/L	0.02	0.004	-	-	0.000323	-	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	837	1080	1150	980	951
Dissolved oxygen (DO), field	mg/L	-	-	5.4	13.1	8.09	8.9	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	8.26	-	-	8.59	-	-
Temperature, field	Deg C	-	8.1	-	-	20.8	-	-
Turbidity, field	NTU	-	-	-	-	119	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	ND(0.028)	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	-	-	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0006	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.020)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			8/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0002	0.0003	ND(0.0001)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.025	0.007	0.027	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.0010)	0.0012	ND(0.0010)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	ND(0.002)	0.0016 J	0.0026 J	0.0011
Iron	mg/L	0.3	-	-	-	0.360	0.557	0.226
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	0.150	0.165	0.0571
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	0.0078	0.0075	0.0124
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	ND(0.01)	0.0022 J	0.0043 J	ND(0.0020)
Zinc	mg/L	0.03	ND(0.005)	0.005	0.009	0.0072 J	0.0133 J	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	160	170	145
Ammonia-N	mg/L	-	ND(0.01)	ND(0.01)	0.99	0.659	0.696	0.190
Biochemical oxygen demand (BOD)	mg/L	-	5	ND(3)	8	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	3.3	3.9	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	33	25	11	70	72	39
Chloride	mg/L	-	-	-	-	51.4	50.5	84.2
Color (apparent)	TCU	-	-	-	-	43.5	45.6	32.0
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.1	9.9	11.3	10.6	10.5	9.1
Escherichia coli	cfu/100mL	100	2	18	96	30	20	1 J
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	50	50	3 J
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.1)	0.1	0.2	ND(0.10)	0.14	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
pH, lab	s.u.	6.5-8.5	8.2	8.55	8.03	8.16	8.23	8.20
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	0.0019	0.0014 J
Phosphorus	mg/L	0.01	-	-	-	0.0348	0.0358	0.0338 J
Sulfate	mg/L	-	-	-	-	183	181	240
Total coliform bacteria	cfu/100mL	-	-	-	-	4000	5000	300 J
Total dissolved solids (TDS)	mg/L	-	-	-	-	488	486	636
Total kjeldahl nitrogen (TKN)	mg/L	-	1.26	0.87	2.69	2.26	1.71	1.25
Total phosphorus	mg/L	-	0.1	0.04	0.1	-	-	-
Total suspended solids (TSS)	mg/L	-	8	ND(3)	10	6.8 J	14.0 J	4.4
Turbidity	NTU	-	-	-	-	6.76	10.0	3.15
Un-ionized ammonia	mg/L	0.02	-	-	-	0.000227	0.000240	0.0194

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			8/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	775	699	765	824	-	1120
Dissolved oxygen (DO), field	mg/L	-	11.1	13.3	12.5	14.72	-	1.53
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	5
pH, field	s.u.	6.5-8.5	-	-	-	9.29	8.88	8.34
Temperature, field	Deg C	-	-	-	-	4.9	4.9	20.8
Turbidity, field	NTU	-	-	-	-	7.6	-	7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.030)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	0.0086 J	0.0118 J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0006	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.050)
Phenanthrene	µg/L	0.03	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.029
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	0.00189 J
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00046
Copper	mg/L	0.005	0.0012	ND(0.0010)	ND(0.0010)	0.0013	0.0012	0.0015
Iron	mg/L	0.3	0.239	0.180	0.173	0.284	0.248	0.562
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00037
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0546	0.170	0.168	0.0449	0.0503	0.146
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0120	0.0055	0.0053	0.0128	0.0130	0.00576
Nickel	mg/L	0.025	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0021	ND(0.0020)	0.0016
Zinc	mg/L	0.03	ND(0.0030)	0.0046	0.0043	0.0066 J	0.0030 J	0.0075
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	143	176	162	115	113	163
Ammonia-N	mg/L	-	0.193	1.88	1.93	0.084	0.128	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	4.7	4.1	2.4	2.0	16.2
Chemical oxygen demand (COD)	mg/L	-	30	43	41	36	29	130
Chloride	mg/L	-	84.5	47.2	46.9	87.5	87.5	50.7
Color (apparent)	TCU	-	32.4	35.0	38.5	35.5	36.0	80.9
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.8	10.9	11.2	12.7	12.0	15.9
Escherichia coli	cfu/100mL	100	4 J	100	90	190	220	60
Fecal coliform bacteria	cfu/100mL	4800	7 J	110	100	190	240	100
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.10	ND(0.10)	ND(0.020)	ND(0.020)	0.025
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)	ND(0.010)	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.19	7.94	7.95	8.02	8.00	8.43
Phenol	mg/L	0.005	0.0034 J	ND(0.0010)	ND(0.0010)	0.00145 J	0.00085 J	0.00208 J
Phosphorus	mg/L	0.01	0.133 J	0.158	0.170	0.0693	0.0777	0.567
Sulfate	mg/L	-	241	115	114	96.4	96.1	82.9
Total coliform bacteria	cfu/100mL	-	500 J	600	900	1000	2000	26000
Total dissolved solids (TDS)	mg/L	-	632	406	404	384	405	396
Total kjeldahl nitrogen (TKN)	mg/L	-	1.01	2.94	2.69	1.35	1.30	1.05 J
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	4.0	9.2	9.6	7.5	5.8	36.0
Turbidity	NTU	-	2.76	9.18	8.17	3.34	4.15	17.8
Un-ionized ammonia	mg/L	0.02	0.0198	0.0888	0.0837	0.0088	0.0065	ND(0.0050)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	-	319	-	0.453	0.453	0.462
Dissolved oxygen (DO), field	mg/L	-	-	16.58	-	8.12	8.12	8.76
Oxidation reduction potential (ORP), field	millivolts	-	-	16.5	-	-	-	49
pH, field	s.u.	6.5-8.5	-	8.34	8.34	8.86	8.85	9.57
Temperature, field	Deg C	-	-	3.16	3.2	23.84	23.84	9.6
Turbidity, field	NTU	-	-	-	-	0	0	2.2
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	110
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	500
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	250
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	880
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	110
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	500
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	250
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	ND(0.050)	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.050)	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0006	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.050)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09
Sample ID:			SW-45804-110915-TS-003
Sample Date:			11/9/2015
			Duplicate
Parameters:	**Units**	**PWQO**	
Metals (Total)			
Arsenic	mg/L	0.005	0.00064
Boron	mg/L	0.2	0.022
Cadmium	mg/L	0.0002	ND(0.000010)
Chromium	mg/L	-	0.00130 J
Cobalt	mg/L	0.0009	0.00031
Copper	mg/L	0.005	0.0012
Iron	mg/L	0.3	0.381
Lead	mg/L	0.005	0.00029
Magnesium	mg/L	-	-
Manganese	mg/L	-	0.139
Mercury	mg/L	0.0002	ND(0.000010)
Mercury (dissolved)	mg/L	-	-
Molybdenum	mg/L	0.04	0.00662
Nickel	mg/L	0.025	0.0016
Zinc	mg/L	0.03	0.0085
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	-	162
Ammonia-N	mg/L	-	0.051
Biochemical oxygen demand (BOD)	mg/L	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	18.9
Chemical oxygen demand (COD)	mg/L	-	114
Chloride	mg/L	-	51.0
Color (apparent)	TCU	-	103
Conductivity	umhos/cm	-	-
Dissolved organic carbon (DOC)	mg/L	-	18.4
Escherichia coli	cfu/100mL	100	80
Fecal coliform bacteria	cfu/100mL	4800	100
Mineral oil and grease	mg/L	-	-
Nitrate (as N)	mg/L	1.82	0.022
Nitrite (as N)	mg/L	0.3	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-
Oil and grease, animal and vegetable	mg/L	-	-
pH, lab	s.u.	6.5-8.5	8.37
Phenol	mg/L	0.005	0.0013 J
Phosphorus	mg/L	0.01	0.428
Sulfate	mg/L	-	83.5
Total coliform bacteria	cfu/100mL	-	31000
Total dissolved solids (TDS)	mg/L	-	386
Total kjeldahl nitrogen (TKN)	mg/L	-	4.27 J
Total phosphorus	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	41.0
Turbidity	NTU	-	17.1
Un-ionized ammonia	mg/L	0.02	0.039

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

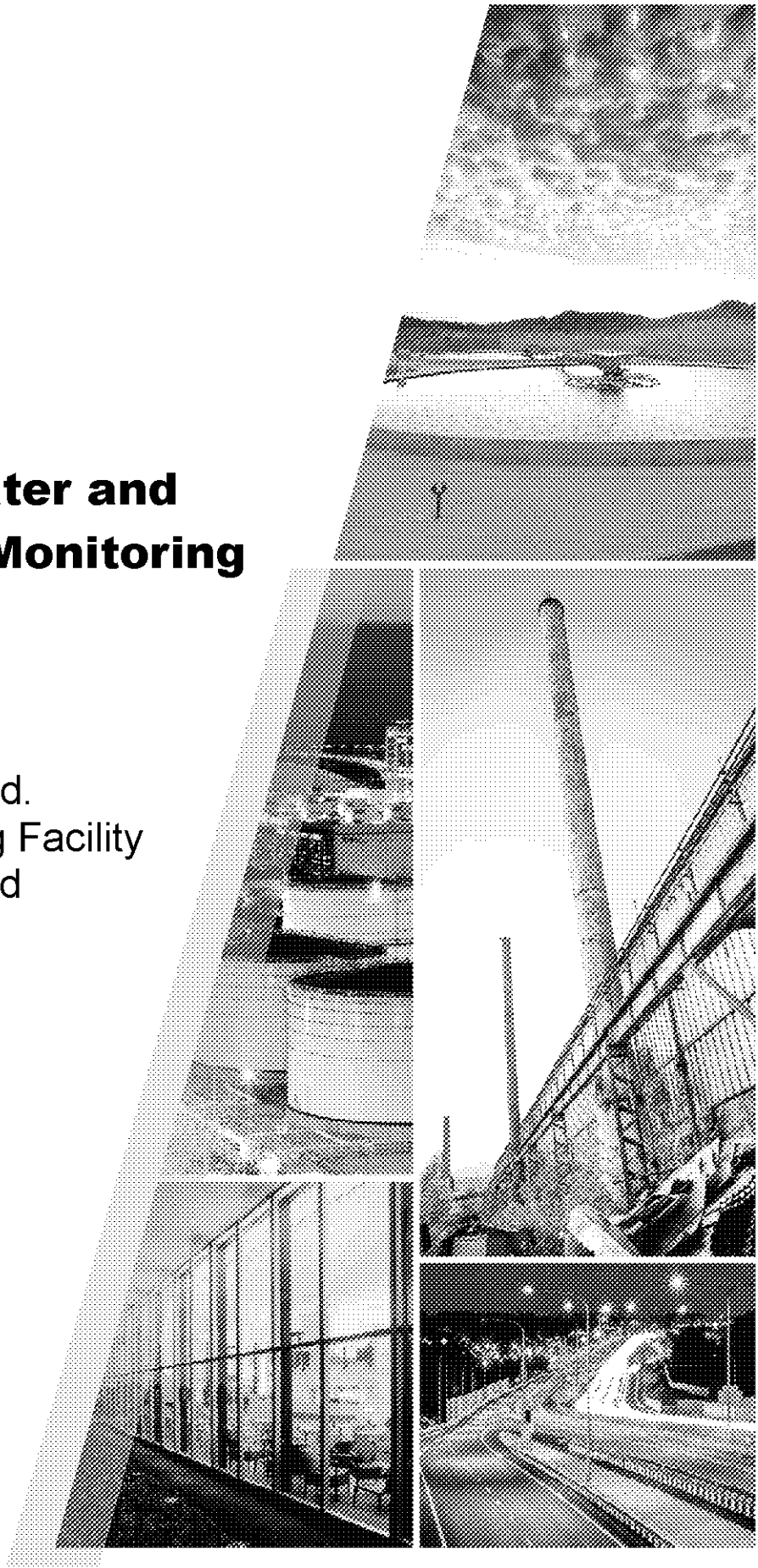
Sample Location:			SW4-09
Sample ID:			SW-45804-110915-TS-003
Sample Date:			11/9/2015
			Duplicate
Parameters:	**Units**	**PWQO**	
Field Parameters			
Conductivity, field	uS/cm	-	1,462
Dissolved oxygen (DO), field	mg/L	-	8.76
Oxidation reduction potential (ORP), field	millivolts	-	49
pH, field	s.u	6.5-8.5	9.57
Temperature, field	Deg C	-	9.6
Turbidity, field	NTU	-	2.2
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	130
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	370
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	500
Total Petroleum Hydrocarbons (C10-C16)	µg/L		130
Total Petroleum Hydrocarbons (C16-C34)	µg/L		370
Total Petroleum Hydrocarbons (C34-C50)	µg/L		ND(250)
Semi-Volatiles			
1-Methylnaphthalene	µg/L	2	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-
2-Methylnaphthalene	µg/L	2	-
Acenaphthene	µg/L	-	-
Acenaphthylene	µg/L	-	-
Acridine	µg/L	-	-
Anthracene	µg/L	0.0008	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-
Benzo(g,h,i)perylene	µg/L	0.00002	-
Benzo(k)fluoranthene	µg/L	0.0002	-
Carcinogenic potency equivalent	µg/L	-	-
Chrysene	µg/L	0.0001	-
Dibenz(a,h)anthracene	µg/L	0.002	-
Fluoranthene	µg/L	0.0008	-
Fluorene	µg/L	0.2	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-
Naphthalene	µg/L	7	-
Phenanthrene	µg/L	0.03	-
Pyrene	µg/L	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

www.ghd.com





2019 Groundwater and Surface Water Monitoring Report

Convertus Canada Ltd.
Organics Composting Facility
5123 Hawthorne Road
Ottawa, Ontario

GHD | 455 Phillip Street Unit 100a Waterloo Ontario N2L 3X2 Canada | 045804 | 58 | Report No 85 | March 26 2020

Executive Summary

GHD was retained by Convertus Canada Ltd. (formerly Renewi Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Convertus Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

The 2019 Monitoring Program was completed in general accordance with the requirements of the Facility's *Industrial Sewage Works Environmental Compliance Approval (*No. 2844-9YNGZC) as amended on February 1, 2017.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

GHD completed three monitoring events at the Site in 2019: June, September, and November. Monitoring included groundwater elevation measurements, groundwater quality sampling, and surface water sampling. Based on the groundwater elevations gathered in June, September and November 2019, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.

Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being affected by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with the presence of an organic contaminant source.

Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing ammonia concentrations during previous monitoring periods had been observed downgradient of the Facility at TW-8, however recent results show decreases and stabilization in ammonia concentrations. Based on the expanded dataset of water quality from 2019, there is no evidence that Facility operations are having a significant affect on deep bedrock groundwater quality.

The 2019 groundwater quality results were assessed using the Site's Trigger Level Program. Within the shallow unconfined aquifer, ammonia was found at concentrations greater than those specified by the Site's trigger concentrations at several of the near Facility monitoring wells as well as some downgradient monitoring locations.

In the unconfined shallow aquifer, Tier I trigger level exceedances were noted at five monitoring locations in 2019. These locations included MW5-09, MW101-13, MW102-09, and MW105-13 (spring and fall) and MW104-13 (spring). During fall 2019, multiple trigger level parameters were exceeded at MW104-13 (ammonia and nitrate). Therefore, MW5-09, MW101-13, MW102-09, and MW105-13 will be sampled according to the Tier I sampling protocol and MW104-13 will be sampled according to the Tier II sampling protocol during the spring 2020 monitoring event.

In the deep bedrock aquifer, a single trigger level exceedance (ammonia) was noted at monitoring well TW-4 (spring). Multiple trigger level exceedances (ammonia and nitrate) were noted at TW-4 (fall) and TW-8 (spring and fall). Therefore, monitoring locations TW-4 and TW-8 will be sampled under Tier II protocols during the spring 2020 monitoring event.

Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2019 monitoring period.

Surface water was discharged once from the on-Site Stormwater Management Pond during the 2019 monitoring period (April). All parameters were below their respective trigger levels, listed in the Site ECA, in samples collected from the Stormwater Management Pond prior to discharging.

Substantial improvements were made to Site operations during a significant capital upgrade effort undertaken in 2019 totalling $8.5 million. The following points summarize the main improvements:

- The original ammonia scrubber was removed and replaced with three new ammonia scrubber units. Leakage from the old ammonia scrubber was suspected to be a contributing source to the elevated ammonia concentrations observed in shallow groundwater adjacent to the facility.
- The floors in the vicinity of the ammonia scrubber were bermed and sealed with a chemical-resistant epoxy coating to reduce the possibility of leakage from within the Facility to the subsurface via leaking through cracks in the floor.
- EW107-15 was plumbed directly into the Facility's process water supply system. EW107-15 is now used as the principal source of water supply for process-related demands, replacing the stormwater retention pond. This improvement allowed for a significant increase in the amount of groundwater extracted from EW107-15 during 2019, which is expected to continue in future years.
- The SCADA system controlling and logging the operation of EW107-15 was upgraded to improve tracking of groundwater extraction volumes.
- Changes to Facility operations have been implemented to ensure that the receiving, processing, storage, and shipping operations are completed in such a way that stockpiling of materials is significantly minimized. These operational changes have improved the Facility's throughput and significantly reduced on-Site storage times of both processed and unprocessed materials which would minimize leachate runoff.
- Significant improvements have been made in the management of leachate within the composting process. Higher volumes of leachate are now recycled within the composting tunnels, and less comingling occurs between leachate and duct condensate water reducing the volume of excess leachate requiring UST storage while awaiting off-site disposal.
- Two new composting tunnels were commissioned (Tunnels #8 & #9), two new storage tunnels were constructed (Tunnels #9 & #10) that could be outfitted as composting tunnels at a future date, a new biofilter was built (Biofilter #3) and a new ventilation system was installed throughout the processing areas to capture odour while minimizing fog during the winter months.

Table of Contents

1. Introduction 1
   - 1.1 Site Background 1
   - 1.2 Site Setting 2
   - 1.3 Site Processes 3
   - 1.4 Site Improvements – 2019 3
   - 1.5 MECP Correspondence to Date 5
2. Physical Setting 6
   - 2.1 Site Geology 6
   - 2.2 Site Hydrogeology 8
   - 2.3 Surface Water and Drainage Features 8
   - 2.4 Groundwater Use 9
3. Monitoring Program 9
   - 3.1 Monitoring Network 10
   - 3.2 Monitoring Protocol 10
     - 3.2.1 Groundwater Monitoring 10
     - 3.2.2 Surface Water Monitoring 11
   - 3.3 Quality Assurance/Quality Control Program 11
4. Monitoring Results 12
   - 4.1 Groundwater Hydraulic Monitoring 12
   - 4.2 Water Quality Monitoring 14
     - 4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality 14
     - 4.2.2 Deep Bedrock Aquifer Groundwater Quality 19
     - 4.2.3 Surface Water Quality 21
5. Shallow Groundwater Extraction System 23
6. Compliance and Trigger Level Program 24
   - 6.1 Trigger Parameters 24
   - 6.2 Trigger Concentrations 24
   - 6.3 Trigger Level Assessment 25
7. MECP Correspondence 27
   - 7.1 MECP Surface Water Comments 27
   - 7.2 MECP Groundwater Comments 27
8. Conclusions 28
9. Recommendations 29
10. References 29

Figure Index

Figure 1.1	Site Location Map
Figure 1.2	Site Plan
Figure 3.1	Groundwater and Surface Water Monitoring Locations
Figure 3.2	Convertus Property Groundwater and Surface Water Monitoring Locations
Figure 4.1	Unconfined Shallow Groundwater Elevations – June 17-18, 2019
Figure 4.2	Unconfined Shallow Groundwater Elevations – November 26-27, 2019
Figure 4.3	Bedrock Groundwater Elevations – June 17-18, 2019
Figure 4.4	Bedrock Groundwater Elevations – November 26-28, 2019
Figure 4.5	Median 2019 Ammonia Concentration Isopleths
Figure 4.6	Median 2019 Dissolved Iron Concentration Isopleths
Figure 4.7	Median 2019 Dissolved Manganese Concentration Isopleths
Figure 4.8	Median 2019 Dissolved Organic Carbon Concentration Isopleths
Figure 4.9.1	Temporal Plots Selected Parameters - MW1-08
Figure 4.9.2	Temporal Plots Selected Parameters - MW2-08
Figure 4.9.3	Temporal Plots Selected Parameters - MW3-08
Figure 4.9.4	Temporal Plots Selected Parameters - MW4-08 & MW4-09
Figure 4.9.5	Temporal Plots Selected Parameters - MW5-09
Figure 4.9.6	Temporal Plots Selected Parameters - MW101-09 & MW101-13
Figure 4.9.7	Temporal Plots Selected Parameters - MW102-09
Figure 4.9.8	Temporal Plots Selected Parameters - MW103-09
Figure 4.9.9	Temporal Plots Selected Parameters - MW104-13
Figure 4.9.10	Temporal Plots Selected Parameters - MW105-13
Figure 4.9.11	Temporal Plots Selected Parameters - MW106-15
Figure 4.9.12	Temporal Plots Selected Parameters - EW107-15
Figure 4.10	Northern Ditch Topography with June 17-18, 2019 Groundwater Contours
Figure 4.11.1	Temporal Plots Selected Parameters - TW-7
Figure 4.11.2	Temporal Plots Selected Parameters - TW-4
Figure 4.11.3	Temporal Plots Selected Parameters – TW-8
Figure 4.12	Temporal Plot Select Parameter – SW-4

Table Index

Table 2.1	Monitoring Location Details
Table 3.1	Monitoring Program Schedule
Table 4.1	Groundwater Elevations
Table 4.2	Shallow Unconfined Aquifer Groundwater Analytical Results
Table 4.2A	MW103-09 Analytical Results – PWQO Comparison
Table 4.3	Deep Bedrock Aquifer Groundwater Analytical Results
Table 4.4	Surface Water Analytical Results
Table 4.5	SW-4 Monthly Sampling Analytical Results
Table 5.1	EW107-15 Daily Pumping Log

Appendix Index

Appendix A	Environmental Compliance Approval (No. 7251-8GKRPD and No. 2844-9YNGZC)
Appendix B	Background Correspondence
	Appendix B.1 Compliance and Trigger Level Program Memorandum
	Appendix B.2 Monitoring Program Rationalization Memorandum
	Appendix B.3 Groundwater Assessment and Work Plan Memorandum
Appendix C	Stratigraphic and Instrumentation Logs
	Appendix C.1 Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs
	Appendix C.2 Deep Bedrock Water Well and Stratigraphic Logs
Appendix D	QA/QC Assessment Memorandum and Laboratory Analytical Reports
Appendix E	2010 – 2019 Analytical Data

1. Introduction

GHD was retained by Convertus Canada Ltd. (formerly Renewi Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Convertus Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

A Site location map is provided on Figure 1.1.

The 2019 Monitoring Program was completed in general accordance with the requirements of the Facility's *Industrial Sewage Works Environmental Compliance Approval (*No. 2844-9YNGZC) as amended on February 1, 2017 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A which is included on the USB stick at the end of this report. Please note that all Appendices are included on the USB stick.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Convertus is a tenant of Tomlinson.

Between June and August 2008, GHD conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO Facility in the southwest portion of the HIP (CRA, 2008a). GHD submitted the ESAs to the City of Ottawa on behalf of Convertus.

Site clearing and preparation was completed in 2008, Facility was constructed during 2009, and initial receipt of materials for processing was in January of 2010.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates Ltd. (Golder) conducted a pumping test and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, GHD was tasked by Convertus to generate the Monitoring Program, based on a request from the Ministry of Environment, Conservation & Parks (MECP) through the process of reviewing the ECA application. In March 2010, the Monitoring Program was modified through an ECA amendment to reflect Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the former ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, GHD prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/2015. The TLP was submitted to the MECP along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 6. For reference, a copy of the memorandum sent to the MECP that outlines the updated TLP is included in Appendix B.1.

GHD prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure that groundwater and surface water was being adequately monitored. This was accomplished through a review of the monitoring program and removal of any redundant or unnecessary monitoring. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of GHD's memorandum outlining the MPR is included in Appendix B.2.

On February 1, 2017, the MECP issued a revised ECA (No. 2844-9YNGZC) for the Facility. The revised ECA incorporates the updated TLP submitted to the MECP in March 2015.

The 2019 monitoring program was completed in accordance to the schedules in the revised ECA. A copy of the revised ECA is included in Appendix A.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2019.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of a large processing plant with a delivery/receiving area, administrative office, septic bed area, and emission stack. An asphalt skirt extends around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system. The on-Site

perimeter ditch system drains to the storm water management (SWM) pond located at the east side of the Site. The layout of the SWM and the drainage ditches are illustrated on Figure 1.2.

Surface water run-off from the Site generally drains to the on-Site perimeter ditch system which, in turn, drains to the on-Site SWM pond where it is impounded until it is manually released off-Site. Water that is released flows through local roadside ditches within the HIP subdivision, which discharge to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, levelled fill material, and a few shrubs and grass scrub.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to convey groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry (all located west/southwest of the Site) has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), leaf & yard waste, food wastes, commercial waste (restaurant wastes, etc.) and certain organic sludges. Organics are processed into a Non-Agricultural Source Material (NASM) and into animal bedding for agriculturally-beneficial applications. The Facility is designed to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts that are a result of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond in accordance with the Site's ECA. Convertus undertakes analysis and testing of the pond water in accordance with the Site's ECA. If analysis and testing show acceptable water quality, the excess stormwater can be discharged into the HIP roadside ditch network.

1.4 Site Improvements – 2019

Several substantial improvements were made to Site operations during a significant capital upgrade effort undertaken in 2019 totalling $8.5 million. A principal objective of these improvements was to continue to improve the Facility's environmental performance. Several of the improvements relate directly to the groundwater remediation system, as discussed below.

The following points summarize the main improvements implemented:

- The original ammonia scrubber was removed and replaced with three new ammonia scrubber units. Leakage from the old ammonia scrubber was suspected to be a contributing source to the elevated ammonia concentrations observed in shallow groundwater adjacent to the Facility.
- The floors in the vicinity of the ammonia scrubber were bermed and sealed with a chemical-resistant epoxy coating to reduce the possibility of leakage from within the Facility to the subsurface via leaking through cracks in the floor.
- EW107-15 was plumbed directly into the Facility's process water supply system. EW107-15 is now used in place of the stormwater management pond as the principal source of make-up water supply for process-related demands. Process water is used to spray on the compost tunnels, used in the ammonia scrubbers and bioscrubbers, used to humidify the biofilters, and is used as fire suppression water supply. This improvement allowed for a significant increase in the amount of groundwater extracted from EW107-15 during 2019, which is expected to continue in future years.
- The SCADA system controlling and logging the operation of EW107-15 was upgraded to improve tracking of groundwater extraction volumes.
- Changes to Facility operations have been implemented to ensure that the receiving, processing, storage and shipping operations are completed in such a way that stockpiling of materials is significantly minimized. These operational changes have improved the Facility's throughput and significantly reduced on-Site storage times of both processed and unprocessed materials which would minimize leachate runoff.
- Significant improvements have been made in the management of leachate within the composting process. Higher volumes of leachate are now recycled within the composting tunnels, and less comingling occurs between leachate and duct condensate water reducing the volume of excess leachate requiring UST storage while awaiting off-site disposal.
- Two new composting tunnels were commissioned (Tunnels #8 & #9), two new storage tunnels were constructed (Tunnels #9 & #10) that could be outfitted as composting tunnels at a future date, a new biofilter was built (Biofilter #3) and a new ventilation system was installed throughout the processing areas to capture odour while minimizing fog during the winter months.

Acting on a recommendation of the MECP Technical Services Branch, GHD and Convertus staff undertook an 8-hour pumping test at EW107-15 on July 30, 2019. The test was undertaken to better understand the zone of hydraulic influence of EW107-15. The test was conducted at a pumping rate of 34.5 litres per minute (LPM) with a total observed drawdown of approximately 0.06 m in EW107-15. No drawdown was observed at any contiguous monitoring wells during the test.

The results of this pumping test confirm that the transmissivity of the shallow flow zone is high in the vicinity of EW107-15 (approximately 1,015 m^2/day). In addition, the maximum capture width upgradient of the extraction well was calculated to be only 2.5 m (~8 feet).

Groundwater extraction at EW107-15 is considered an appropriate remedial strategy, despite the limited capture zone, because of the position of this well in the interpreted zone of most pronounced impact. Removal of impacted shallow groundwater at this location will result in significant contaminant mass reduction in the subsurface and over the long-term will augment existing natural

attenuation processes at further reducing concentrations downgradient of the interpreted source area.

1.5 MECP Correspondence to Date

The correspondence below documents selected communications between Convertus and the MECP with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 2844-9YNGZC (formerly covered under ECA No. 7251-8GKRPD):

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b).
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009).
- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009).
- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a).
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010).
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011).
- Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013).
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014).
- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 3, 2015a).

- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015b).
- Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2015d).
- Memorandum RE: Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa- Hydrogeologic Assessment from Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region (MECP, January 3, 2017a).
- Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MECP, February 1 ,2017b).

2. Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and through examination of the stratigraphic logs.

A total of 19 monitoring wells and one extraction well have been completed in the shallow unconfined aquifer unit throughout the HIP subdivision, 16 of which have been completed within the limits of the Convertus Site.

Test wells (TW-1 to TW-6) were completed by Golder in 1993 and 2008. TW-1 through TW-6 extend into the deep bedrock aquifer unit which was identified as the Nepean bedrock formation (Golder Associates, 2008).

In May 2010, GHD oversaw the installation of two on-Site deep bedrock test wells (TW-7 and TW-8). The stratigraphic logs from GHD's monitoring wells confirmed the presence of sandstone but also identified limestone at TW-8.

Ontario Geologic Survey (OGS) mapping shows the Oxford Formation (Dolostone) covers much of the Site with the March and Nepean Formations (Dolostone/Sandstone formations) present in the Northern portions of the HIP (OGS, Map 1508A).

The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix C for the overburden and deep bedrock wells. Monitoring location details are provided in Table 2.1.

Examination of the stratigraphic logs prepared by GHD indicates that the geology is generally consistent across the HIP subdivision. Five main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer

- Alluvial sand and silts
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, marine deposits with some removal by fluvial erosion. The Site is located on a former quarry and thus filling activities have been carried out since the early 1990's which have significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the ground surface; however, the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by GHD indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick), occasionally some clay, boulders, and dredged sediment. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was dark brown to black in colour, and was generally loose and moist. Topsoil was found in most locations that were not used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface outcrops to a depth of approximately 7.6 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to identify and characterize the bedrock. The bedrock at MW2-08 and MW4-08 was described as fractured grey limestone. The bedrock was generally found to be fractured in the upper meter, where core recovery ranged from 93 to 94 percent and Rock Quality Designation (RQD) ranged from 63 to 75 percent. At depths in excess of 1 m into the bedrock, at MW2-08, the bedrock was found to be more competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- A shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock.
- A deep confined bedrock unit (referred to as the deep bedrock aquifer).

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

As part of GHD's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. During the pumping test, water levels gathered from the shallow unconfined aquifer unit indicated no corresponding drawdown between the shallow and deep wells. Water levels in the deep bedrock aquifer unit lowered from 1.2 to 3.7 m during the 6-hour period. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface water run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to the on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch which runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually outletting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Convertus Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by GHD shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs (Appendix C.2). Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. If necessary, TW-4 can also be used as an alternative refilling source for replenishing the fire suppression water holding tank.

3. Monitoring Program

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), GHD has completed ongoing monitoring from 2009 to present.

The following monitoring activities were completed at the Site during the current monitoring period:

- June 2019 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples
- September 2019 - Tri-annual sampling:
  - Hydraulic monitoring and sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW106-15) and one deep bedrock aquifer well (TW-4)
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples
- November 2019 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells

- Sampling and hydraulic monitoring at the extraction well, EW107-15
- Hydraulic monitoring of the staff gauges in the northern ditch
- Collection and analysis of QA/QC samples

3.1 Monitoring Network

Currently the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer unit: 11 groundwater monitoring wells and one extraction well: MW01-08, MW2-08, MW3-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, MW106-15, and EW107-15.
- Deep bedrock aquifer unit: three monitoring wells: TW-4, TW-7, and TW-8.

Surface water quality is monitored through four surface water monitoring locations (SW-1 to SW-4). Surface water level monitoring in the northern ditch is monitored by the four staff gauges (SG-1 through SG-4).

Table 3.1 provides a summary of the 2019 monitoring program.

The groundwater and surface water monitoring locations within the HIP subdivision are provided on Figure 3.1. Figure 3.1 also shows the Site limits included in the Convertus lease and the boundary of the HIP subdivision.

Figure 3.2 shows the groundwater and surface water locations on the Convertus Property.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following GHD's field method guideline protocols, which are consistent with MECP requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling techniques with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled following stabilized field readings.

Due to the greater depth to groundwater, deep bedrock aquifer unit monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

During mid-2016, a dedicated sampling port was installed in the Facility to facilitate sampling from EW107-15. The sample is collected after the extraction well and sample port are purged for several minutes to ensure the sample port and associated lines are clear of stagnant water.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted for analysis, under chain-of-custody protocol, to

the Ottawa depot of ALS Environmental (ALS), based in Waterloo. Analytical results are discussed in Section 4.

The analytical parameter list for groundwater is summarized in Table 3.1. Due to a change in field staff and a coordination oversight, the September 2019 groundwater samples were analyzed for the stormwater management pond parameter list. As a result, several parameters normally included in the groundwater parameter list were inadvertently excluded from this event. Actions have been undertaken to ensure this error will not be repeated.

The original laboratory analytical reports are provided in Appendix D.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW-1 to SW-4) following GHD's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch or pond water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, dissolved oxygen, oxidation reduction potential (ORP), turbidity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. It should be noted that potential dissolution of particulates by the acid preservative in the metals sample bottles can artificially increase parameter concentrations in surface water samples. Acid preservation is a standard method for preserving water samples for metals analysis. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

Hydraulic level monitoring is completed at four staff gauges located throughout the roadside ditch adjacent to the Site along the south side of Somme Street. The depth to standing-surface water was visually observed to be nil/dry during all three of the staff gauge monitoring events in 2019.

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2019 analytical data were made through the QA/QC assessment.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix D. The qualifications indicated in Appendix D do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

4. Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 - Groundwater Hydraulic Monitoring
- Section 4.2 - Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow unconfined aquifer unit, deep bedrock aquifer unit, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the June, September and November 2019 monitoring events are consistent with those observed historically at the Site, and were used to develop groundwater contour figures, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the June 2019 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2019 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.43 to 98.37 metres above mean sea level (m AMSL) at MW103-09 and MW3-08 during the June monitoring event, 91.53 to 93.13 m AMSL at MW102-09 and MW105-13 during the September monitoring event and 90.37 to 98.39 m AMSL at MW103-09 and MW3-08 during the November event. During 2019, the depth below grade to the shallow aquifer water table generally varied from 0.2 to 2.0 m BGS. The groundwater elevations measured at MW1-08 were above the surveyed ground surface elevation by 0.16 metres and below the ground surface by 0.01 meters during the June and November 2019 events, respectively. This is due to the low ground surface elevation around the Stormwater Management Pond. Based on the groundwater elevations gathered in June and November 2019, flow occurs in an east-northeast direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the May and November 2019 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.02 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 40 percent for the shallow

unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)

K = hydraulic conductivity (L/T)

i = horizontal hydraulic gradient (unitless)

n = effective porosity

Based on this equation, the local groundwater velocity is estimated to range from a few millimeters per year to a high of approximately 6.4 m per year in the fill deposits and shallow fractured bedrock. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

During the 2019 monitoring period, the deep bedrock aquifer unit groundwater levels ranged from a low of 83.18 m AMSL (TW-8) to high of 90.74 m AMSL (TW-7). The seasonal water level fluctuation ranged from 0.56 m (TW-8) to 1.35 m (TW-7). Based on the 2019 groundwater elevations, groundwater in the deep bedrock aquifer unit flows in a west-southwest direction, which is opposite to the flow direction of the shallow unconfined aquifer unit. It is likely that the presence of a quarry to the west and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit. This is consistent with previous interpretations of groundwater flow across the Site.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.017 and 0.015 m/m for the June and November 2019 events, respectively.

Acting on a recommendation of the MECP Technical Services Branch, GHD and Convertus staff undertook an 8-hour pumping test at EW107-15 on July 30, 2019. The test was undertaken to better understand the zone of hydraulic influence of EW107-15. The test was conducted at a pumping rate of 34.5 litres per minute (LPM) with a total observed drawdown of approximately 0.06 m in EW107-15. No drawdown was observed at any contiguous monitoring wells during the test.

The results of this pumping test confirm that the transmissivity of the shallow flow zone is high in the vicinity of EW107-15 (approximately 1,015 m^2/day). In addition, the maximum capture width upgradient of the extraction well was calculated to be only 2.5 m (~8 feet).

Groundwater extraction at EW107-15 is considered an appropriate remedial strategy, despite the limited capture zone, because of the position of this well in the interpreted zone of most pronounced impact. Removal of impacted shallow groundwater at this location will result in significant contaminant mass reduction in the subsurface and over the long-term and will augment existing natural attenuation processes at further reducing concentrations downgradient of the interpreted source area.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in an east-northeast direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08 and MW4-09
- Upgradient/cross gradient wells: MW2-08
- Facility Area: EW107-15, MW101-13, and MW105-13
- Downgradient: MW1-08, MW5-09, MW102-09, MW103-09, MW104-13, and MW106-15

Tabulated analytical results for the shallow unconfined aquifer from the 2019 sampling program are provided in Table 4.2.

On behalf of Convertus, GHD completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment, Appendix B.3). The Groundwater Assessment evaluated the 2013 and historical groundwater quality in order to determine appropriate parameters of concern for the Site. Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for Facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of an ammonia plume within the shallow unconfined aquifer unit

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MECP criteria listed in the Ontario Drinking Water Standards (ODWS) (MOE, 2003, as amended). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

Ammonia and DOC are commonly used as indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2019 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleth figures are useful for evaluating and presenting spatial patterns in groundwater chemistry.

On Figures 4.5 through 4.8, the presence of elevated concentrations of the indicator parameters are identified in close proximity to, or just downgradient from, the Facility. The elevated concentrations appear to extend from the Facility to the east-northeast following the direction of groundwater flow. Some decreases in concentrations are observed with increased distance from the Facility (following the path of groundwater flow in the shallow unconfined aquifer) for ammonia in particular and concentrations remain low to the west, south, and southeast of the Facility. Note that due to the highly variable concentrations of ammonia, iron and manganese at EW107-15 water quality from this location has not been included in the contouring presented on Figures 4.5, 4.6 and 4.7. Pumping at EW107-15 is suspected to contribute to the highly variable water quality observed at this location. Further discussion of the extraction well is provided in Section 5.

The pattern of iron and manganese concentrations presented on Figures 4.6 and 4.7 is different than that observed for ammonia and DOC in that the concentrations reported in close proximity to the Facility are lower than those reported at the downgradient Site boundary. Notwithstanding this difference, the pattern of elevated concentrations on Site is consistent with a source emanating from the Facility. The pattern is likely attributable to the complex behaviour of these parameters in the subsurface, but also to the effects of periodic groundwater extraction adjacent to the Facility.

This distribution of elevated concentrations of ammonia, DOC, and to a lesser extent iron, and manganese is consistent with an organics-related contaminant source.

Figures 4.9.1 to 4.9.12 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges for ammonia in the shallow unconfined aquifer:

Location	Trend	Ammonia Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**
MW4-09	↑	ND(0.050) – 0.554	ND(0.020) – 1.3
MW3-08	↑	ND(0.020) – 0.264	ND(0.020)
MW2-08	(2011-2018) Stable to ↑ and 2019 ↓	ND(0.020) – 0.171	ND(0.010) – ND(1.0)
EW107-15	↑ and ↓	0.123 – 88.0/91.1	31.4 – 83.8
MW105-13	↓	4.88 – 76.0	5.6 – 19.3
MW101-13	Stable	0.237 – 34.9	13.9/14.0 – 14.1
MW104-13	↑ and ↓	1.20 – 20.0	6.30/7.3 – 16.8
MW5-09	↓	0.32 – 31.4	12.8 – 14.4/16.1
MW102-09	↑	ND(0.050) – 15.2	9.61 – 11.6
MW1-08	↑	0.335 – 3.67	3.0 – 3.16
MW103-09	Stable	0.217/0.255 –2.35	0.95 – 1.7
MW106-15	Stable to ↑	1.91 – 18.6	1.68 – 3.3

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

As presented above, each of the upgradient locations (MW2-08, MW3-08 and MW4-09) have low ammonia levels. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have shown some evidence of increases in recent monitoring, however concentrations remain relatively low. There is some evidence of recent increases in ammonia concentrations at upgradient monitoring wells during recent monitoring years. This pattern may suggest an upgradient off-Site source of ammonia contributing to the ammonia concentrations observed at these monitoring wells.

During the 2019 reporting year, overall trends in ammonia concentrations have been decreasing, particularly near the Facility. Ammonia concentrations at MW105-13 and MW101-13 had previously showed increasing trends. Current analytical data indicates declining and stable trends at each Facility area well. The analytical results for EW107-15 show highly variable concentrations during the period of operation of this extraction well. Active pumping at this location is suspected to be the principal source of the observed variability. Notwithstanding the fluctuations, the presence of elevated ammonia in the extraction well indicates that active groundwater extraction at this location is an appropriate remedial strategy.

Ammonia concentrations at MW5-09 followed a clear increasing trend between 2009 and mid-2015. Monitoring results from 2016 through 2019 demonstrate a more stable trend with ammonia concentrations ranging between 10 mg/L and 20 mg/L. Convertus's efforts to eliminate the source of subsurface discharge through the replacement of the existing ammonia scrubber with three new units in July 2019, along with the remediation of the zone of elevated ammonia adjacent to the Facility through operation of EW107-15, are likely responsible for the observed improvements in water quality at MW5-09 during this period.

Ammonia concentrations at downgradient locations MW102-09 and MW104-13 continue to demonstrate trends of increasing concentrations. The ammonia trends downgradient of the Facility are all increasing with the exception of MW103-09 and MW106-15 which continue to show fairly stable concentrations. MW5-09 and MW102-09 continue to exhibit elevated concentrations downgradient of the Facility.

The following table summarizes recent trends in iron and manganese concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**	**Historic (pre-2019)**	**2019**
MW4-09	↓	ND(0.010) – 1.86	ND(0.10) – 0.15	0.0556 – 1.25	0.0582 – 0.240
MW3-08	Stable	ND(0.010) – 1.04	ND(0.010)	ND(0.00050) – 0.0987	0.00074 – 0.0226
MW2-08	Stable	ND(0.010) – ND(0.10)	ND(0.010)	0.00058 – 0.207	0.00068 – 0.00566
EW107-15	Stable and ↓	0.022 – 2.56	ND(0.10) – 0.63	0.435/0.441 – 4.52/4.57	0.388 – 1.45
MW105-13	↑ and ↓	0.080/0.095 – 7.61	2.10 – 3.95	0.145 – 1.06	0.722 – 0.990
MW101-13	↓	ND(0.050) – 34.5	0.069/0.071 – 2.84/2.97	0.0114 – 2.24	0.671/0.685 – 1.36/1.42

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
MW104-13	↓	0.071 – 23.9	0.051/0.052 – 9.96/10.6	0.548 -19.4	1.95/1.98 – 5.33/5.46
MW5-09	Stable to ↓	1.99 – 14.5	3.22– 5.01/5.05	1.09 – 5.33	1.45 – 1.85/1.86
MW102-09	↓ and Stable	ND(0.010) – 24.0/24.7	2.41 – 4.53	ND(0.00050) – 5.16	1.69 – 2.39
MW1-08	↓	0.897 – 16.6/17.2	0.260 – 2.00	0.539 – 10.9/11.0	0.453 – 0.729
MW103-09	↓	0.60 – 22.9/23.8	4.67 – 5.46	0.458/0.460 – 7.70/7.77	1.96 – 2.65
MW106-15	Stable to ↓	0.838 – 6.05	1.08 – 4.03	1.06 – 2.62	1.07 – 1.63

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

Elevated concentrations of dissolved iron and manganese are apparent in the Facility area and downgradient of the Facility, with the most elevated concentrations being reported at MW105-13, MW104-13, MW5-09, MW102-09, MW106-15, and MW1-08. As discussed above, iron and manganese concentrations in the interpreted source area immediately adjacent to the Facility have been lower than at downgradient locations during recent monitoring years.

The principal observation with respect to trends in iron and manganese concentrations within shallow groundwater at the Site is that concentrations have generally followed trends of decreasing levels over time. The principal exception to this pattern is at MW105-13. It is expected that these concentrations will continue to stabilize and decrease with time through natural attenuation and in response to Convertus's efforts to control releases to the subsurface and continue to remove impacted groundwater at EW107-15.

The following table summarizes recent trends in DOC concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	DOC Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**
MW4-09	Stable to ↓	1.0 – 3.5	1.97 – 2.46
MW3-08	Stable	1.5 – 3.5/9.0	2.35 – 3.04
MW2-08	↑	1.5 – 10.0	5.28 – 9.21
EW107-15	Stable to ↑	3.2 – 965/1,030	7.88 – 34
MW105-13	Stable to ↑	2.6 – 16.0	3.02 – 6.75
MW101-13	Stable	3.6 – 14.8	5.62 – 6.76/7.29
MW104-13	↓	5.5 – 51.2	7.70/8.19 – 9.23
MW5-09	Stable	5.4 – 13.0	6.33/6.74 – 8.53
MW102-09	Stable to ↓	ND(1.0) – 18.5	9.47 – 10.7
MW1-08	Stable	6.2 – 10.7	8.07 – 9.55

Location	Trend	DOC Concentration Range (mg/L)	
MW103-09	Stable	3.0/8.9 – 17.9	8.60 – 11.6
MW106-15	Stable	8.0 – 13.0	10.2 – 12.0

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

The current levels of DOC have remained consistent with some minor decreasing trends at MW104-13 and MW102-09. Concentrations of DOC are relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility had previously demonstrated trends of elevated and increasing levels of DOC. Over the past monitoring year many of the concentrations have demonstrated decreasing or stable trends. Water quality at EW107-15 is highly variable, likely due to intermittent pumping at this location.

In general, the limited increases in DOC concentrations downgradient of the Facility relative to upgradient concentrations are minor compared to those observed for ammonia, iron or manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MECP on the 2012 annual report, the MECP requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of future annual monitoring reports. Table 4.2A provides the 2019 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during the current monitoring period. The following provides a summary of those few exceedances:

- Iron – 2 of 2 samples
- Phosphorus – 2 of 2 samples

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included that staff gauges be installed at four points within the northern ditch system and that a topographic survey of the northern portion of the Site, including the ditch, be undertaken.

Topographic surveying of the northern ditch system (including the ditch which drains into the SWM Pond and the ditch that continues towards Findlay Creek – the HIP Ditch) was completed and the four staff gauges were installed in early 2015. The Site's northern ditch was dry at each of the staff gauge locations during each monitoring event in 2019, which provides evidence that a significant volume of groundwater is not likely continuously discharging to the creek. A similar observation of the lack of sustained flow in the ditch has been made during every sampling event since 2015.

Figure 4.10 presents the results of the topographic surveying of the northern ditch overlain by the June 2019 groundwater contours. The topographic contours are provided in 0.5 m intervals with the lowest elevation presented representing the bottom of the ditch.

As shown in Figure 4.10, the topography of the ditches is 'w' shaped. The two ditch valleys or troughs travel parallel to the northern Site boundary with the on-Site ditch (that drains to the SWM

Pond) found south of the HIP ditch. The inferred groundwater elevations from June 2019 coincide closely with the bottom elevation of the ditches, and are above the bottom of the northern (roadside) ditch in several locations. These locations are illustrated on Figure 4.10 and are interpreted to be areas where shallow groundwater is discharging to the northern ditch. It should be noted that cattails and other hydrophilic vegetation are present in portions of this ditch providing further evidence support to the interpretation that some groundwater is discharging to the ditch.

Figure 4.10 further shows that a substantial portion of the ditch bottom is lower than groundwater elevations where the ditch is intersected by the extrapolated contours. Therefore, groundwater is likely discharging to the north ditch, particularly during periods of high groundwater levels (typically during the spring).

However, as noted above each of the staff gauge locations did not contain sufficient standing, or flowing, water for sampling during the 2019 monitoring events (or during any previous monitoring events). Based on the information available, the volume of groundwater seeping into the ditch is too low to maintain a consistent base flow. It is likely that groundwater seepage into the ditch is largely lost to evapotranspiration.

In conclusion, small volumes of groundwater are likely seeping to the north roadside ditch but the volumes are insufficient to form a base flow. Based on current available information, groundwater discharging to the ditch is unlikely to cause any adverse impacts to the surface water bodies in the vicinity of the Site.

4.2.2 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2019 sampling program are provided in Table 4.3 along with a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOE, June 2003, revised June 2006 and July 2017).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2019:

Location	ODWQS Exceedances		
	June 2019	September 2019	November 2019
TW-7 (upgradient)	Manganese, pH (field)	-	pH (lab), turbidity (lab), turbidity (field)
TW-4 (downgradient)	Manganese, alkalinity, dissolved organic carbon, temperature (field), turbidity (field)	Iron, manganese, temperature (field)	Iron, manganese, alkalinity, dissolved organic carbon, turbidity (lab), turbidity (field)
TW-8 (downgradient)	Temperature (field), turbidity (field)	-	Iron, manganese, turbidity (lab), turbidity (field)

ODWQS Operational Guidelines, as well as the criteria for temperature and turbidity, do not relate directly to water samples collected from monitoring wells. The criteria for each are included in the ODWQS as they related to the effectiveness of water treatment and are thus not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and thus these Guidelines are not relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer was poor in 2019. This is consistent with historical water quality within the deep bedrock aquifer, including water quality in samples collected from prior to construction of the Facility (see Appendix E). Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer.

Water quality results from both downgradient wells had previously demonstrated some evidence of increases in ammonia concentrations. In particular, ammonia concentrations increased between 2009 and 2014 at TW-4 and TW-8. Monitoring data post 2014 has shown a reversal of this trend, with the exception of a single anomalous detection of ammonia above 10 mg/L at TW-4 in 2018. The timing of increases followed by decreases in ammonia concentrations suggests the Facility is not the source of this pattern in water quality.

Figures 4.11.1 to 4.11.3 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

		Ammonia Concentration Range (mg/L)		DOC Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2019)**	**2019**	**Trend**	**Historic (pre-2019)**	**2019**
TW-7	Stable to ↑	ND(0.05) – 0.825	ND(1.0) – 0.019	↓	2.1 -15.1	3.02 – 4.37
TW-4	Stable	0.218 – 13.0	0.740/0.742 – 2.1	stable	4.4 – 10.4	6.39 – 7.49/8.26
TW-8	↓ to Stable	ND(0.050) – 4.60	0.479 – 1.7	↓	1.9 – 13.5	2.77 – 3.81

		Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2019)**	**2019**	**Trend**	**Historic (pre-2019)**	**2019**
TW-7	↓	ND(0.010) – 11.1	ND(0.010) – 0.222	↓	0.0352 – 1.71	0.0322 – 0.161
TW-4	↓	ND(0.050) – 3.30	0.11 – 0.44/0.64	Stable	0.496 – 1.94	0.969/0.976 – 1.17
TW-8	↓	ND(0.050) – 6.25	0.011 – 1.56	↓	0.00640 – 2.95	0.00252 – 0.556

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

It is important to note that the concentrations of iron, manganese and DOC at all on-Site deep bedrock locations remain relatively stable or have demonstrated trends of clear decreases. Considering shallow groundwater quality in the zone of most pronounced impact, it is unlikely that the Facility is a source of impact to the deep bedrock aquifer, given the temporal patterns observed in this aquifer.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. The overall pattern of groundwater quality within the deep bedrock aquifer suggests that water quality is naturally poor. Notwithstanding the above, it is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential Facility-related water quality impacts. If trends of deteriorating water quality are consistent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy. Based on the monitoring results from the 2019 monitoring period, no additional investigation or remedial activities are necessary at this time, however indicator parameter concentrations at TW-4 should be closely monitored during future monitoring events.

4.2.3 Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW-4) and local ditch monitoring locations (SW-1 through SW-3) are presented in Table 4.4 and compared to the Provincial Water Quality Objectives (PWQO). The following table summarizes the surface water monitoring parameters that did not meet the PWQO during the 2019 sampling events.

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-1	Iron	0.3	0.324	0.368
SW-1	Phosphorus	0.01	0.0171	0.0625
SW-1	Escherichia Coli	100*	(52*)	280*
SW-2	Iron	0.3	0.576	1.22
SW-2	Phosphorus	0.01	0.0332	0.0620
SW-2	Escherichia Coli	100*	(68*)	450*

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-2	pH (field)	6.5-8.5	(7.61)	6.24
SW-3	Iron	0.3	0.481	1.13/1.19
SW-3	Phosphorus	0.01	0.0225	0.0503/0.0523
SW-3	Escherichia Coli	100*	170*	400/460*
SW-4	Phosphorus	0.01	0.177/0.210	0.110
SW-4	Phenolics	0.001	-	0.0094
SW-4	Escherichia Coli	100*	(4/16*)	900*

Notes:
*- Escherichia Coli concentrations are in colony forming units per 100 mL (CFU/100 mL)
** - temperature and species dependent
(7.16) – Brackets indicate value does not exceed PWQO

In general, water quality at the downstream surface water monitoring location (SW-3) is similar to upstream surface water monitoring location (SW-2), which indicates that contributions to surface water flow from the Convertus Facility are not impacting downstream water quality.

Concentrations of phosphorus were consistently above the PWQO at each of the monitoring locations. In addition, elevated iron concentrations were noted at SW-1, SW-2 and SW-3. E. coli levels were in exceedance of the PWQO for all fall 2019 samples.

Previous assessments of the Site concluded that concentrations of ammonia were showing increases at SW-4. Temporal concentration versus time plots for ammonia, DOC, manganese, and iron levels at SW-4 are presented on Figure 4.12. Figure 4.12 shows that ammonia concentrations are variable with elevated concentrations reported during late 2014, 2016 and late 2017 to late 2019. An overall trend of increases in ammonia concentrations within SW-4 between 2011 and 2019, as illustrated on Figure 4.12.

A total of 12 additional samples were collected by Convertus staff at surface water monitoring location SW-4 during the 2019 monitoring period. The analytical results for these samples have been included in Table 4.5.

Water was discharged from the stormwater management pond once during the 2019 monitoring period in April. The surface water quality results were compared to the trigger level parameters presented in the ECA prior to discharges to determine that the concentrations of trigger parameters were below the discharge criteria. All analytical results for samples collected prior to discharge were below their respective trigger levels. On this basis, all stormwater management pond discharge events were in compliance with the ECA trigger levels (outlined in Table 2 of the ECA) during 2019.

The stormwater management pond has had a total of six aerators installed to improve the water quality by agitating and oxygenating the ponded water. The first aerator was installed on July 10, 2018 and an additional five were installed on November 28, 2018. The 2019 sample results provide evidence that the aerators are reducing ammonia concentrations within the pond.

Based on the results of the surface water monitoring, there were no measurable effects on downstream surface water quality from the discharges during the 2019 monitoring period.

5. Shallow Groundwater Extraction System

Beginning on October 4, 2016, pumping from shallow groundwater extraction well EW107-15 commenced. The total volume pumped from extraction well EW107-15 during 2019 was 492,460 L. The 2019 pumping data is summarized in Table 5.1.

As previously mentioned, EW107-15 was sampled three times during the current reporting period with all three samples collected via the dedicated sampling port. The following table provides a summary of the 2019 indicator parameters:

Parameter (mg/L)	June 13, 2019	September 4/5, 2019	November 28, 2019
Ammonia-N	83.8	NA	31.4
Iron (dissolved)	ND(0.10)	ND(0.10)	0.63
Manganese (dissolved)	0.388	0.424	1.45
DOC	34	NA	7.88

Note:
/ - indicates duplicate analytical results

As indicated previously, the September 2019 groundwater samples were analyzed for the incorrect parameter list. Accordingly, several parameters are not available for this sample. There has been a high degree of variability in the concentrations reported in samples collected from this extraction well since installation. Groundwater quality at the Site is seasonally variable because of the effects of precipitation and runoff on shallow recharge, and periodic extraction of groundwater, as shown in Table 5.1, also likely contributes to the variability in the results. The June sample was collected during a period of infrequent pumping and the November sample was collected during a period of more regular pumping. The extraction well is primarily used during periods of water deficit when the amount of moisture contained in the incoming SSO is insufficient to maintain the various composting and process humidification purposes. This water deficit situation typically exists from late Spring to late Fall. In the colder winter months, the Facility is in a water surplus situation due to condensation and less evaporation.

Water quality results for the 2016 through 2019 monitoring periods suggest some improvement in water quality in the vicinity of EW107-15 and downgradient. This improvement is likely related to Facility improvements made to control the source of discharge and active groundwater extraction within the interpreted historical source area. It is expected that continued/improved operation of the shallow groundwater extraction well will, over time, remove the most impacted groundwater from the Facility area. This will result in improved water quality in both the Facility area and downgradient which should, in turn, reduce the occurrence of Tier I trigger exceedances.

As discussed previously, Convertus made changes to the configuration of their process water system during 2019. These changes allow for an increase in the amount of groundwater extracted from EW107-15. It is likely that the higher and more consistent extraction rates at this well will result in observable improvements in groundwater quality in the zone of most pronounced impact (near the Facility) and downgradient over the long-term.

In order to provide for a more detailed understanding of the effects of increased pumping at EW107-15 it is recommended that EW107-15 be sampled monthly for 2 years.

6. Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA (2011) requires the development of trigger level criteria in accordance with MECP Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MECP, dated February 27, 2015, GHD provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B1. The memo provides a detailed history of developing the TLP as well as the three-tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

6.1 Trigger Parameters

A focused set of parameters which are related to the sources of potential impacts from on-Site activities were selected for the purposes of the TLP. The TLP parameter list includes the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and E. Coli. Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic sources due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

6.2 Trigger Concentrations

The following table provides the trigger levels for the above-referenced trigger parameters.

The trigger levels for the shallow unconfined aquifer are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail on how the trigger concentrations were calculated is provided in Appendix B.1.

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations. The UTLs were

calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.)

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow and deep bedrock aquifer units.

Parameter	Shallow Unconfined Aquifer Trigger Level	Deep Bedrock Aquifer Trigger Level
Ammonia	4.0 mg/L	0.2 mg/L
Phosphorus	7.2 mg/L	0.5 mg/L
Dissolved Organic Carbon	34.6 mg/L	18.4 mg/L
Nitrate	1.3 mg/L	0.5 mg/L
Iron	48.3 mg/L	10.6 mg/L
Manganese	17.1 mg/L	2.1 mg/L
Alkalinity	633 mg/L	996 mg/L
Escherichia Coli	25.6 CFU/100 mL	5.0 CFU/100 mL

6.3 Trigger Level Assessment

The first Tier of the TLP consists of regular monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) include a comparison to the established trigger level concentrations.

Tier II confirmatory monitoring consists of collecting follow-up water quality samples in duplicate from the location(s) that exceed the Tier I trigger levels. The Tier II confirmatory monitoring will be carried-out during the next scheduled monitoring event. Tier I monitoring will resume following confirmatory samples below the Tier I trigger levels.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	**September**	**November**	
MW1-08	I	None	-	None	I
MW2-08	I	None	-	None	I
MW3-08	-	None	-	None	I
MW4-08	-	None	-	None	I
MW5-09	I	Ammonia	None	Ammonia	I
MW101-13	II	Ammonia	None	Ammonia	I

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	**September**	**November**	
MW102-09	I	Ammonia	None	Ammonia	I
MW103-09	I	None	-	None	I
MW104-13	II	Ammonia	None	**Ammonia, Nitrate**	II
MW105-13	I	Ammonia	None	Ammonia	I
MW106-15	I	None	None	None	I

Note:
BOLD – Requires Tier II Sampling Protocol in 2020

As indicated in the above table, trigger level exceedances were noted in samples collected from five wells during 2019. At MW5-09, MW101-13, MW102-09, and MW105-13, only single trigger level exceedances persisted in 2019. Therefore, it is recommended that in 2020, MW5-09, MW101-13, MW102-09, and MW105-13 be sampled following Tier I protocols. Multiple trigger level exceedances (ammonia and nitrate) were noted at MW104-13 during November 2019. Therefore, MW104-13 will be sampled in duplicate following the Tier II sampling protocol in 2020.

As discussed above, the Site initiated a program of groundwater remediation in 2016 in response to elevated ammonia concentrations in shallow groundwater near and downgradient of the Facility. Operation of this system represents implementation of the contingency remedial response to observed groundwater quality impacts. Accordingly, future trigger level assessments should be undertaken for the purpose of tracking the evolution of groundwater quality as it relates to the remedial response, and should not necessarily be used for the purpose of triggering additional remedial response.

Convertus continues to explore groundwater treatment technologies which will reduce contaminant concentrations of all Trigger Contaminants, including ammonia, to levels below their respective PWQOs, thereby allowing the discharge of the treated effluent to surface water. As yet, no acceptable technology has been identified, but laboratory trials are still underway.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	September	November	
TW-7	I	None	NA	None	I
TW-4	II	Ammonia	None	**Ammonia, Nitrate**	II
TW-8	I	**Ammonia, Nitrate**	NA	**Ammonia, Nitrate**	II

Notes:
BOLD – Requires Tier II Sampling Protocol in 2020
NA – Not Analyzed

TW-4 was sampled following Tier II protocols in June 2019 and ammonia continued to exceed its Tier I trigger level. In November 2019, concentrations of ammonia and nitrate exceeded their respective deep bedrock Tier I trigger levels at TW-4 (fall) and TW-8 (spring and fall). Therefore, it is recommended that that Tier II sampling be initiated at TW-4 and TW-8 in the spring of 2020.

7. MECP Correspondence

During the fall of 2018 Convertus received three letters from the MECP with comments in relation to the 2016 and 2017 Groundwater and Surface Water Monitoring Reports (GHD, 2017 and GHD, 2018). Convertus has not received comments from the MECP on the 2018 Groundwater and Surface Water Monitoring Report (GHD, 2019).

7.1 MECP Surface Water Comments

In a letter dated September 4, 2018 the MECP presented their review of the surface water monitoring portions of the 2016 and 2017 reports (GHD, 2017 and GHD, 2018). The letter describes the MECP's general concurrence with the interpretations and conclusions provided in the 2016 and 2017 Annual Monitoring Reports.

In addition, the letter provides a brief description of the available information related to grab sampling of pond discharge water by Golder Associates in April 2018. With respect to this sampling, the MECP indicates concurrence that the results of sampling do not constitute ECA non-compliance, as there is no requirement for sampling during discharge.

The MECP provides further concurrence with Convertus' statement that future exceedances of a trigger level within the SWMP during discharge should be addressed through the "Spill Contingency and Pollution Prevention Plan", required under Condition 5(6) of the ECA.

7.2 MECP Groundwater Comments

Convertus received two letters from the MECP dated November 13, 2018 and December 10, 2018 in relation to the 2016 and 2017 reports, respectively (GHD, 2017 and GHD, 2018). The following summarizes the comments provided by the MECP Technical Services Branch Hydrogeologist on the 2016 Annual Monitoring Report:

- Pumping volumes from EW107-15 were insufficient during 2016 and 2017.
- The bedrock aquifer is showing signs of impact.
- Sampling confirms that groundwater was impaired due to elevated nitrate nitrogen levels above the ODQWS MAC of 10 mg/l at MW104-13 on August 16, 2016 and at MW105-13 on August 16, 2016, and November 15, 2016.
- The extraction well must be operated more frequently to avoid further remedial measures and groundwater impairment as required by the Tier III Trigger Level Program.
- MECP reviewer was not in agreement with GHD that the existing single extraction well is the sole remedial measure that may be required to protect groundwater at this site.

In the December 10, 2018 letter the MECP reviewer commented on the 2017 report by noting that several trigger levels exceeded several times in the shallow aquifer and ongoing impact on deep groundwater.

As discussed above, Convertus made significant improvements in the configuration of the extraction well system during 2019. These improvements allowed for a significant increase in extraction of impacted groundwater from the shallow flow system. There is currently insufficient data to observe the effect of this increased pumping.

GHD recommends that samples are collected from EW107-15 on a monthly basis for 2 years in order to observe the effect of the increased pumping rate on groundwater quality in the interpreted source area. It is further recommended that the evolution of extracted groundwater quality at EW107-15 is used to guide future decisions concerning the possibility of incorporating a groundwater treatment facility into the remediation system, or future expansion of the groundwater extraction program.

8. Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2019:

1. Based on the groundwater elevations gathered in June, September and November 2019, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being affected by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with an area of localized impact related to an organic contaminant source.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. This observation is consistent with investigations of deep bedrock groundwater quality prior to Facility construction.
4. Improvements in water quality at downgradient deep bedrock monitoring well TW-8 have been observed during recent monitoring periods. There is currently insufficient data to confirm if the Facility is the source of sporadic water quality within the deep bedrock aquifer, however trends of decreasing concentrations in the downgradient deep bedrock monitoring wells suggest that the Facility is not significantly affecting this aquifer.
5. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2019 monitoring period.
6. Surface water was discharged once from the on-Site Stormwater Management Pond during the 2019 monitoring period (April). All parameters were below their respective trigger levels listed in the Site ECA in samples collected from the Stormwater Management Pond prior to commencing discharging.

9. Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. The groundwater extraction system should be operated in such a manner that as much impacted groundwater from the shallow flow system is removed, as is practical.
2. The SCADA monitoring system should continue to be used to accurately record the volume of water pumped.
3. Groundwater samples should be collected from EW107-15 on a monthly basis for 2 years to observe the evolution of groundwater quality under the scenario of more consistent pumping. This more detailed water quality data should be used to inform decisions concerning future operation or expansion of the remediation system including the possibility of incorporating a proven groundwater treatment technology into the remediation system.
4. Tier II confirmatory sampling should be completed during the spring 2020 sampling event at MW104-13, TW-4, and TW-8.

10. References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015a. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015b. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, March 23, 2015c. 2014 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, March 25, 2015d. Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2016 - 2015 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2017- 2016 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 15, 2018 - 2017 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, February 8, 2019 - 2018 Groundwater and Surface Water Monitoring Report, Renewi Canada Ltd. Organics Composting Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario.

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region, January 3, 2017a. Hydrogeologic Assessment, Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa.

Ministry of the Environment and Climate Change, February 1, 2017b. Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

All of Which is Respectfully Submitted,

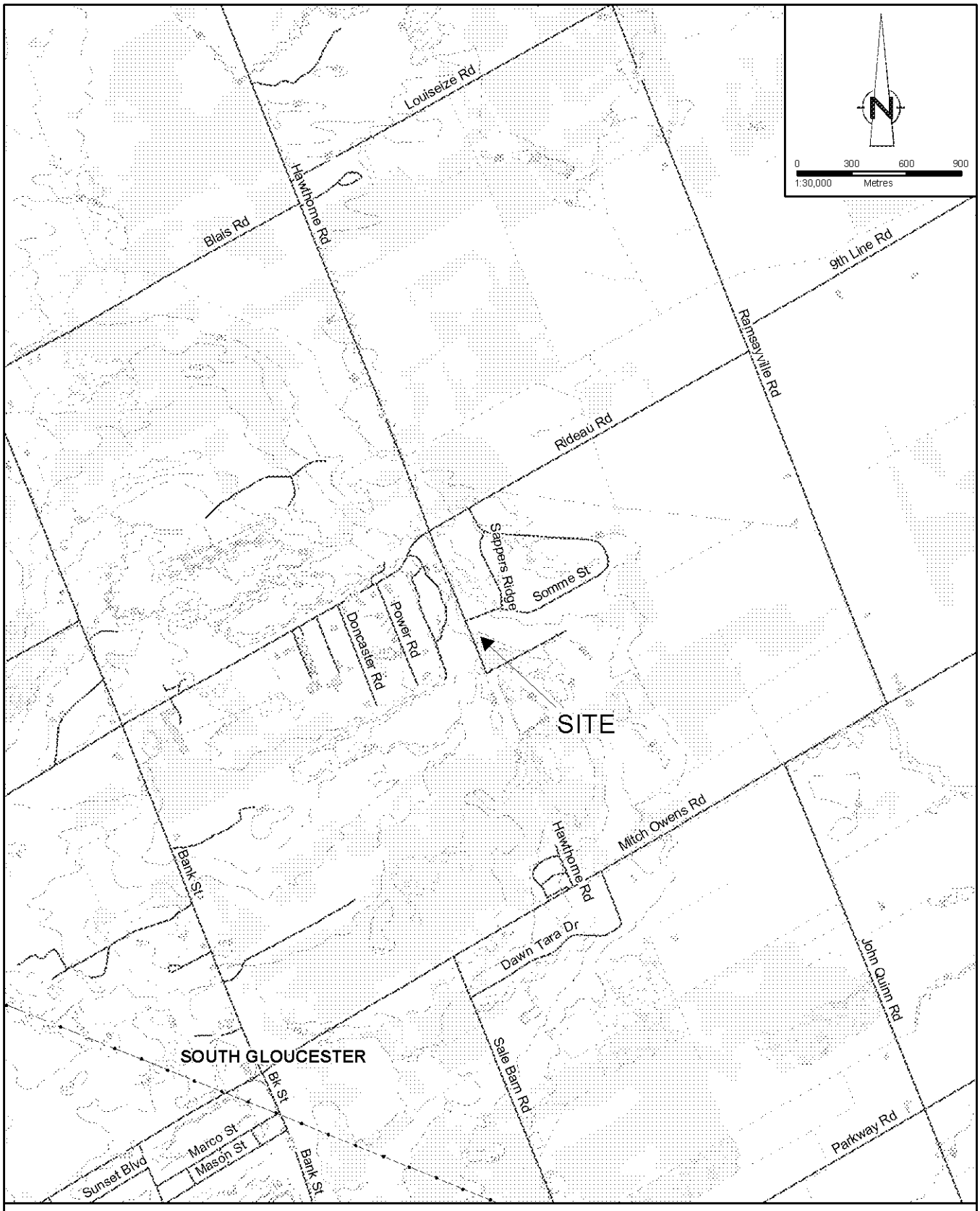
GHD



Allan Molenhuis, P.Geo. (Limited)



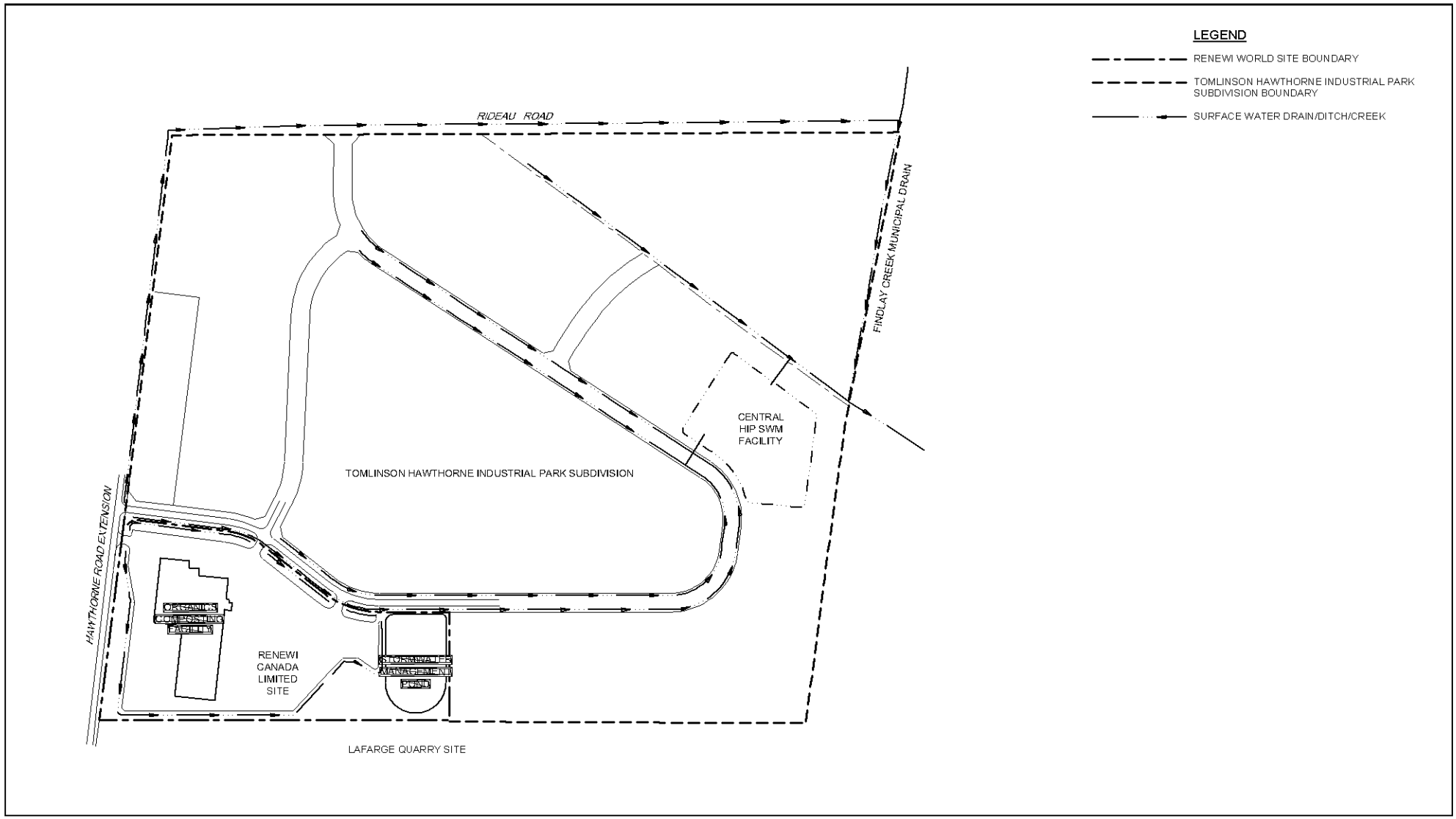
Ben Kempel, P.Geo. (Limited)



Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;
Coordinate System: NAD 1983 UTM Zone 18N

figure 1.1

SITE LOCATION MAP
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Renewi Canada Ltd.



0 50 100 150m

RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

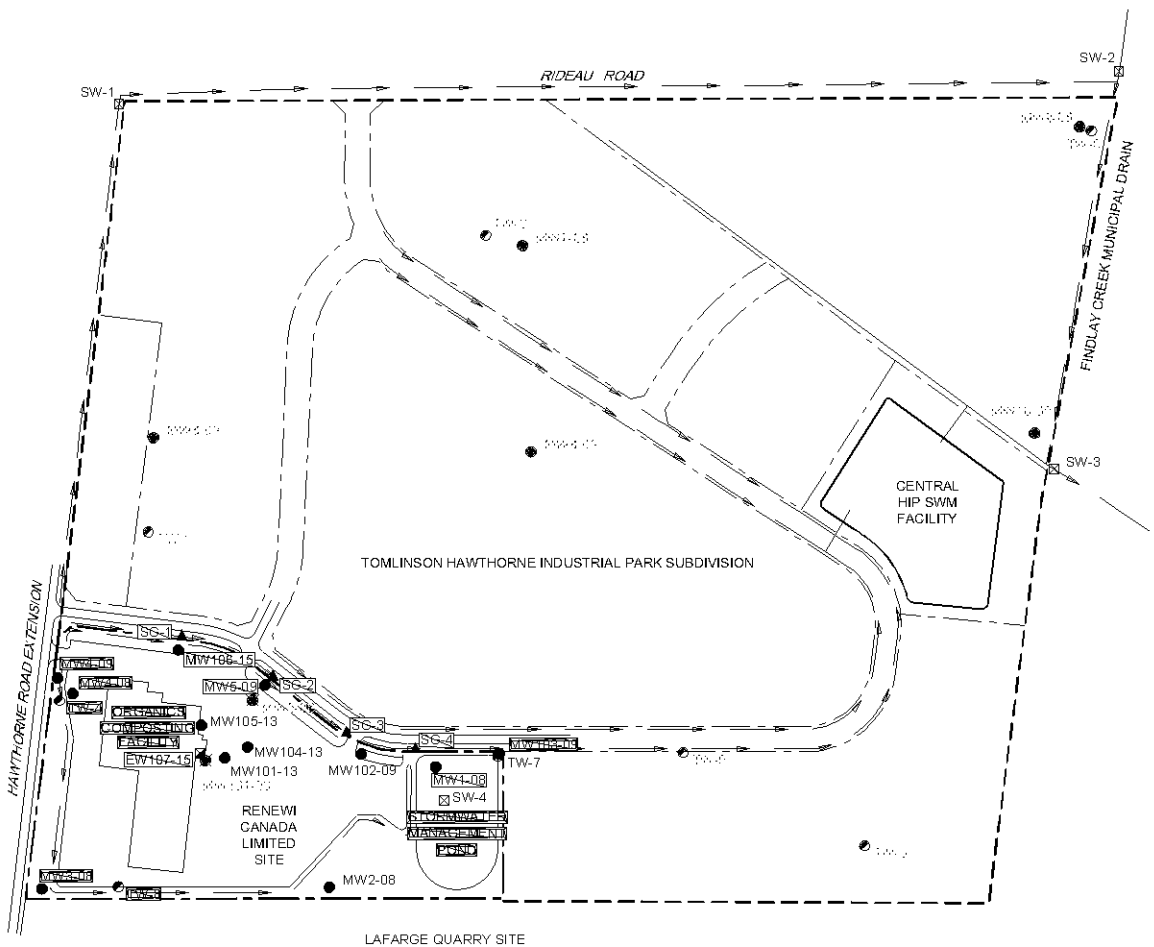
45804-58
Feb 24, 2020

SITE PLAN

figure 1.2

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA001.DWG

001267



LEGEND

- RENEWI SITE BOUNDARY
- TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
- SURFACE WATER DRAIN/DITCH/CREEK
- MW2-08 — SHALLOW MONITORING WELL LOCATION
- TW-4 — DEEP BEDROCK MONITORING WELL LOCATION
- EW107-15 — SHALLOW EXTRACTION WELL LOCATION (APPROX.)
- SW-3 — SURFACE WATER MONITORING LOCATION
- SG-2 — SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
- MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE (SEE NOTE BELOW)

NOTES:

1. SHALLOW AND DEEP MONITORING WELLS LOCATED OUTSIDE OF RENEWI SITE LIMITS ARE NO LONGER ACCESSIBLE TO OCL OR GHD AS OF JANUARY 2010.

0 50 100 150m

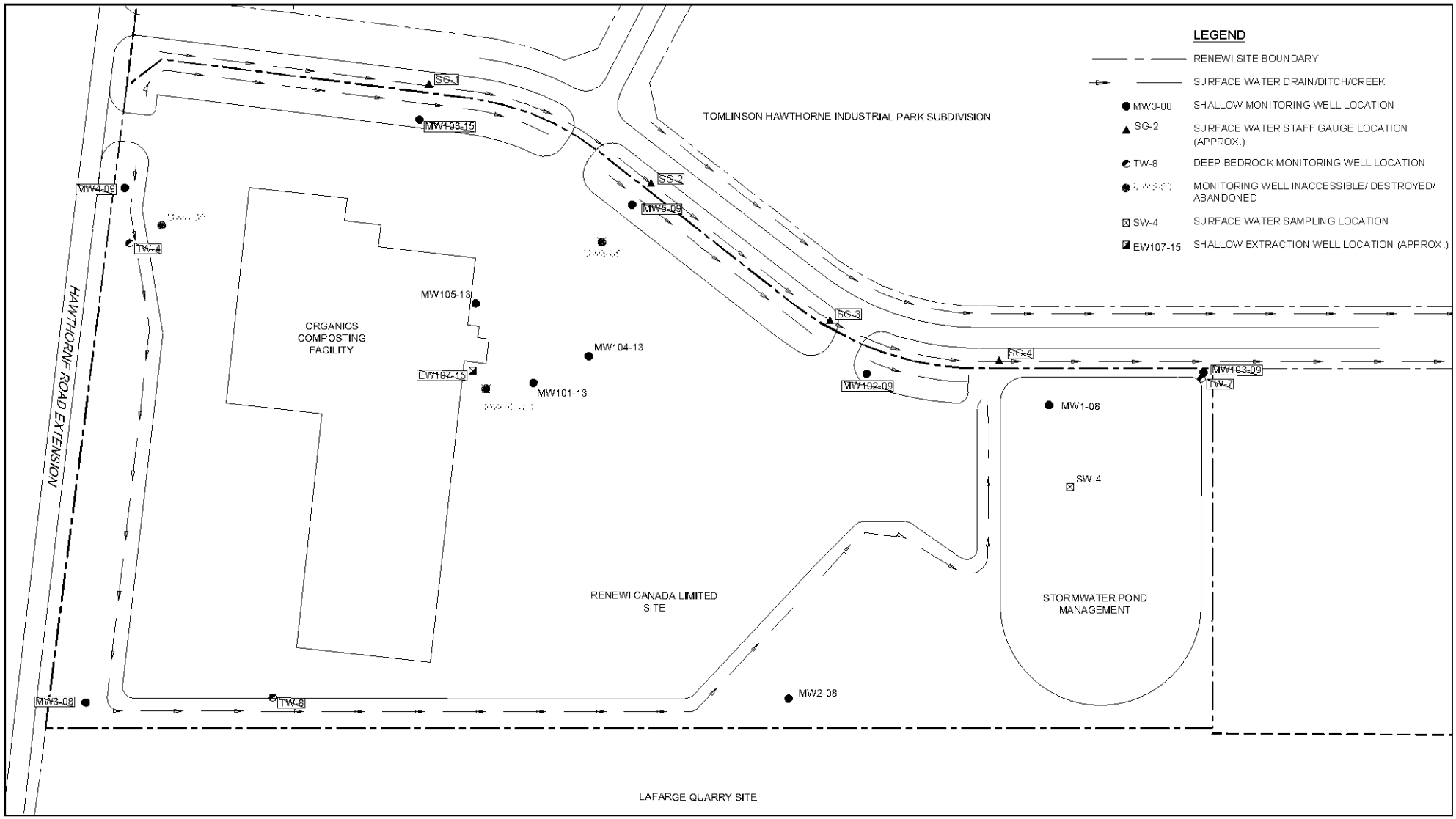
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 24, 2020

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS figure 3.1

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA002.DWG

001268



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

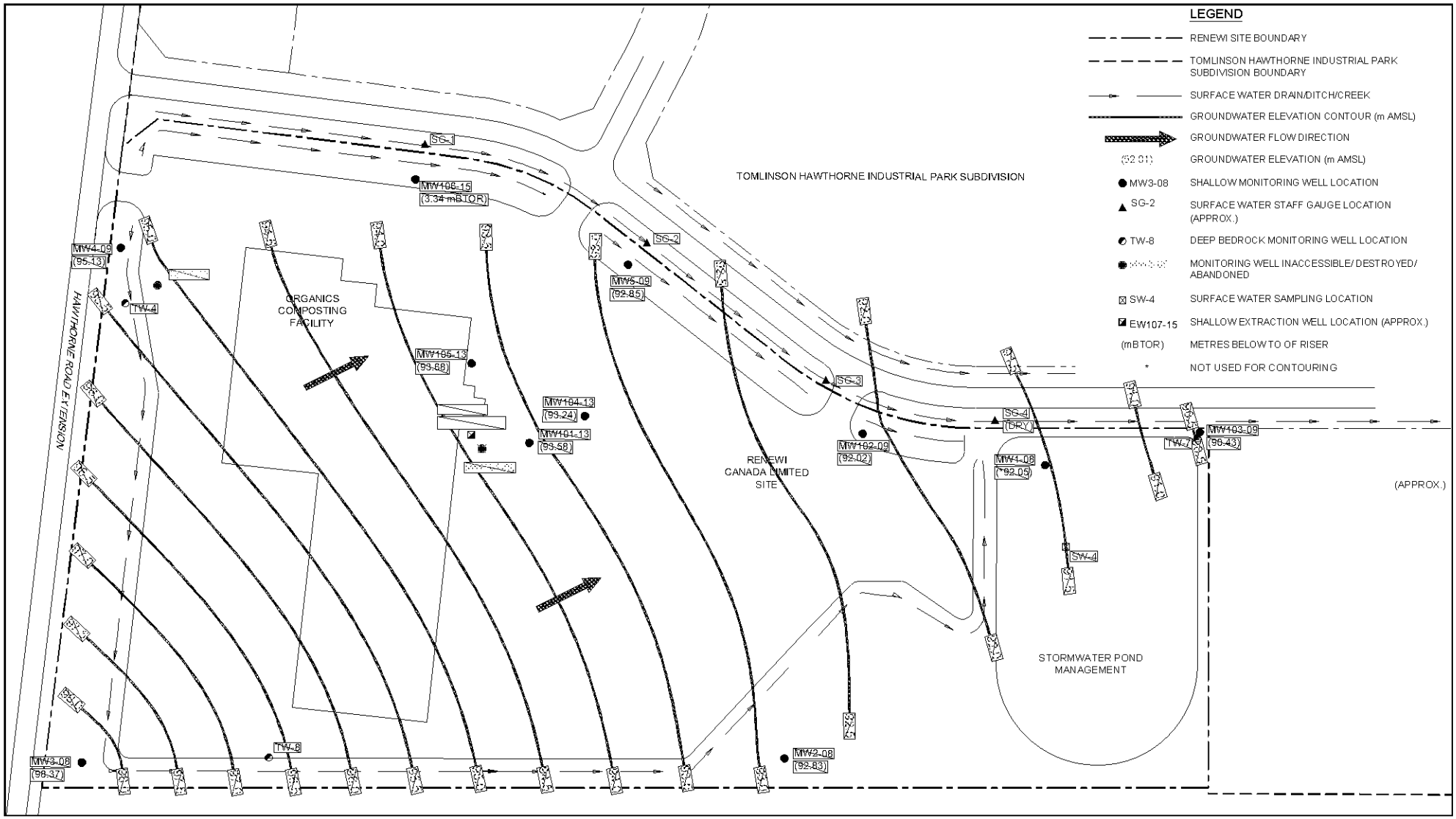
RENEWI PROPERTY GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

45804-58
Feb 24, 2020

figure 3.2

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA003.DWG

001269



0 15 30 45m

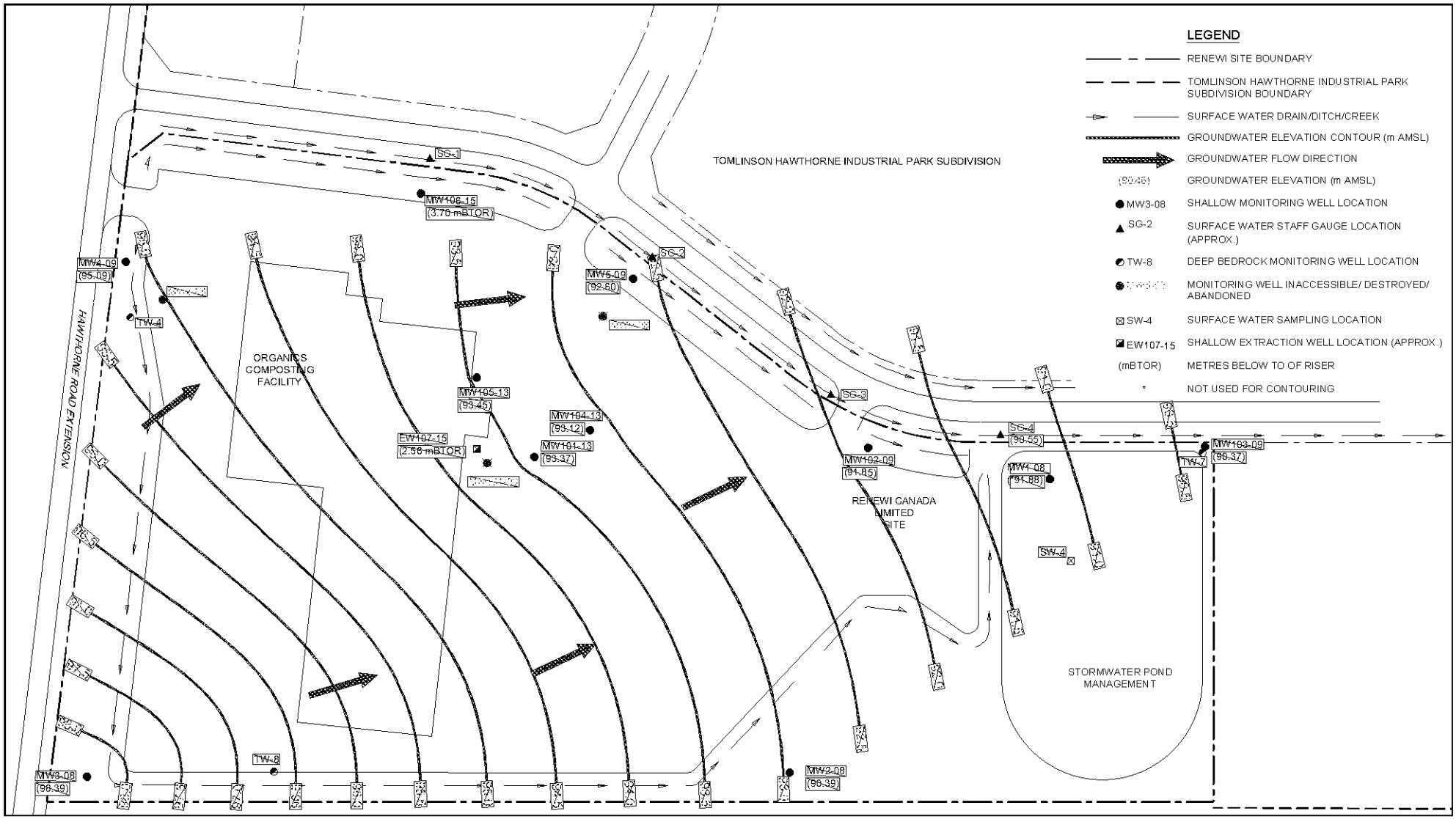
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
JUNE 17 & 18, 2019

45804-58
Feb 25, 2020

figure 4.1

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA004.DWG

001270



0 15 30 45m

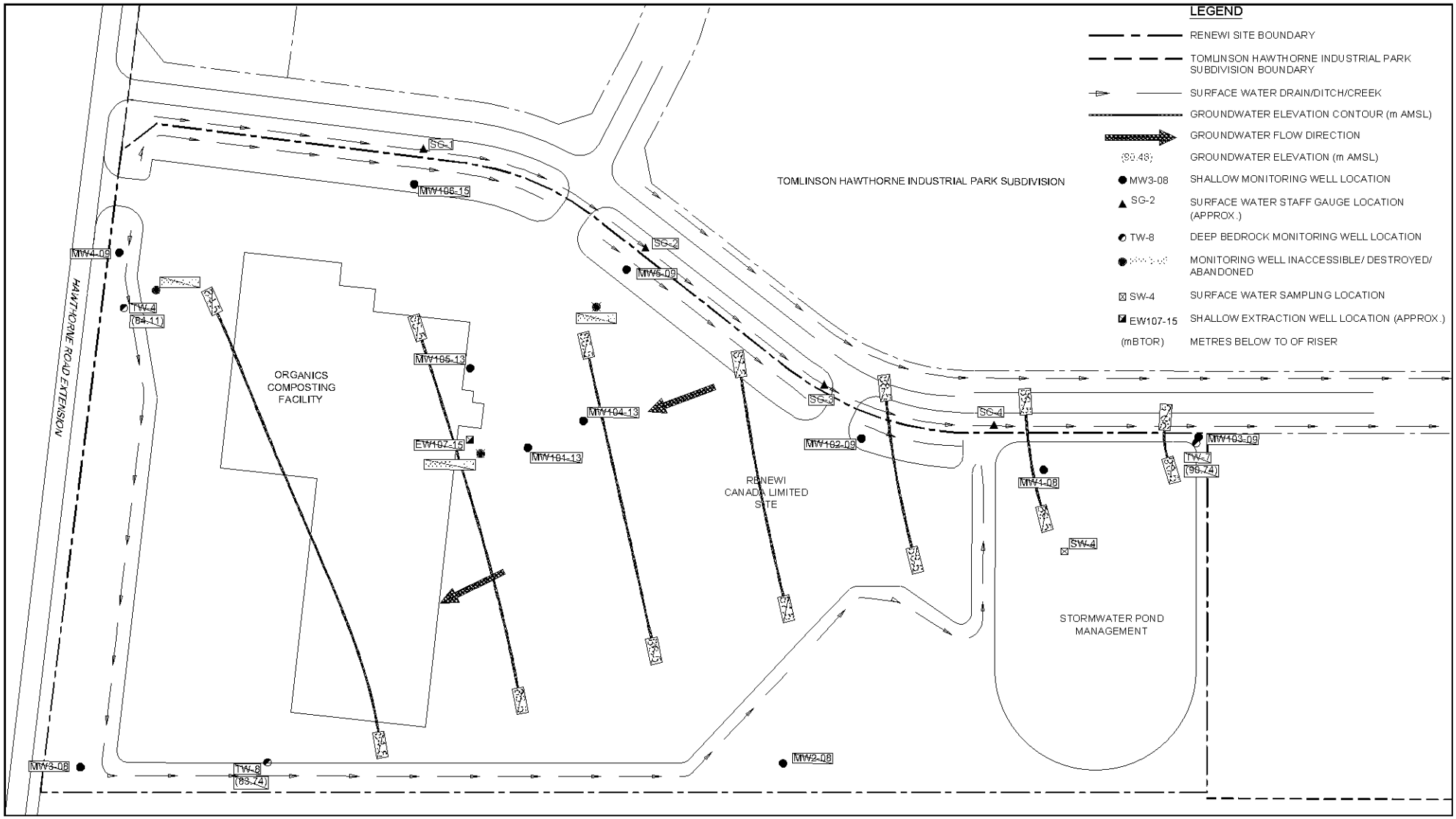
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
NOVEMBER 26-28, 2019

45804-58
Feb 25, 2020

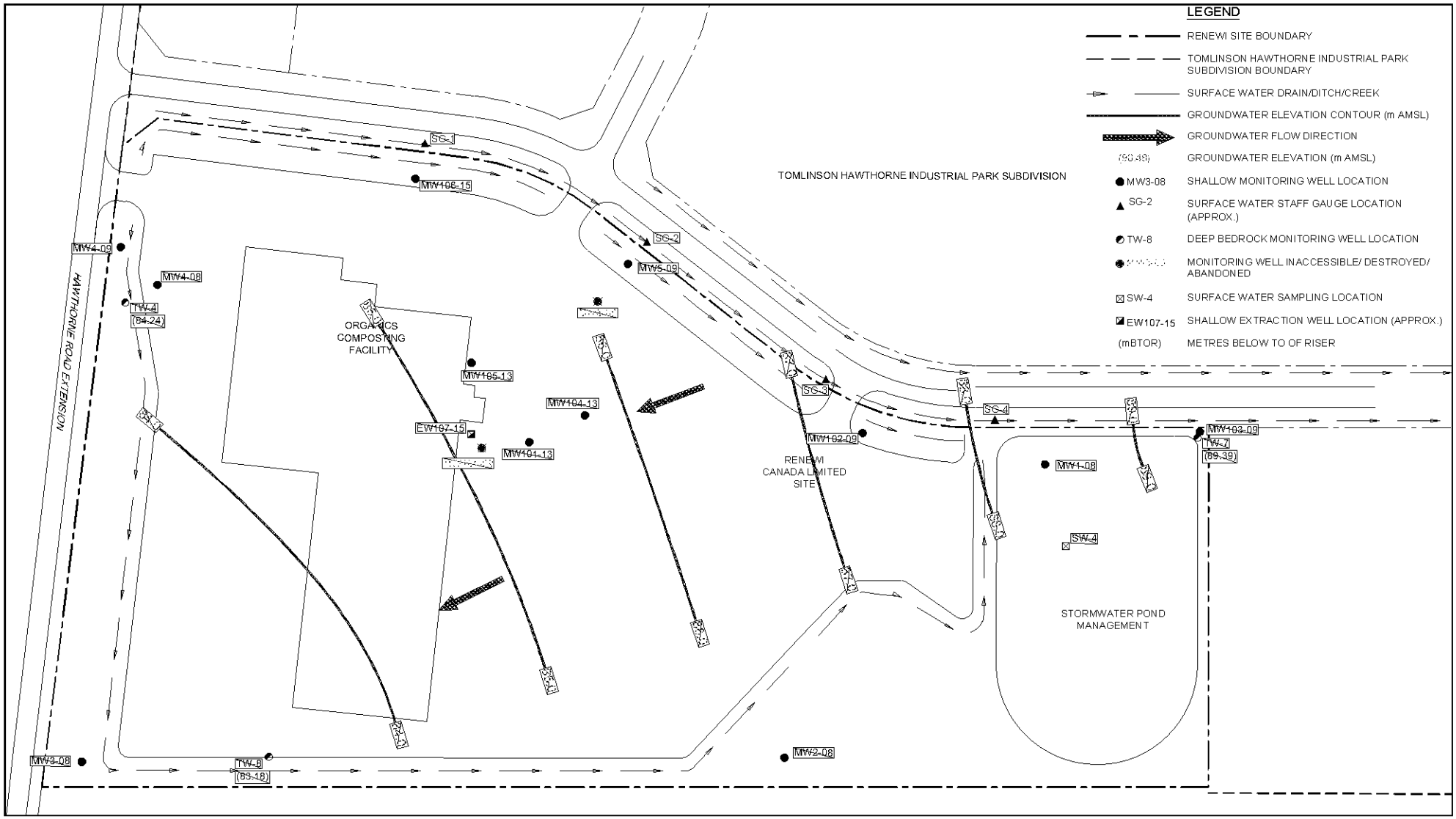
figure 4.2

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA005.DWG

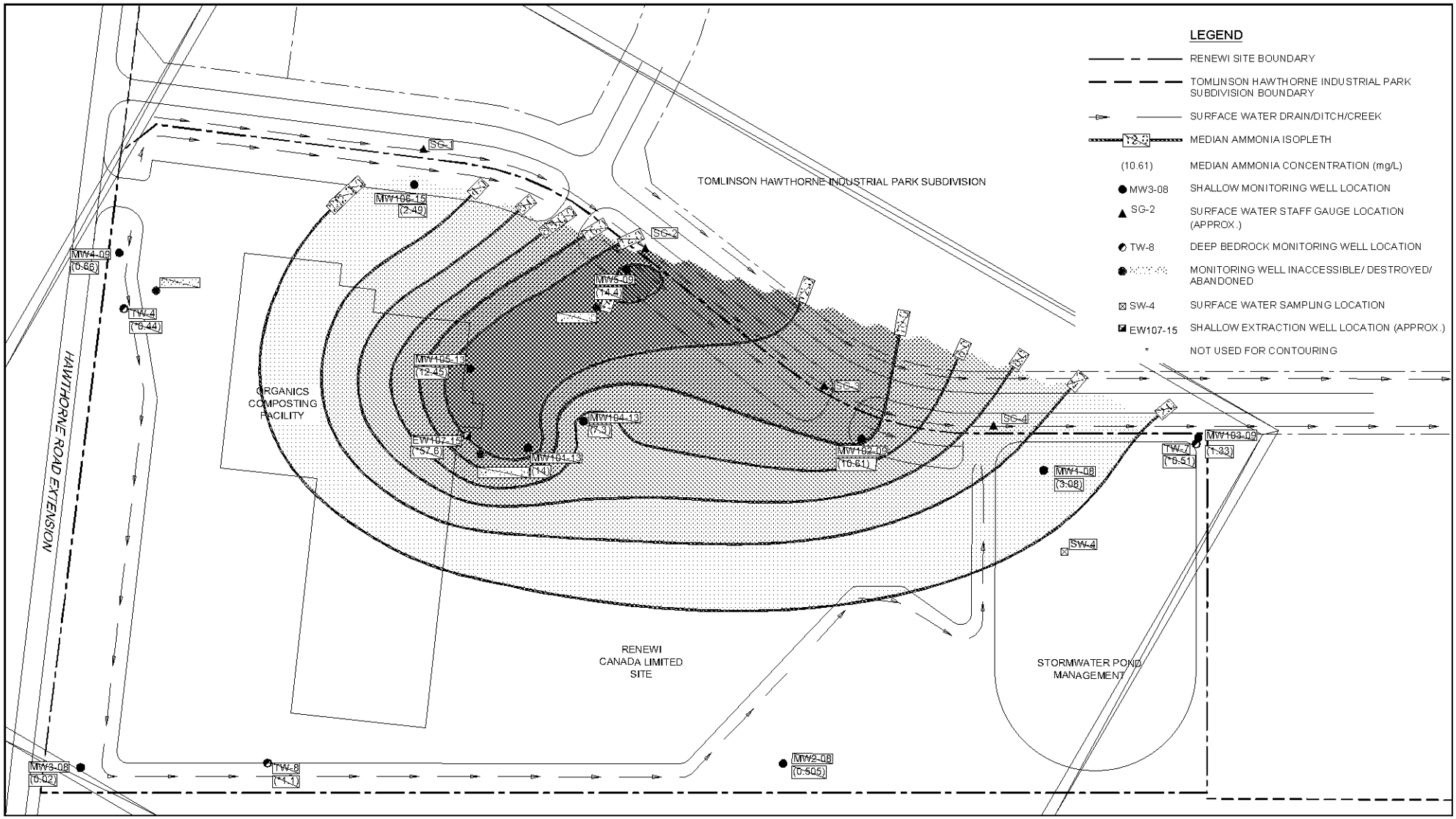
001271


LEGEND
RENEWI SITE BOUNDARY
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
SURFACE WATER DRAIN/DITCH/CREEK
GROUNDWATER ELEVATION CONTOUR (m AMSL)
GROUNDWATER FLOW DIRECTION
(90.48) GROUNDWATER ELEVATION (m AMSL)
MW3-08 SHALLOW MONITORING WELL LOCATION
SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
TW-8 DEEP BEDROCK MONITORING WELL LOCATION
MONITORING WELL INACCESSIBLE/ DESTROYED/ ABANDONED
SW-4 SURFACE WATER SAMPLING LOCATION
EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
(mBTOR) METRES BELOW TO OF RISER
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION
HAWTHORNE ROAD EXTENSION
ORGANICS COMPOSTING FACILITY
RENEWI CANADA LIMITED SITE
STORMWATER POND MANAGEMENT
SG-1
SG-2
SG-3
SG-4
MW106-15
MW4-09
MW6-09
TW-4
(84.11)
MW105-13
MW104-13
EW107-15
MW101-13
MW102-09
MW103-09
TW-7
(90.74)
MW1-08
SW-4
MW3-08
TW-8
(83.74)
MW2-08
0 15 30 45m
N
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
BEDROCK GROUNDWATER ELEVATIONS
JUNE 17 & 18, 2019
45804-58
Feb 25, 2020
figure 4.3
CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(D85)\45804-58(D85)GN\45804-58(D85)GN-WA006.DWG

001272


LEGEND
RENEWI SITE BOUNDARY
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
SURFACE WATER DRAIN/DITCH/CREEK
GROUNDWATER ELEVATION CONTOUR (m AMSL)
GROUNDWATER FLOW DIRECTION
(90.48) GROUNDWATER ELEVATION (m AMSL)
MW3-08 SHALLOW MONITORING WELL LOCATION
SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
TW-8 DEEP BEDROCK MONITORING WELL LOCATION
MONITORING WELL INACCESSIBLE/ DESTROYED/ ABANDONED
SW-4 SURFACE WATER SAMPLING LOCATION
EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
(mBTOR) METRES BELOW TO OF RISER
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION
HAWTHORNE ROAD EXTENSION
ORGANICS COMPOSTING FACILITY
RENEWI CANADA LIMITED SITE
STORMWATER POND MANAGEMENT
SG-1
SG-2
SG-3
SG-4
MW4-09
MW4-08
TW-4
(84.24)
MW106-15
MW105-13
MW104-13
EW107-15
MW104-13
MW5-09
MW102-09
MW103-09
TW-7
(89.39)
MW1-08
SW-4
MW3-08
TW-8
(83.18)
MW2-08
0 1.5 3.0 4.5m
N
GHD
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
BEDROCK GROUNDWATER ELEVATIONS
NOVEMBER 26-28, 2019
45804-58
Feb 25, 2020
figure 4.4
CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA007.DWG

001273



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

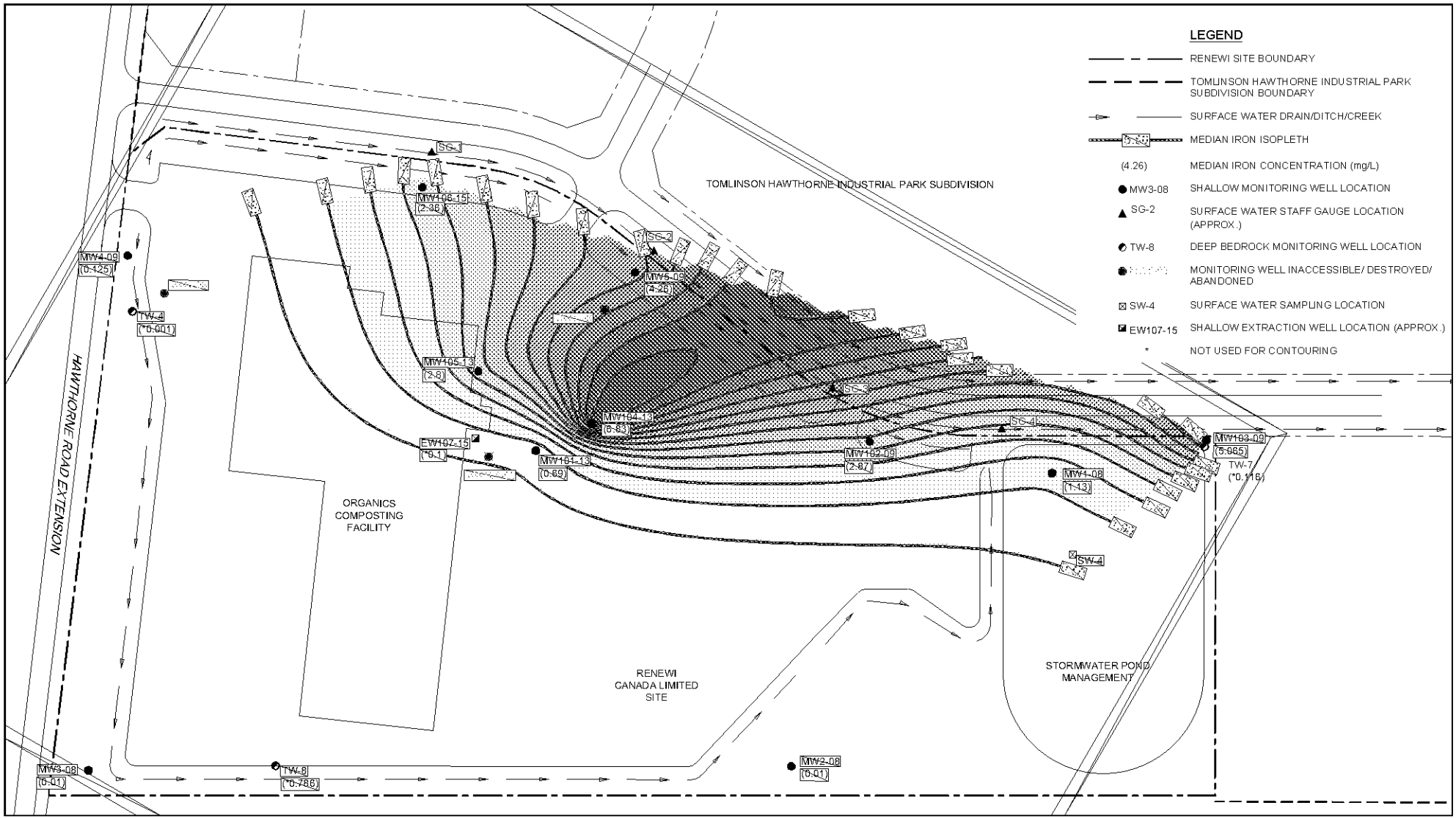
45804-58
Feb 25, 2020

MEDIAN 2019 AMMONIA CONCENTRATION ISOPLETHS

figure 4.5

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA008.DWG

001274



0 1.5 3.0 4.5m

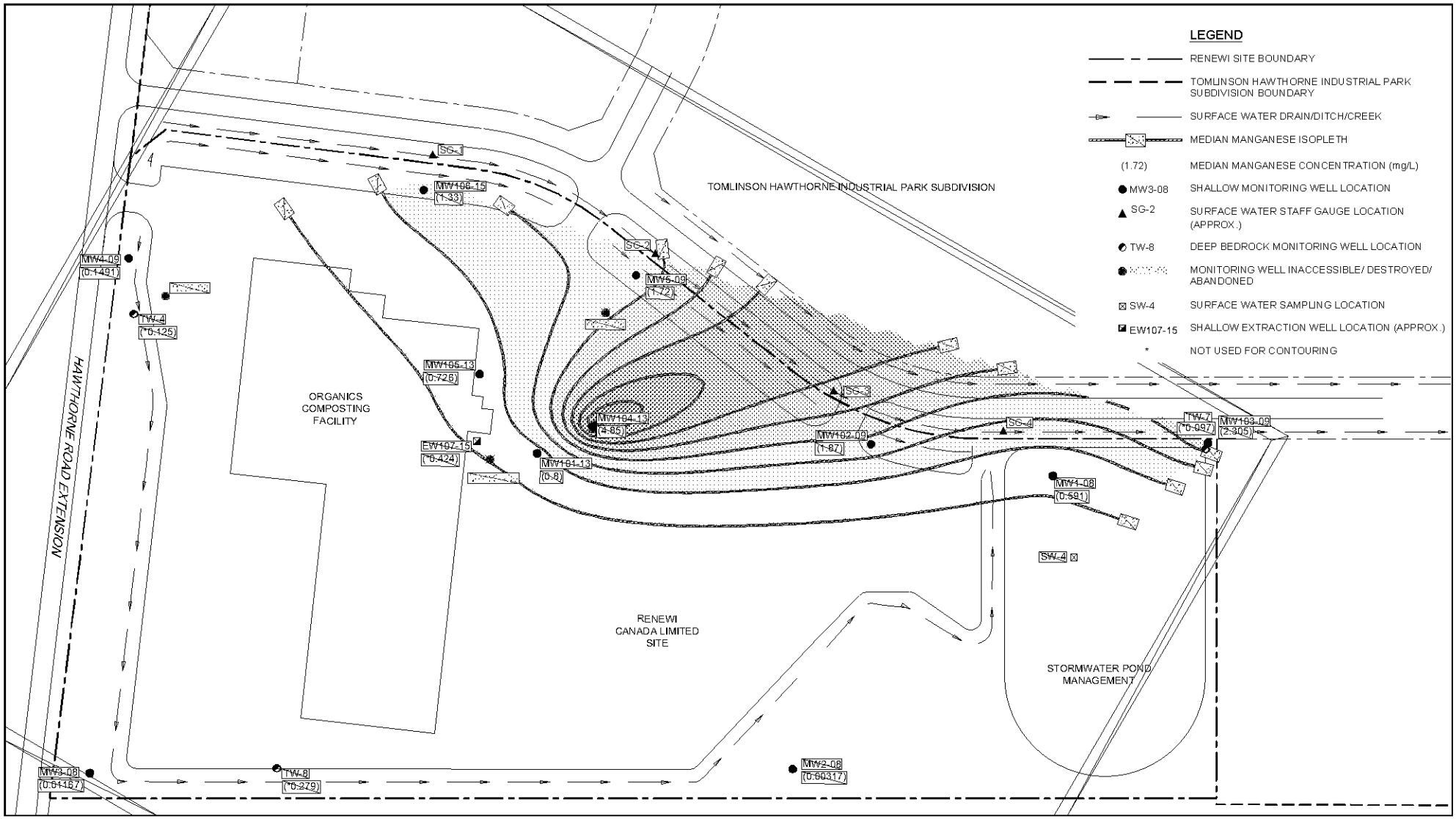
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 25, 2020

MEDIAN 2019 DISSOLVED IRON CONCENTRATION ISOPLETHS figure 4.6

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA009.DWG

001275



0 15 30 45m

RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

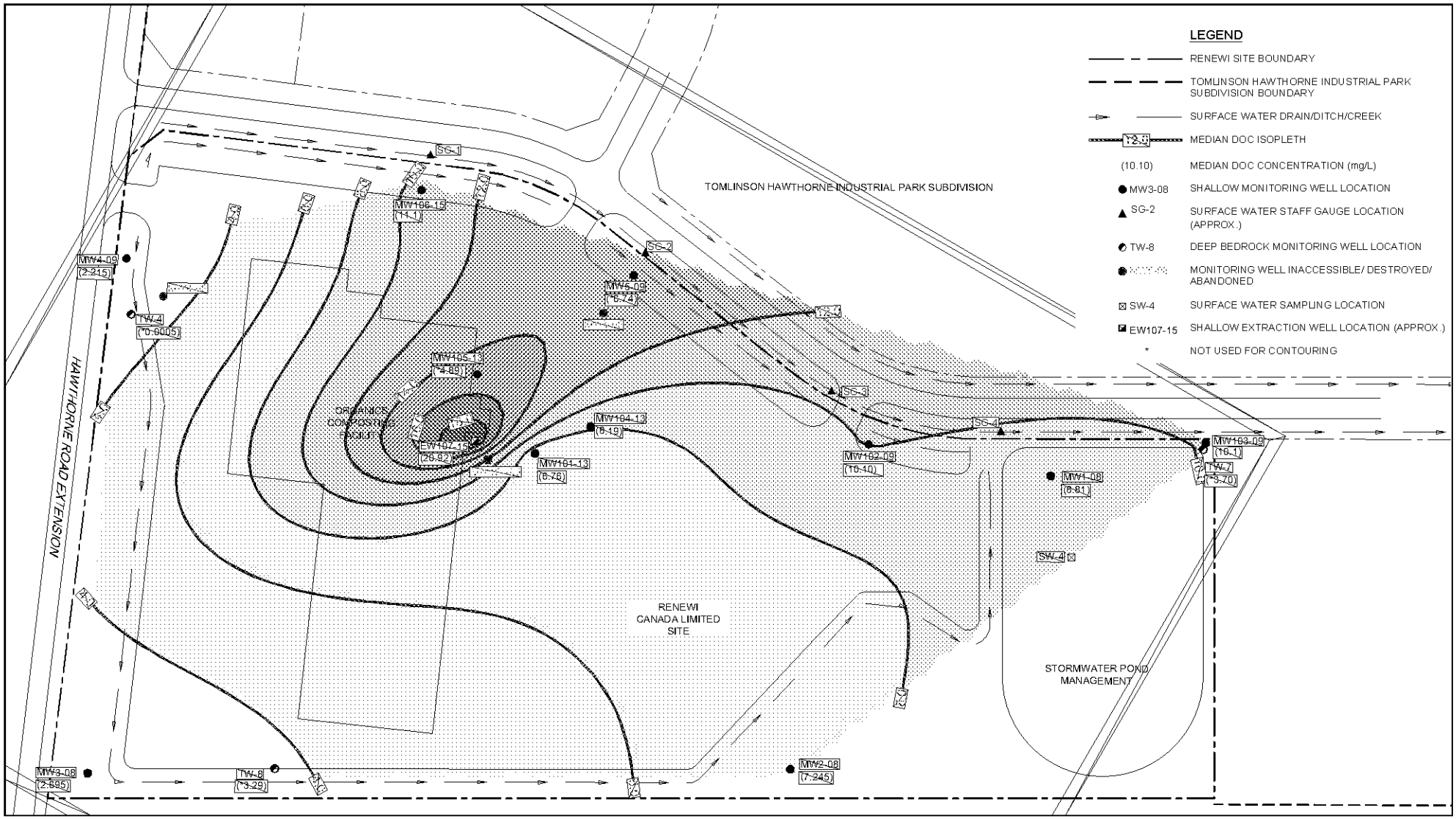
MEDIAN 2019 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS

45804-58
Feb 25, 2020

figure 4.7

CAD File: N:\CAWaterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA010.DWG

001276



0 15 30 45m

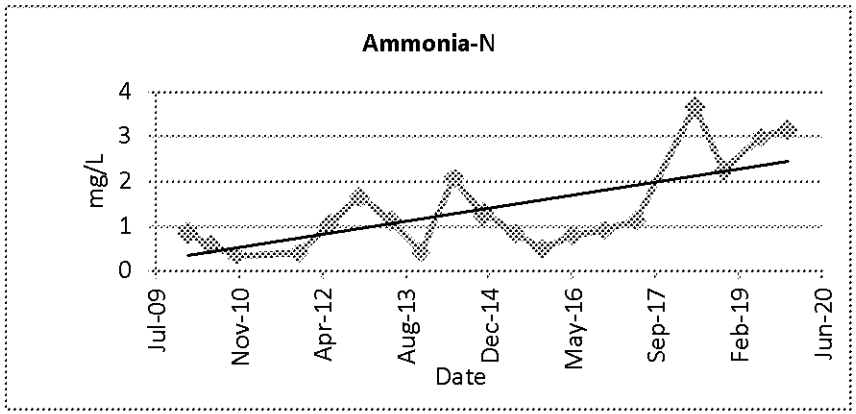
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

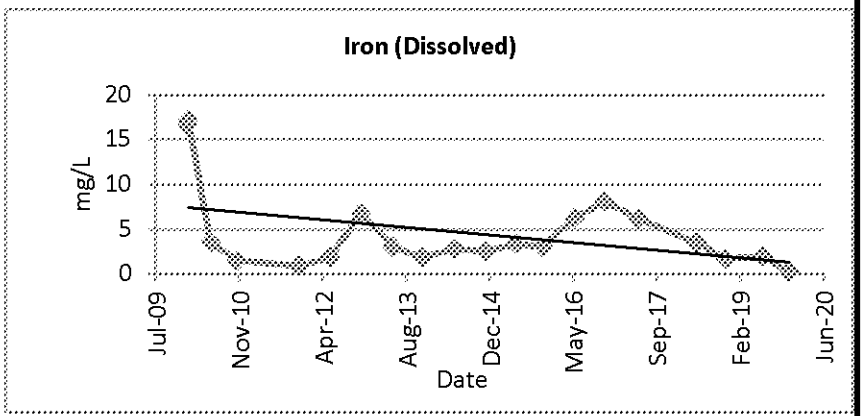
MEDIAN 2019 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS

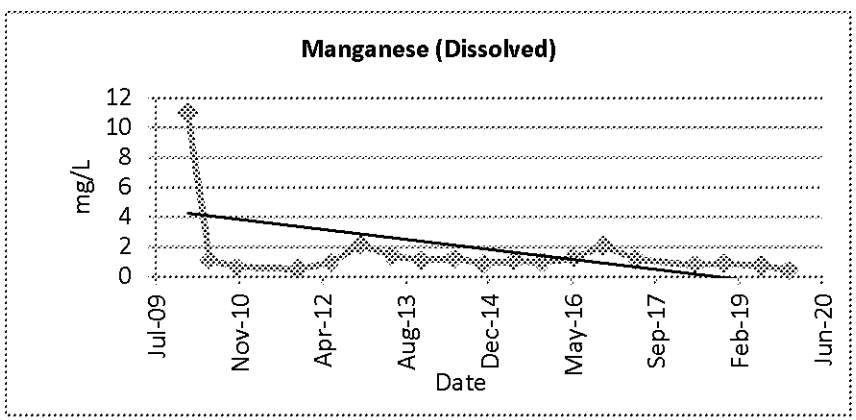
45804-58
Feb 25, 2020

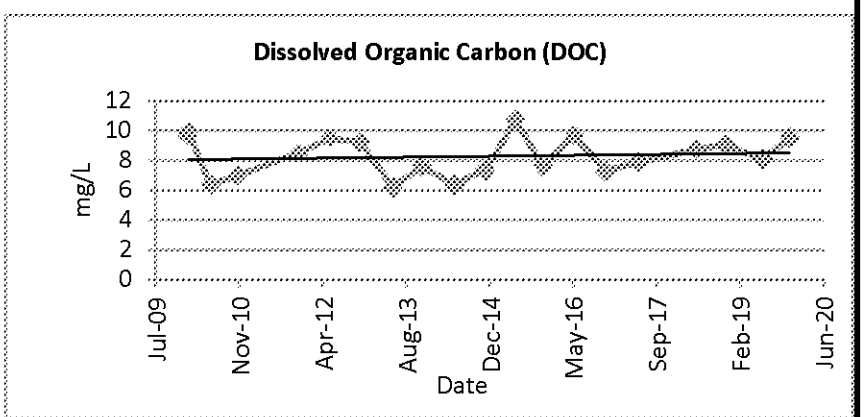
figure 4.8

CAD File: N:\CA\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA011.DWG





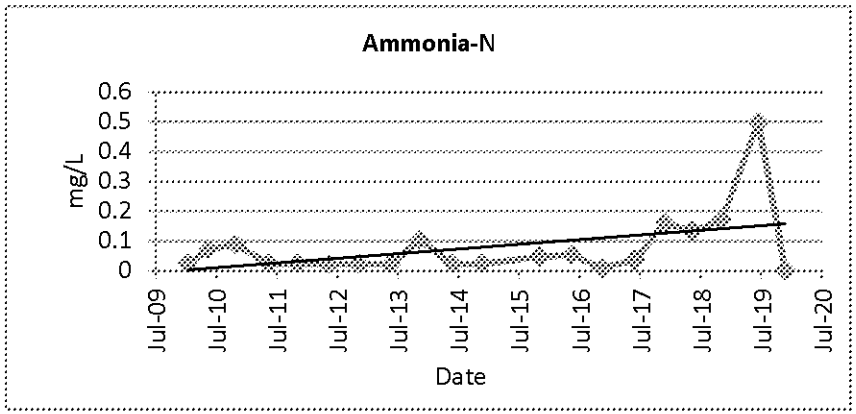


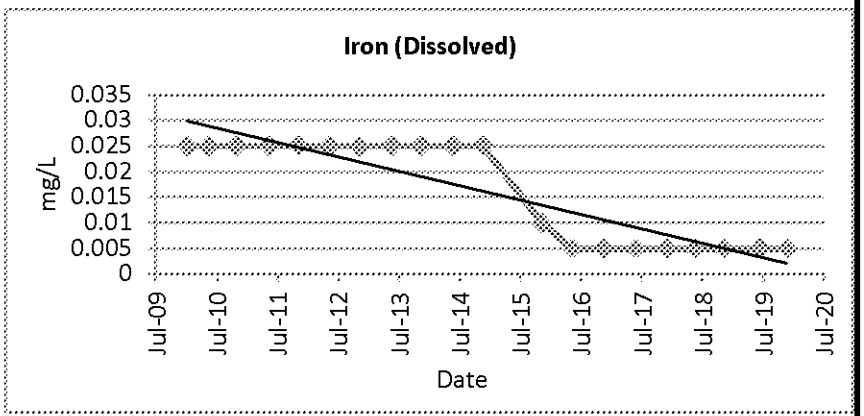


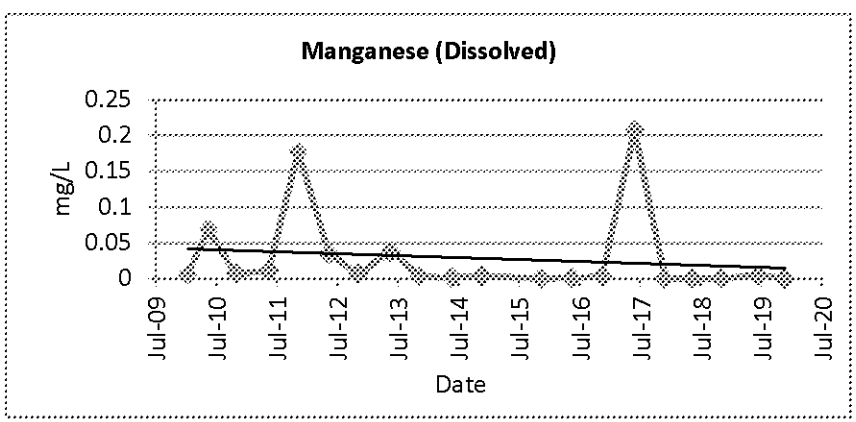
Note: ND results as 1/2 the detection limit

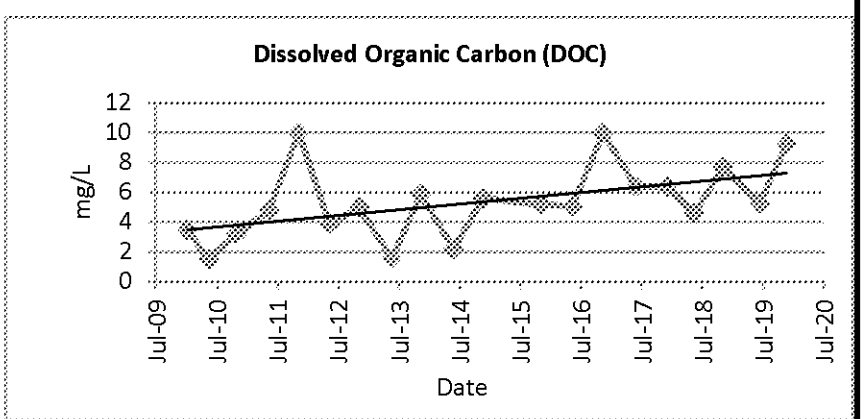
figure 4.9.1

TEMPORAL PLOTS - SELECTED PARAMETERS
MW1-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





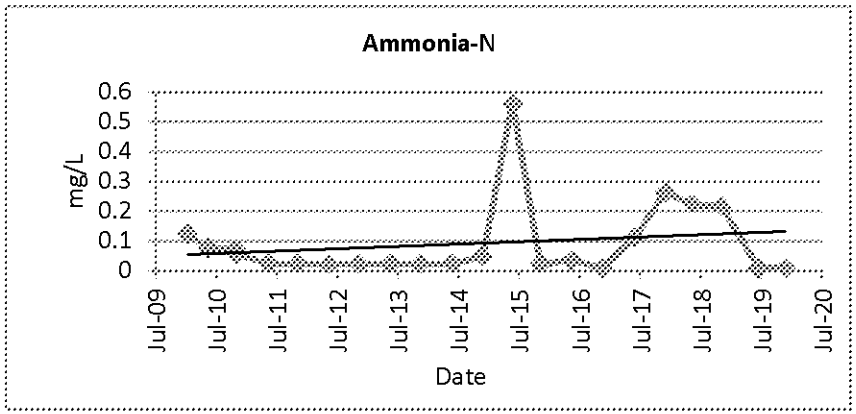


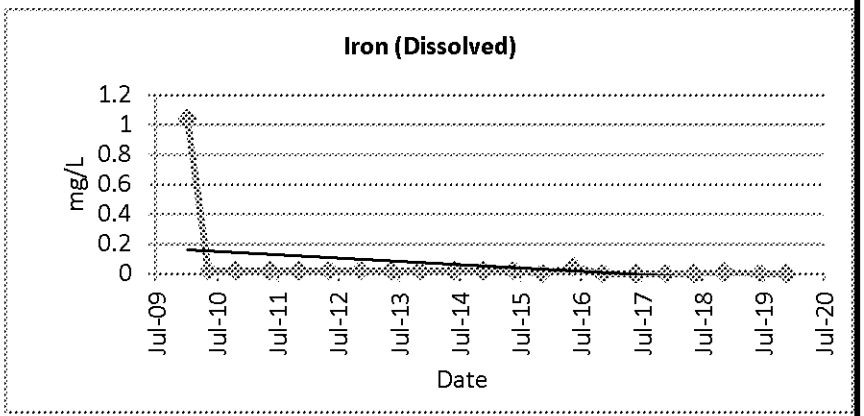


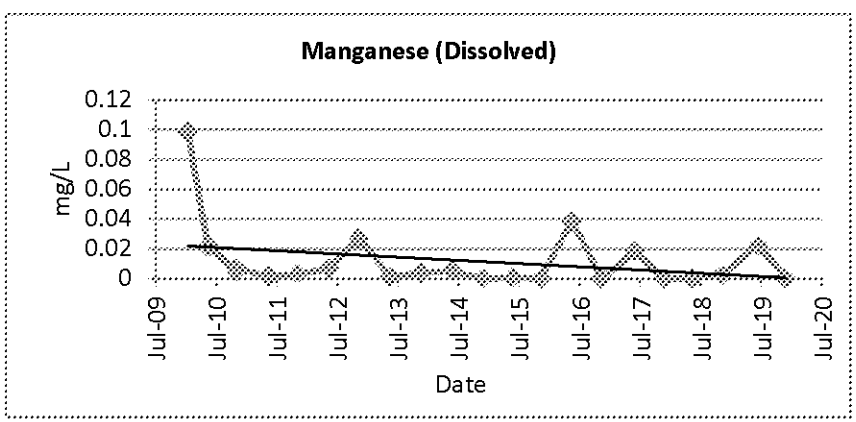
Note: ND results as 1/2 the detection limit

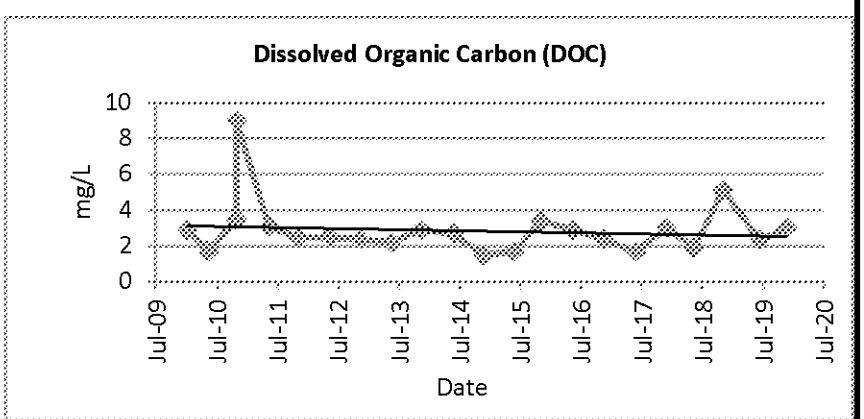
figure 4.9.2

TEMPORAL PLOTS - SELECTED PARAMETERS
MW2-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





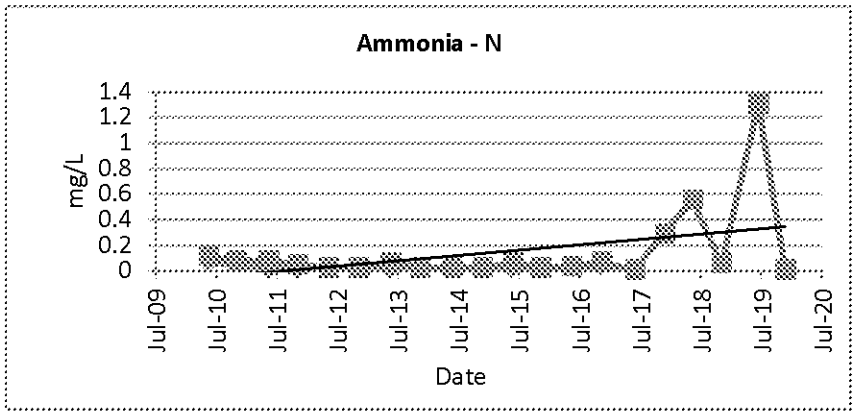


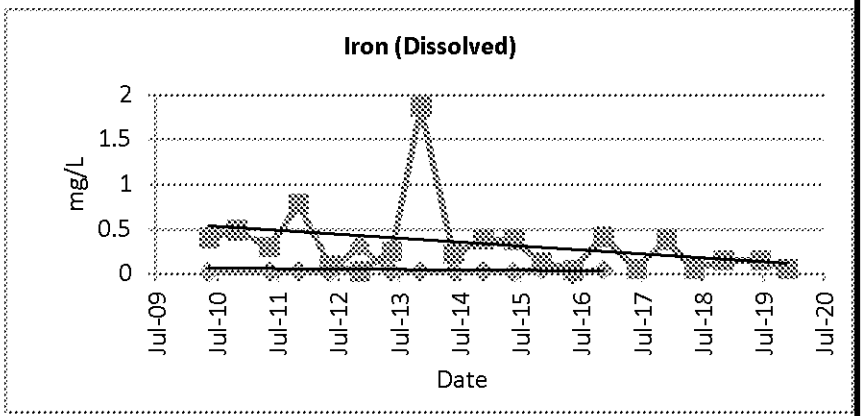


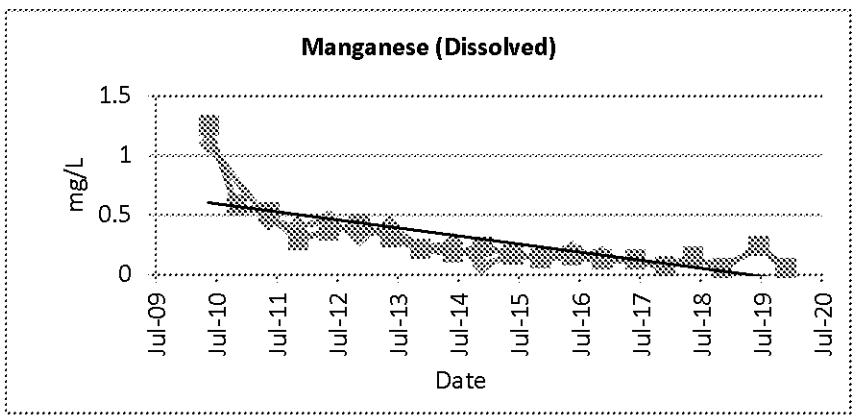
Note: ND results as 1/2 the detection limit

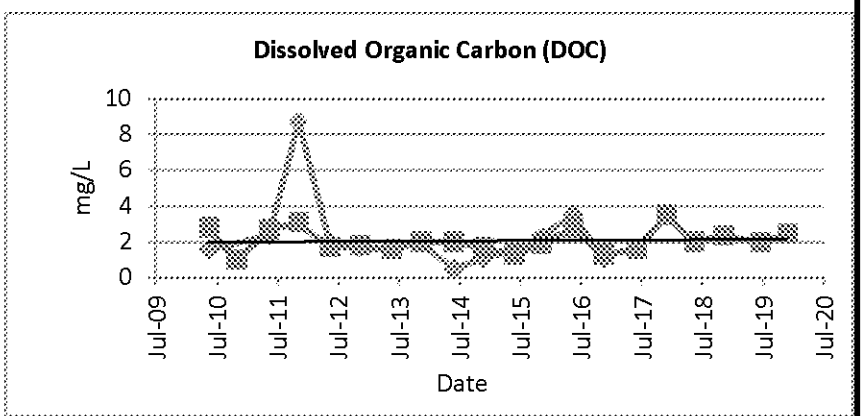
figure 4.9.3

TEMPORAL PLOTS - SELECTED PARAMETERS
MW3-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY







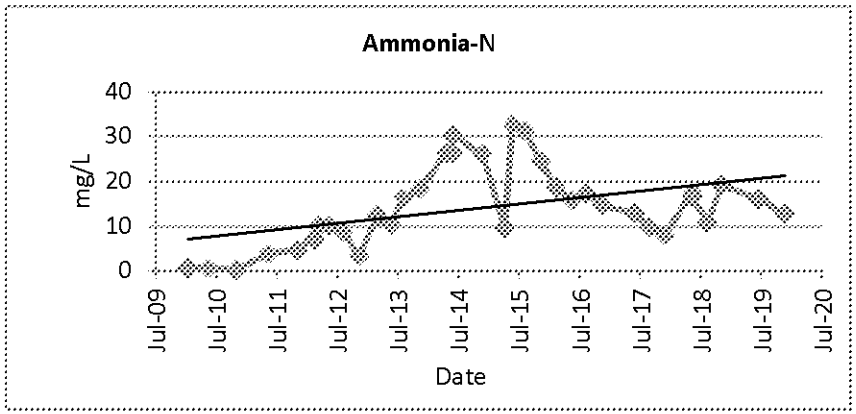


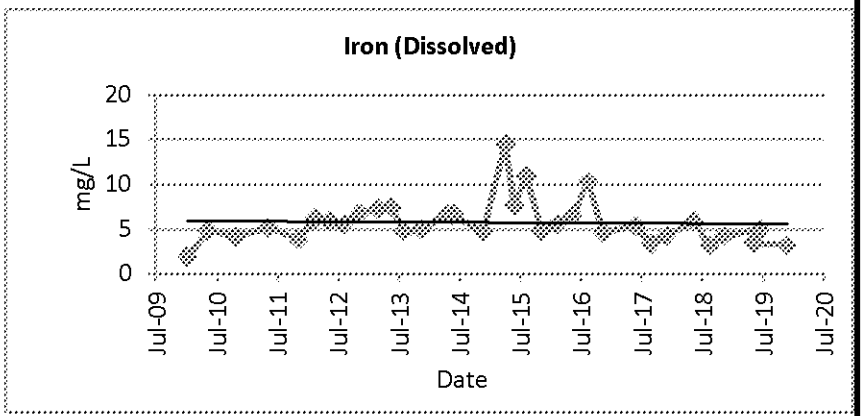
Note: ND results as 1/2 the detection limit

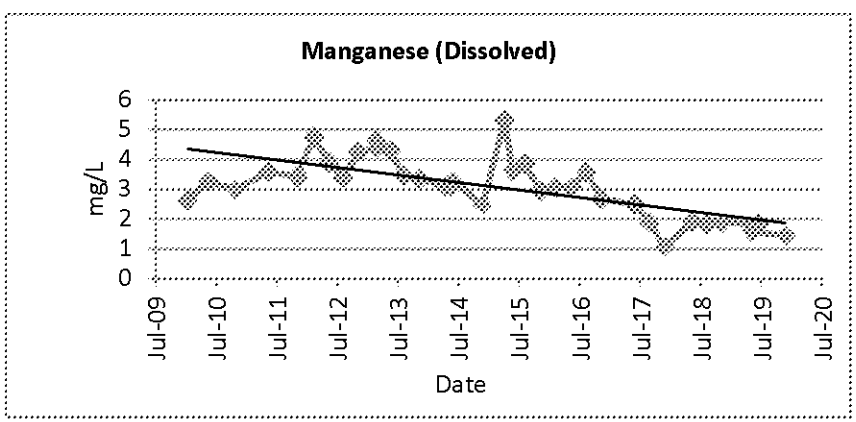
MW4-08
MW4-09

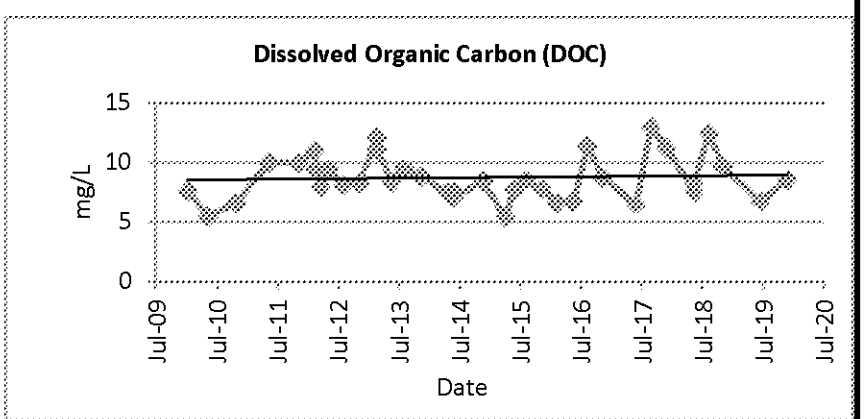
figure 4.9.4

TEMPORAL PLOTS - SELECTED PARAMETERS
MW4-08 & MW4-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





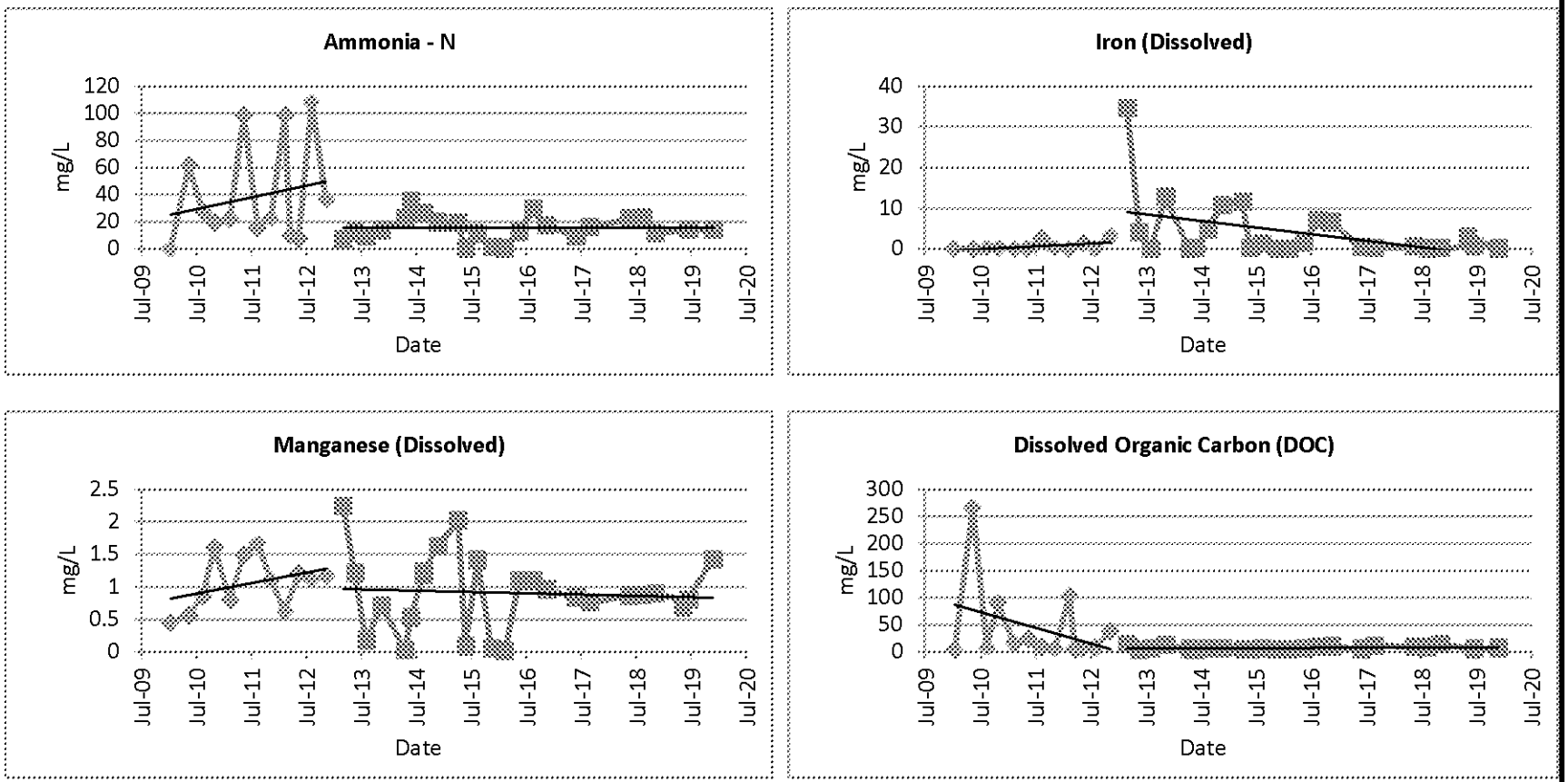




Note: ND results as 1/2 the detection limit

figure 4.9.5

TEMPORAL PLOTS - SELECTED PARAMETERS
MW5-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

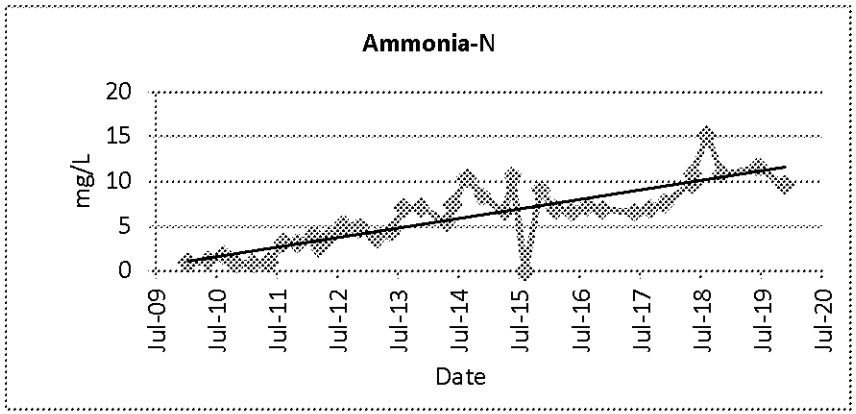


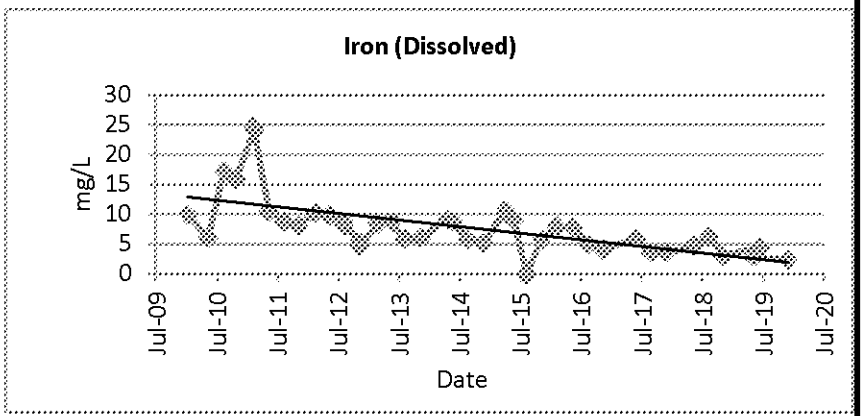
Note: ND results as 1/2 the detection limit

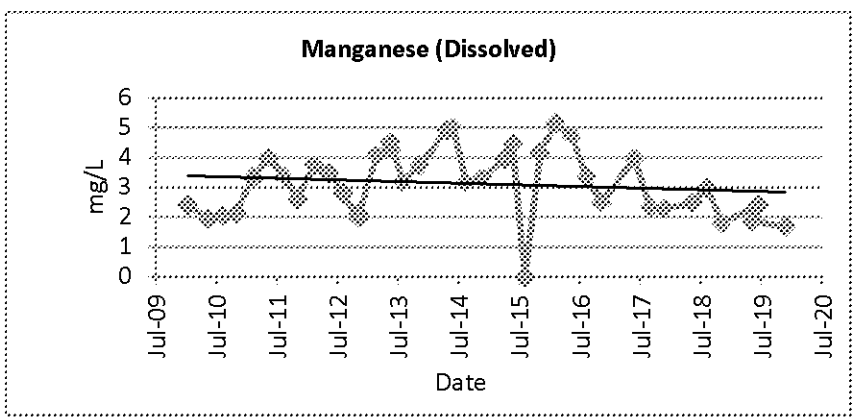
MW101-09
MW101-13

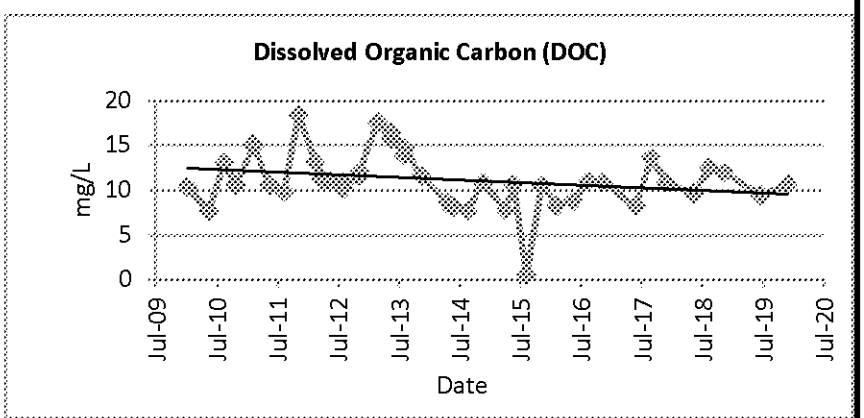
figure 4.9.6

TEMPORAL PLOTS - SELECTED PARAMETERS
MW101-09 & MW101-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





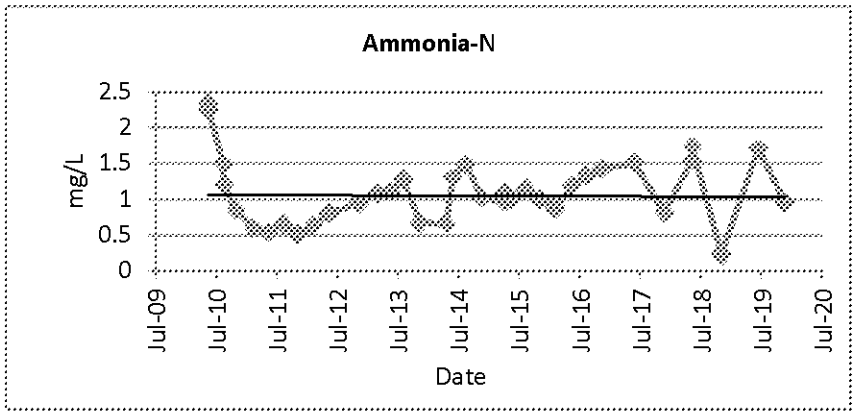


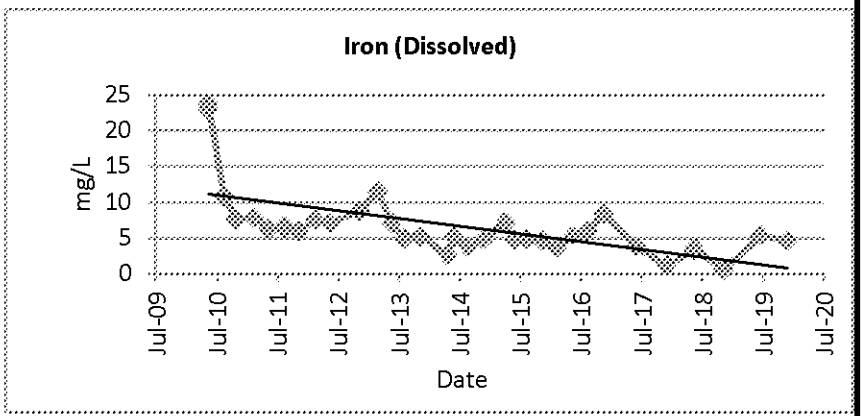


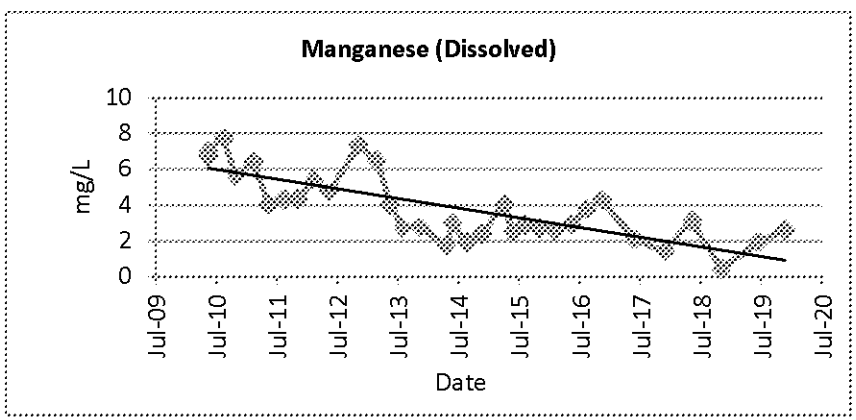
Note: ND results as 1/2 the detection limit

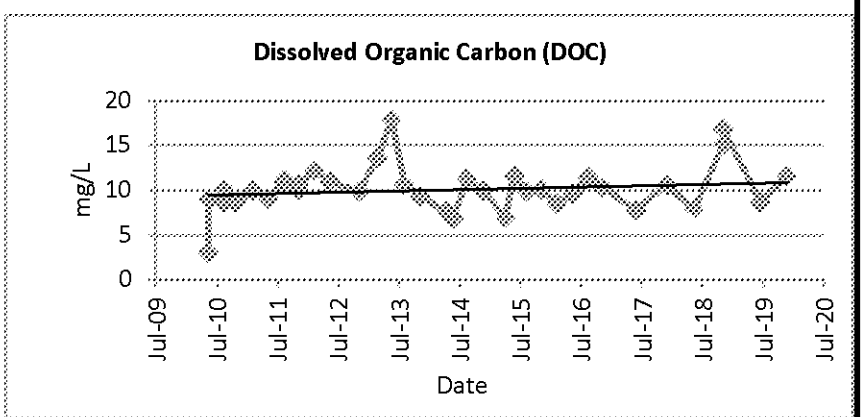
figure 4.9.7

TEMPORAL PLOTS - SELECTED PARAMETERS
MW102-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





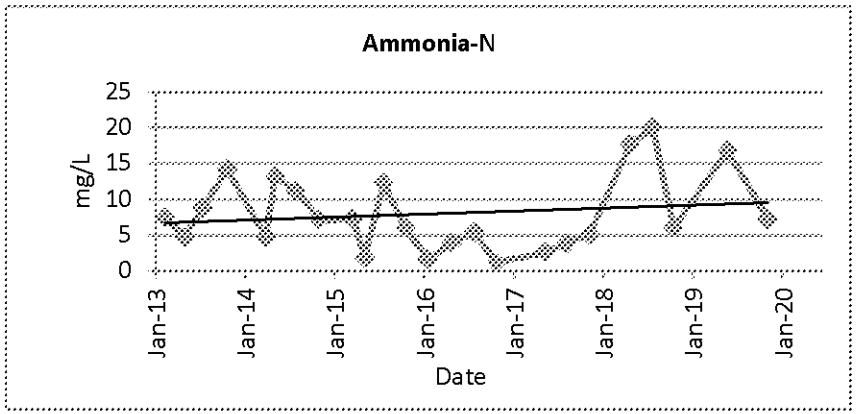


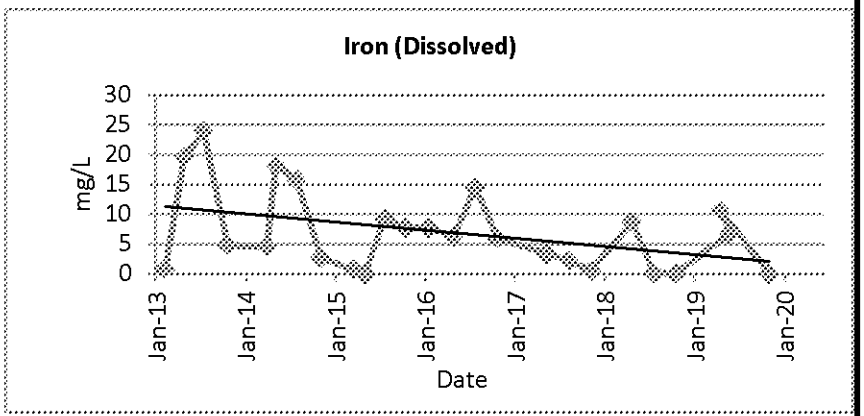


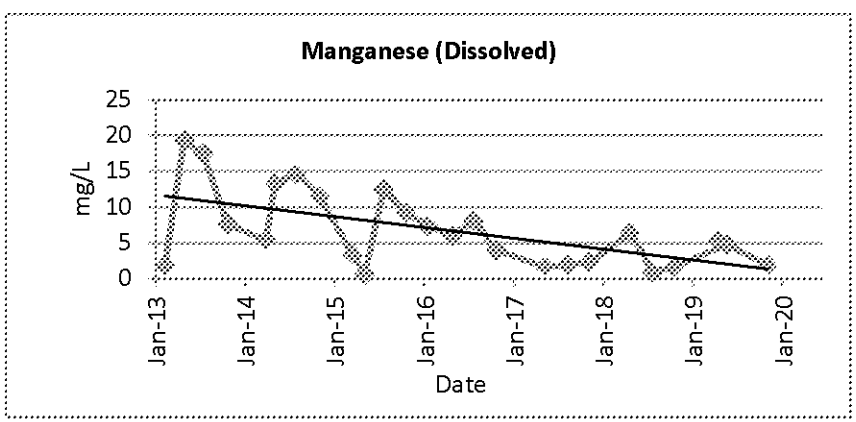
Note: ND results as 1/2 the detection limit

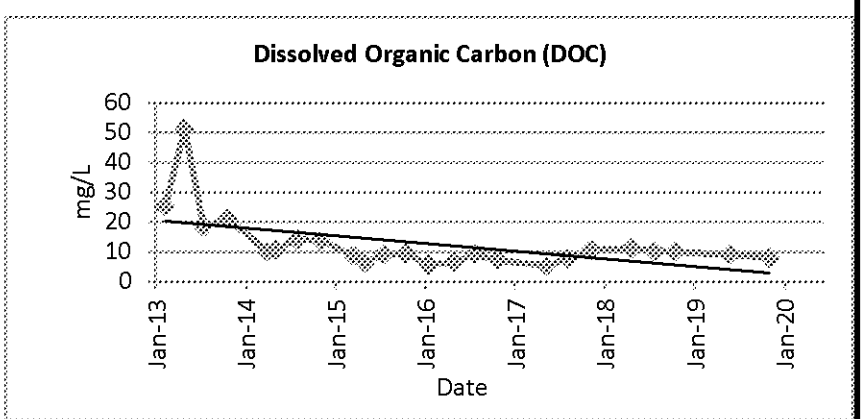
figure 4.9.8

TEMPORAL PLOTS - SELECTED PARAMETERS
MW103-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





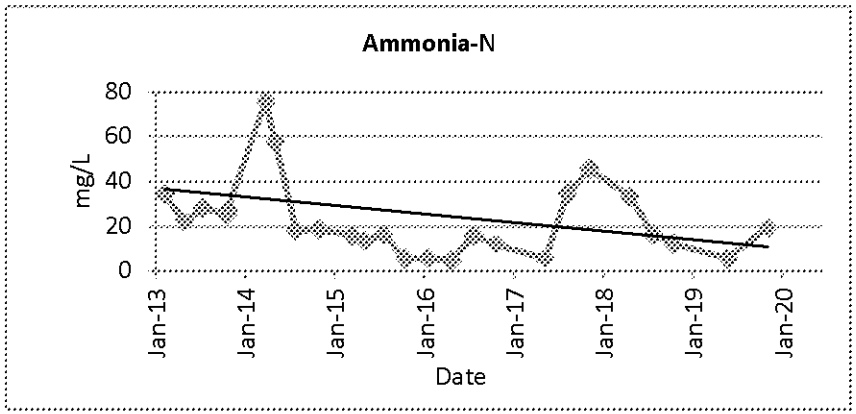


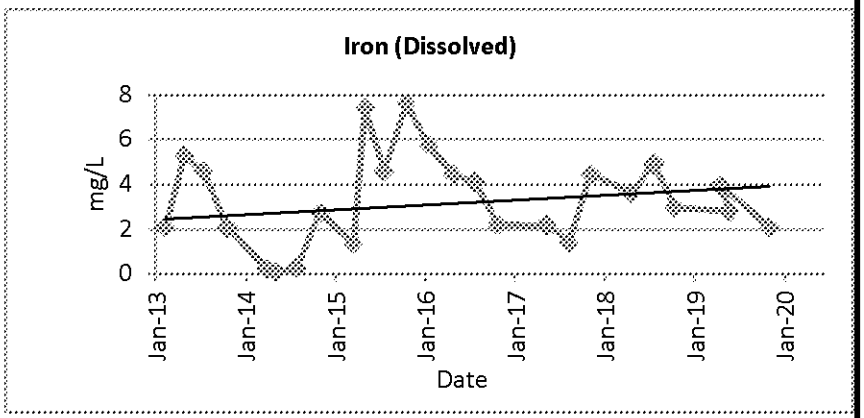


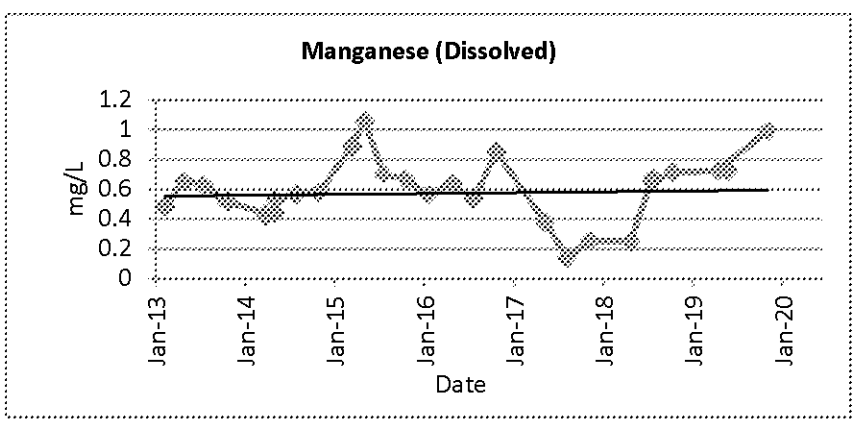
Note: ND results as 1/2 the detection limit

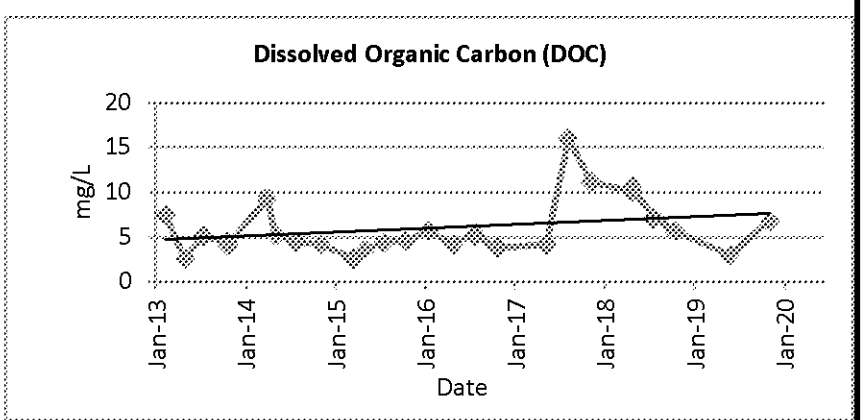
figure 4.9.9

TEMPORAL PLOTS - SELECTED PARAMETERS
MW104-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





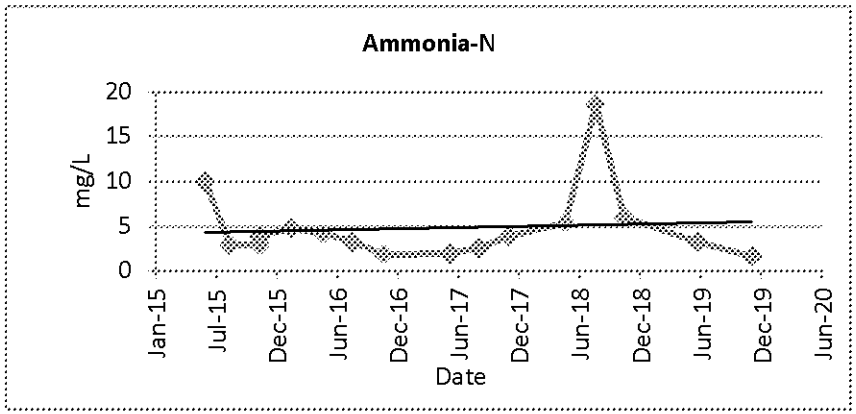


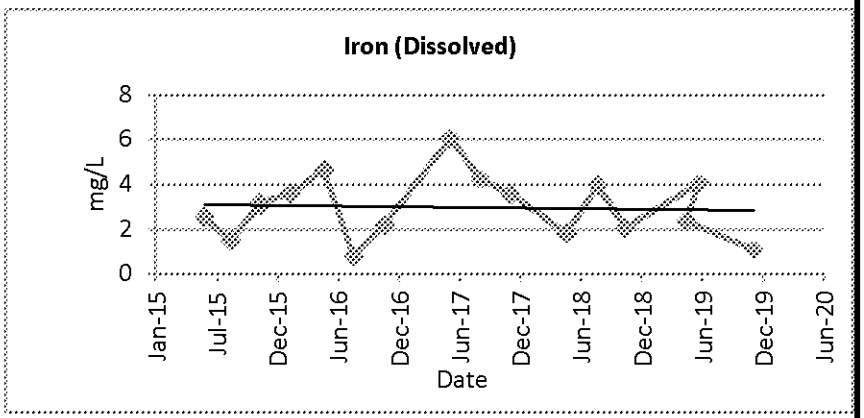


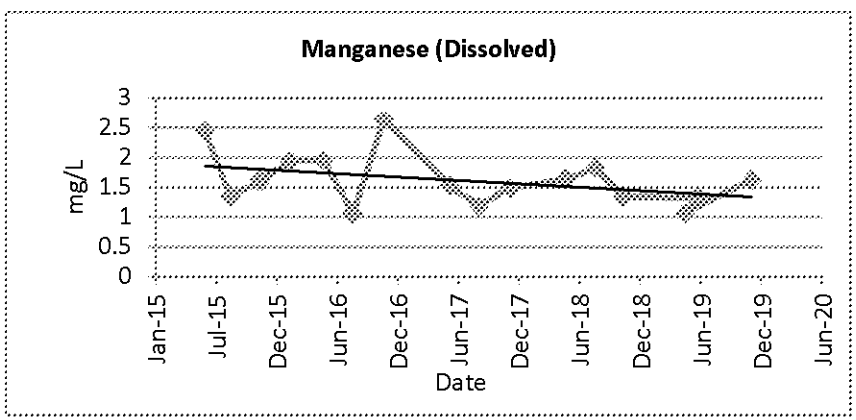
Note: ND results as 1/2 the detection limit

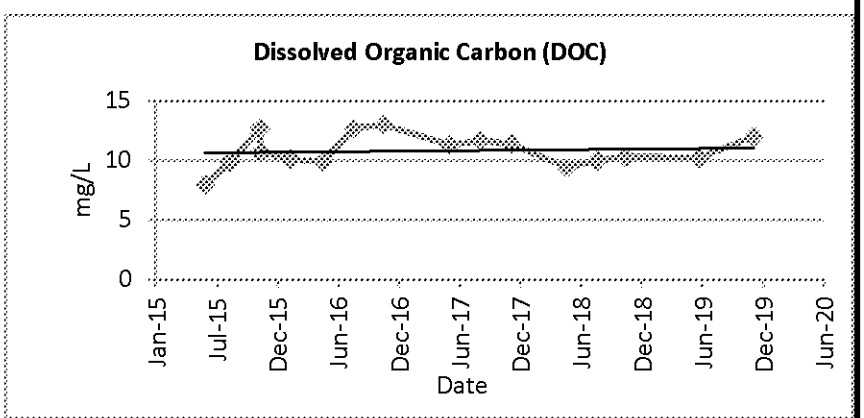
figure 4.9.10

TEMPORAL PLOTS - SELECTED PARAMETERS
MW105-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





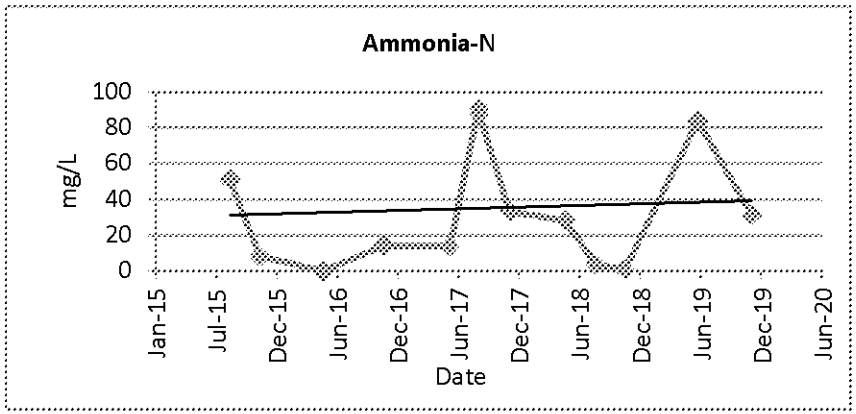


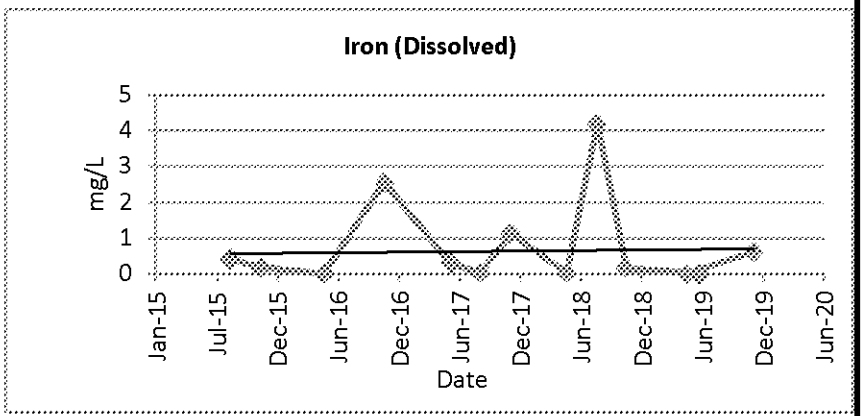


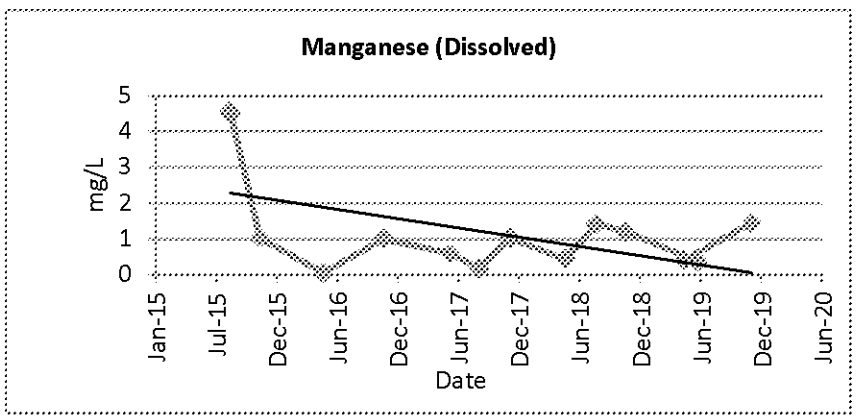
Note: ND results as 1/2 the detection limit

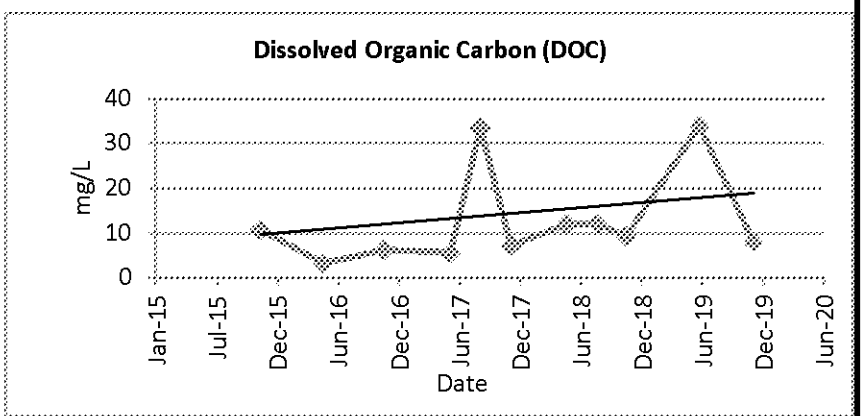
figure 4.9.11

TEMPORAL PLOTS - SELECTED PARAMETERS
MW106-15
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





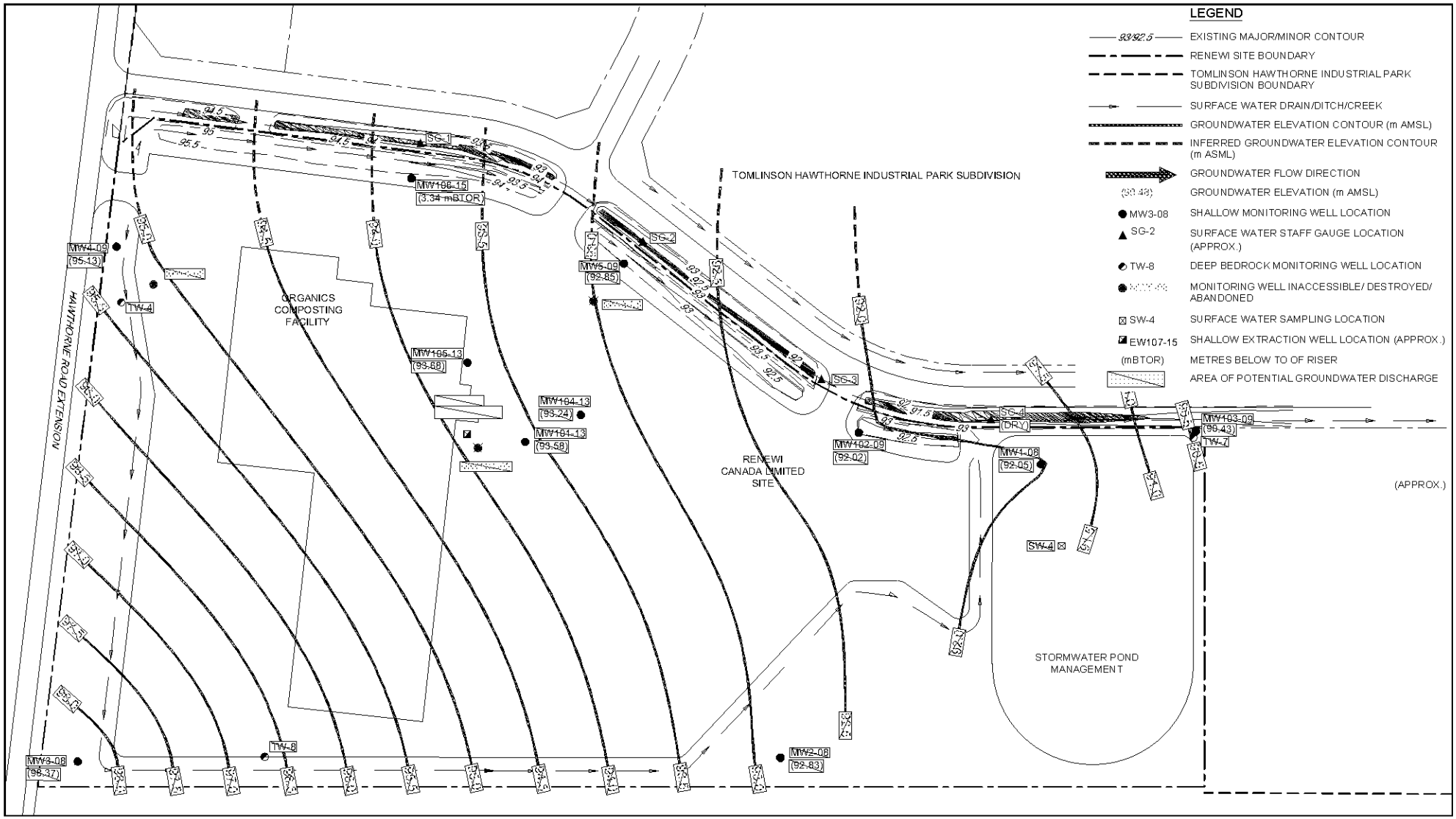




Note: ND results as 1/2 the detection limit
DOC plot omits August 2015 results (965/1030 mg/L)

figure 4.9.12

TEMPORAL PLOTS - SELECTED PARAMETERS
EW107-15
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY



0 15 30 45m

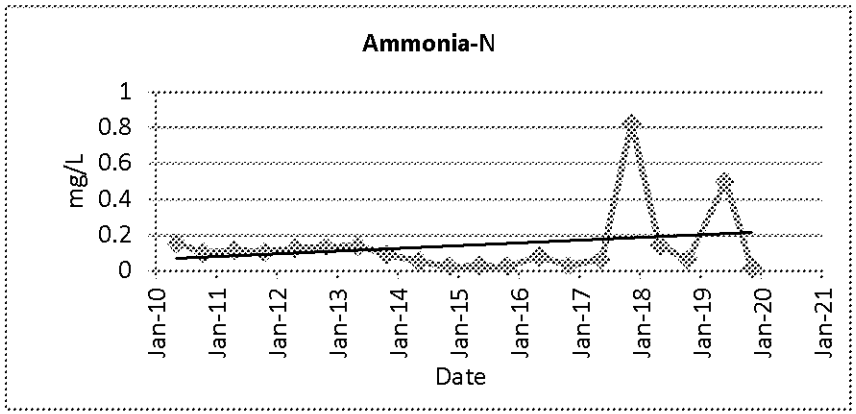
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
NORTHERN DITCH TOPOGRAPHY WITH JUNE 17 & 18, 2019 GROUNDWATER CONTOURS

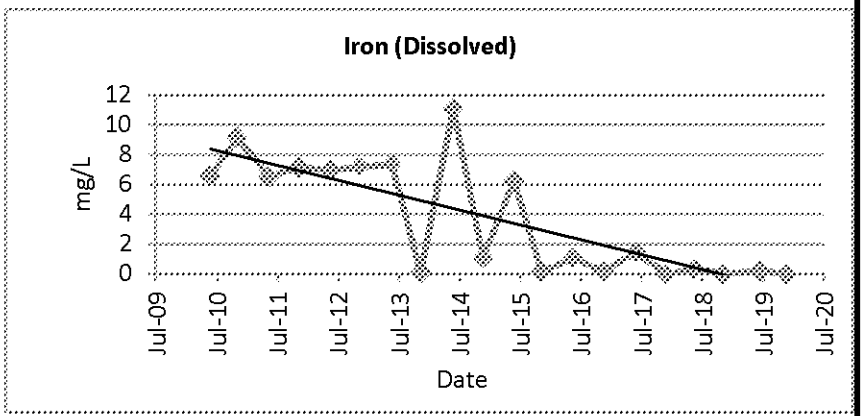
45804-58
Feb 25, 2020

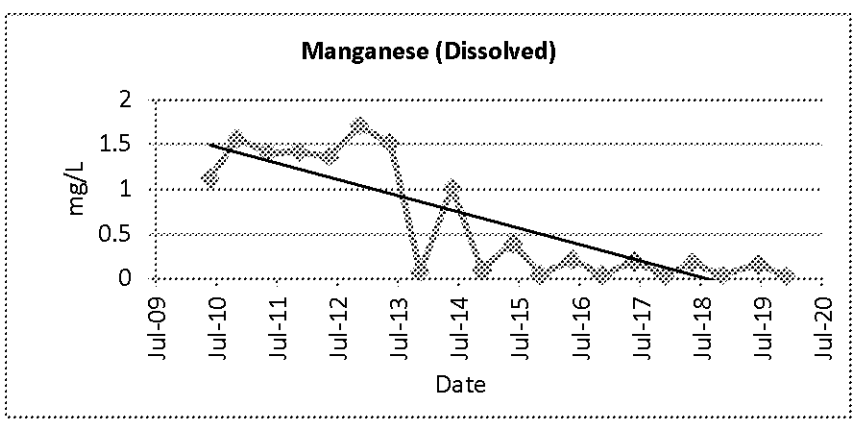
figure 4.10

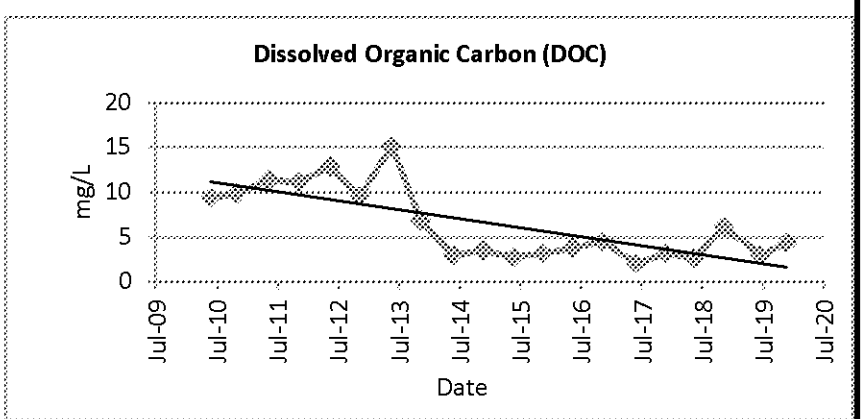
CAD File: N:\CAN\Waterloo\Legacy\CAD\drawings\45000s\45804\45804-reports\45804-58(085)\45804-58(085)GN\45804-58(085)GN-WA012.DWG

001290





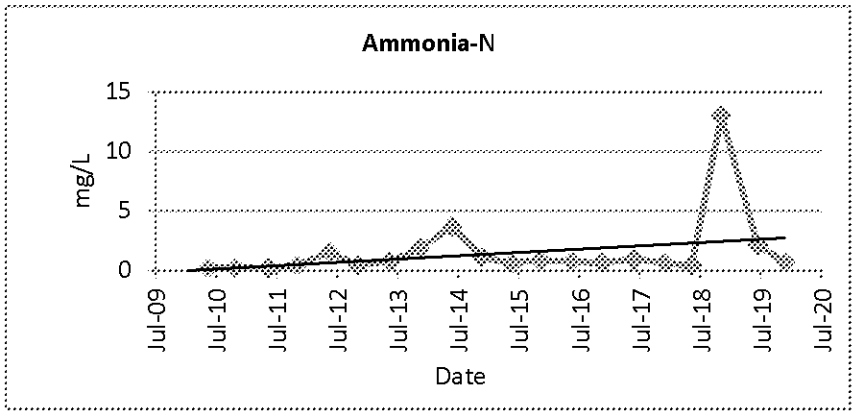


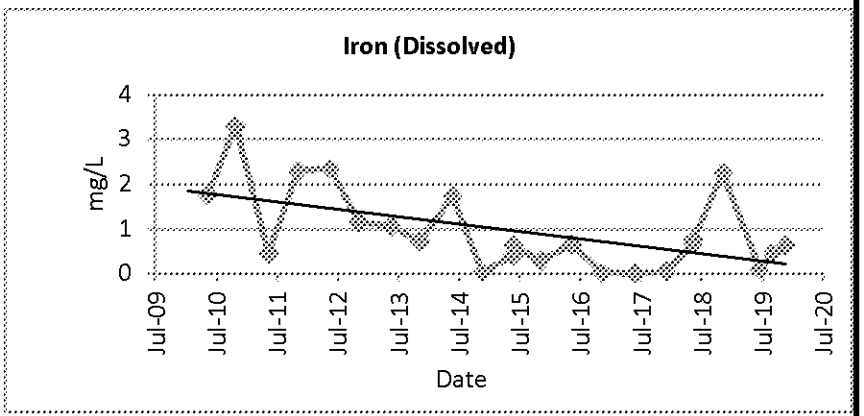


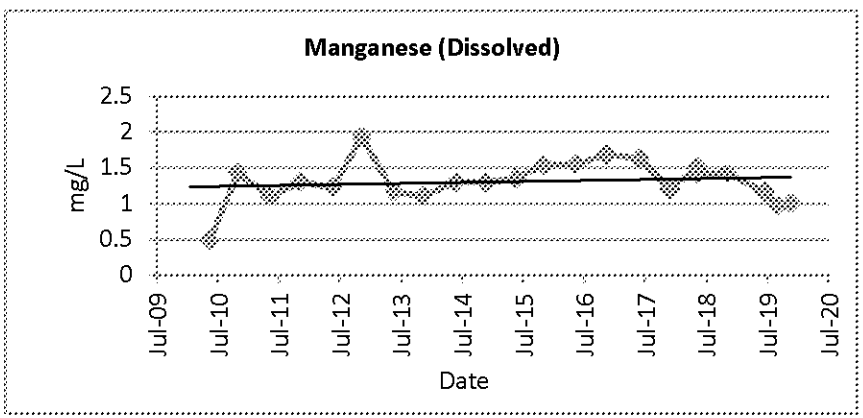
Note: ND results as 1/2 the detection limit

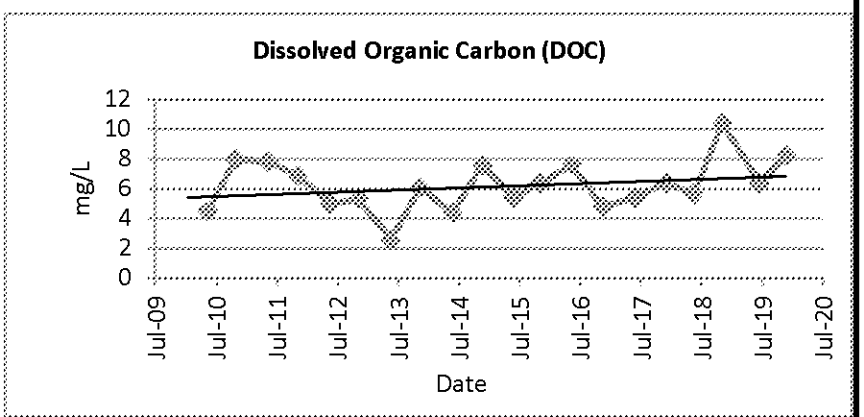
figure 4.11.1

TEMPORAL PLOTS - SELECTED PARAMETERS
TW-7
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





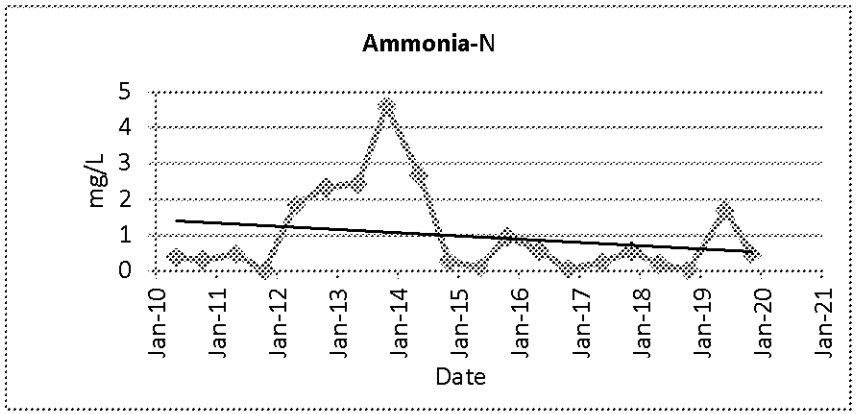


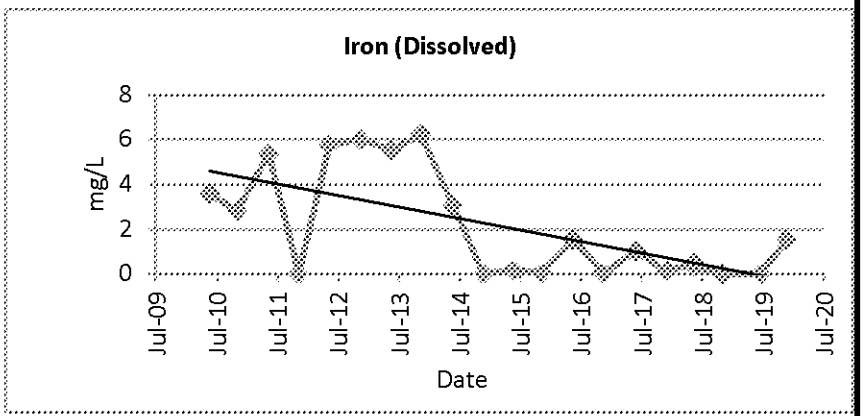


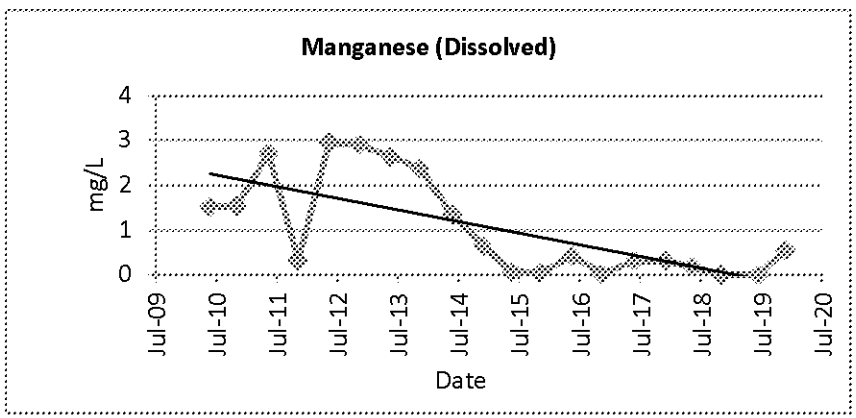
Note: ND results as 1/2 the detection limit

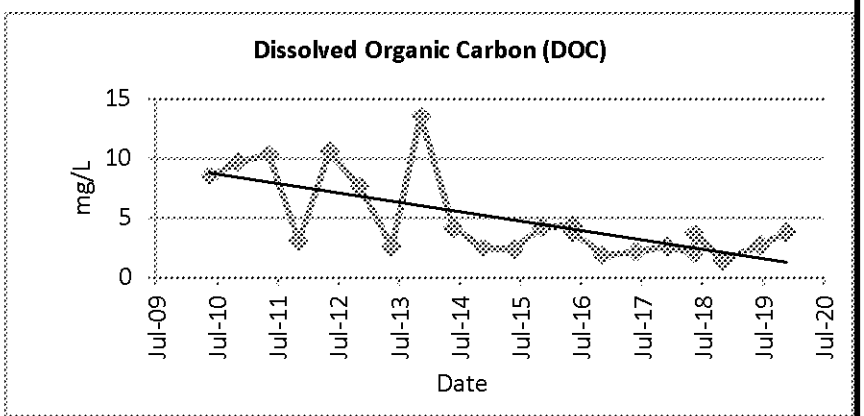
figure 4.11.2

TEMPORAL PLOTS - SELECTED PARAMETERS
TW-4
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





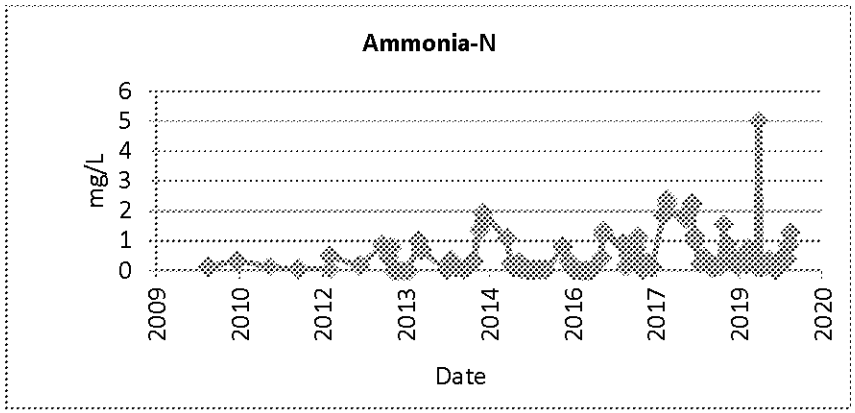


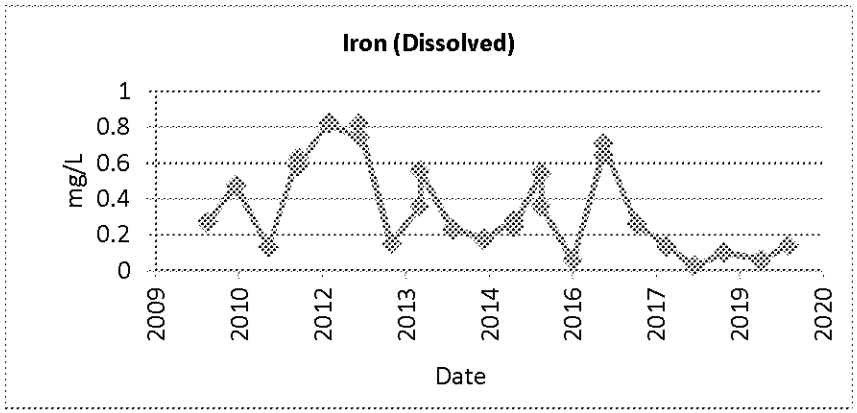


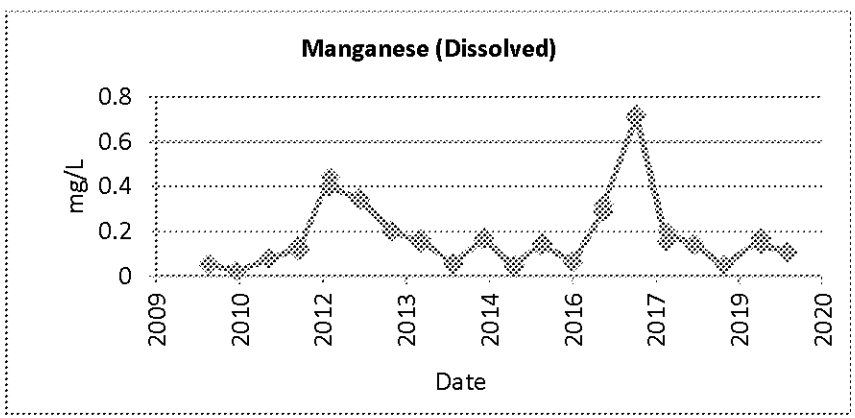
Note: ND results as 1/2 the detection limit

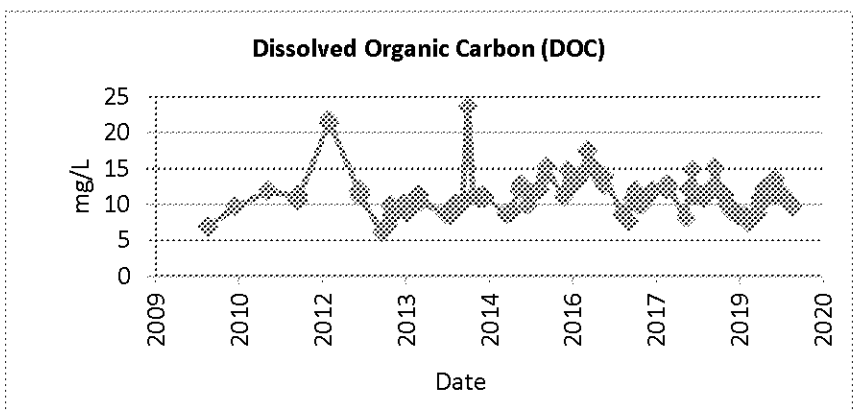
figure 4.11.3

TEMPORAL PLOTS - SELECTED PARAMETERS
TW-8
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure 4.12

TEMPORAL PLOTS - SELECTED PARAMETERS
SW-4
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

Table 2.1

Monitoring Location Details
2019 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval [2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Shallow Water Table Wells								
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill	
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)	
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)	
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)	
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand	
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill	Decommissioned, replaced by MW05-09
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand	
MW6-08[4]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface	
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface	No access
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill	No access
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay	No access
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand	No access
MW101-09 [5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill	Decommissioned, replaced by MW101-13
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay	
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand	
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel	
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel	
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel	
MW106-15	NS	NS	3.33	6.38	NS	NS	Fill and silty sand till	
EW107-15	NS	NS	2.44	5.49	NS	NS	Fill, Bedrock (fractured)	
Bedrock Wells								
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock	No access
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock	No access
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock	No access
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock	
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock	No access
TW-6 (2008)[4]	83.08	83.73	17.67	25.36	65.41	57.72	Competent Bedrock	No access
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock	
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock	

Monitoring Location Details
2019 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval [2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Surface Water Staff Guages								
SG-1	NS	NS	-	-	-	-	North Drainage Ditch	
SG-2	NS	NS	-	-	-	-	North Drainage Ditch	
SG-3	NS	NS	-	-	-	-	North Drainage Ditch	
SG-4	NS	NS	-	-	-	-	North Drainage Ditch	

Notes:

m AMSL metres above mean sea level.
m bgs metres below ground surface.
NI No Information.
NS Not Surveyed.
(1) The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe, respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010.
The 2015-series wells have not yet been surveyed.
(2) Bedrock wells are open to the rock.
(3) Decommissioned, replaced by MW05-09
(4) Located on Tomlinson property; no longer accessible.
(5) Decommissioned, replaced by MW101-13

Table 3.1

Monitoring Program Schedule
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd
5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters				
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	SW General Chemistry[2]	Metals[3/4]	Bacteriological Components[5]	Collection Method
Surface Water Monitoring Locations (4 locations)								
SW-1		√	√	√		√	√	grab
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Surface Water Northern Ditch Staff Guages (4 locations)								
SG-1	X							
SG-2	X							
SG-3	X							
SG-4	X							
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	√	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

(1) General chemistry parameters - alkalinity, ammonia, DOC, nitrate, phosphorus turbidity, and un-ionized ammonia
(2) Additional Surface Water General Chemistry parameters analyzed at SW-4 during monthly sampling - BOD, COD, TKN, nitrite, total phenols, TSS, oil & grease, pH, arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, zinc
(3) Metals - iron and manganese
(4) Surface water metals are total while groundwater metals are dissolved.
(5) 5 Escherichia coli (e.coli)
(6) SW-4 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)
X Samples to be collected tri-annually (spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)

001297

Groundwater Elevations
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Location	Reference Elevation [1] [2] (m AMSL)	June 17-18, 2019		September 4-5, 2019		November 26-28, 2019	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations							
MW1-08	93.00	0.95	92.05	-	-	1.12	91.88
MW2-08	93.78	0.95	92.83	-	-	0.83	92.96
MW3-08	104.22	5.85	98.37	-	-	5.84	98.39
MW4-09	97.45	2.32	95.13	-	-	2.36	95.09
MW5-09	94.50	1.65	92.85	2.44	92.06	1.90	92.60
MW101-13	94.88	1.30	93.58	2.18	92.70	1.52	93.37
MW102-09	93.79	1.77	92.02	2.26	91.53	1.94	91.85
MW103-09	93.33	2.90	90.43	-	-	2.97	90.37
MW104-13	94.55	1.31	93.24	2.18	92.37	1.43	93.12
MW105-13	94.95	1.27	93.68	1.83	93.13	1.50	93.45
MW106-15	NS	3.34	NS	4.14	NS	3.70	NS
Deep Groundwater Elevations							
TW-4	96.90	12.79	84.11	12.16	84.75	12.66	84.24
TW-7	92.98	2.25	90.74	-	-	3.59	89.39
TW-8	94.88	11.14	83.74	-	-	11.70	83.18
Extraction Well							
EW107-15	NS	2.38	NS	3.00	NS	2.56	NS
Surface Water Staff Gauge Locations							
SG-1	93.51	dry	dry	dry	dry	dry	dry
SG-2	92.37	dry	dry	dry	dry	dry	dry
SG-3	91.76	dry	dry	dry	dry	dry	dry
SG-4	90.97	dry	dry	dry	dry	0.42	90.55

Notes:

(1)	Top of Riser for MW
(2)	Top of Cap for TW and EW
m AMSL	meters above mean sea level.
NA	No access.
NS	Not surveyed.
-	Not measured (not part of monitoring program).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-061819-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-019
Sample Date:			6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:						Original
Parameters	**Units**	**TLP [1]**				
Metals						
Arsenic (dissolved)	mg/L		-	-	0.0014	-
Boron (dissolved)	mg/L		-	-	ND(0.10)	-
Cadmium (dissolved)	mg/L		-	-	ND(0.000050)	-
Chromium (dissolved)	mg/L		-	-	ND(0.0050)	-
Cobalt (dissolved)	mg/L		-	-	ND(0.0010)	-
Copper (dissolved)	mg/L		-	-	ND(0.0020)	-
Iron (dissolved)	mg/L	48.3	ND(0.10)	-	ND(0.10)	0.63
Lead (dissolved)	mg/L		-	-	ND(0.00050)	-
Manganese (dissolved)	mg/L	17.1	0.388	-	0.424	1.45
Mercury (dissolved)	mg/L		-	-	ND(0.000050)	-
Nickel (dissolved)	mg/L		-	-	ND(0.0050)	-
Zinc (dissolved)	mg/L		-	-	ND(0.010)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	1140	-	-	380
Ammonia-N	mg/L	4.0	33.2	-	-	31.4
Biochemical oxygen demand (BOD)	mg/L		-	40	-	-
Chemical oxygen demand (COD)	mg/L		-	247	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	34	-	-	7.88
Escherichia coli	cfu/100mL	25.6	-	6	-	7
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-	-
Oil and grease	mg/L		-	15.9	-	-
Orthophosphate (dissolved)	mg/L		1.67	-	-	-
pH, lab	s.u.		-	7.72	-	-
Phenolics (total)	mg/L		-	0.056	-	-
Phosphorus	mg/L	7.2	2.24	-	-	0.450
Total kjeldahl nitrogen (TKN)	mg/L		-	116	-	-
Total suspended solids (TSS)	mg/L		-	148	-	-
Turbidity	NTU		-	-	-	55.0
Un-ionized ammonia	mg/L		-	-	-	0.0538
Field Parameters						
Conductivity, field	mS/cm		2.99	-	-	2.88
Dissolved oxygen (DO), field	mg/L		0.55	-	-	1.64
Oxidation reduction potential (ORP), field	millivolts		-343	-	-	-162
pH, field	s.u.		7.08	-	-	6.6
Temperature, field	Deg C		19.5	-	-	15.71
Turbidity, field	NTU		0	-	-	1.4

Notes:

ND Not detected at the associated reporting limit.
26.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-061719-TS-014	GW-045804-090519-JC-007	GW-045804-090519-JC-008	GW-045804-112619-JC-002	GW-045804-112619-JC-003
Sample Date:			6/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019
Sample Type:					Duplicate		Duplicate
Parameters	**Units**	**TLP [1]**					
Metals							
Arsenic (dissolved)	mg/L		-	0.00680	0.00690	-	-
Boron (dissolved)	mg/L		-	0.094	0.093	-	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	ND(0.000010)	-	-
Chromium (dissolved)	mg/L		-	0.00136	0.00168	-	-
Cobalt (dissolved)	mg/L		-	0.00022	0.00024	-	-
Copper (dissolved)	mg/L		-	0.00067	ND(0.00020)	-	-
Iron (dissolved)	mg/L	48.3	0.69	2.84	2.97	0.069	0.071
Lead (dissolved)	mg/L		-	ND(0.000050)	ND(0.000050)	-	-
Manganese (dissolved)	mg/L	17.1	0.800	0.685	0.671	1.42	1.36
Mercury (dissolved)	mg/L		-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		-	0.00114	0.00113	-	-
Zinc (dissolved)	mg/L		-	0.0032	0.0010	-	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	406	-	-	503	504
Ammonia-N	mg/L	4.0	14.1	-	-	13.9	14.0
Biochemical oxygen demand (BOD)	mg/L		-	8.3	8.8	-	-
Chemical oxygen demand (COD)	mg/L		-	27	29	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.62	-	-	6.76	7.29
Escherichia coli	cfu/100mL	25.6	0	3	3	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	-	0.10	0.11
Nitrite (as N)	mg/L		-	ND(0.050)	ND(0.050)	-	-
Oil and grease	mg/L		-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		-	7.45	7.47	7.40	7.38
Phenolics (total)	mg/L		-	ND(0.0010)	0.0090	-	-
Phosphorus	mg/L	7.2	0.121	-	-	0.0099	0.0073
Total kjeldahl nitrogen (TKN)	mg/L		-	19.6	19.9	-	-
Total suspended solids (TSS)	mg/L		-	16.0	14.6	-	-
Turbidity	NTU		-	-	-	1.26	1.42
Un-ionized ammonia	mg/L		-	-	-	0.00869	0.00873
Field Parameters							
Conductivity, field	mS/cm		1.67	1.540	1.540	2.05	2.05
Dissolved oxygen (DO), field	mg/L		6.66	0.4	-	0.01	-
Oxidation reduction potential (ORP), field	millivolts		-118	-85	-	25	-
pH, field	s.u.		7.03	6.95	6.95	6.41	6.41
Temperature, field	Deg C		20.14	23.02	23.02	10.95	10.95
Turbidity, field	NTU		1.6	16.6	-	0.4	-

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-061819-JC-008	GW-045804-090419-JC-001	GW-045804-112619-JC-007
Sample Date:			6/18/2019	9/4/2019	11/26/2019
Parameters	**Units**	**TLP [1]**			
Metals					
Arsenic (dissolved)	mg/L		-	0.00076	-
Boron (dissolved)	mg/L		-	0.114	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00159	-
Cobalt (dissolved)	mg/L		-	0.00019	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	4.53	2.87	2.41
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	2.39	1.87	1.69
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00118	-
Zinc (dissolved)	mg/L		-	ND(0.0010)	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	517	-	598
Ammonia-N	mg/L	4.0	11.5	-	9.51
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	36	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.47	-	10.7
Escherichia coli	cfu/100mL	25.6	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	ND(5.0)	-
pH, lab	s.u.		-	7.65	7.87
Phenolics (total)	mg/L		-	0.0099	-
Phosphorus	mg/L	7.2	0.114	-	0.143
Total kjeldahl nitrogen (TKN)	mg/L		-	12.0	-
Total suspended solids (TSS)	mg/L		-	2.8	-
Turbidity	NTU		-	-	33.9
Un-ionized ammonia	mg/L		-	-	0.0181
Field Parameters					
Conductivity, field	mS/cm		1.86	1.810	1.77
Dissolved oxygen (DO), field	mg/L		0.03	0.82	0
Oxidation reduction potential (ORP), field	millivolts		-181	-96	-140
pH, field	s.u.		7.22	7.01	6.86
Temperature, field	Deg C		15.51	20.31	11.86
Turbidity, field	NTU		0.7	0	27.4

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW103-09**	**MW103-09**
Sample ID:			**GW-45804-061819-JC-010**	**GW-045804-112619-JC-004**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP [1]**		
Metals				
Iron (dissolved)	mg/L	48.3	5.46	4.67
Manganese (dissolved)	mg/L	17.1	1.96	2.65
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	300	296
Ammonia-N	mg/L	4.0	1.7	0.95
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.60	11.6
Escherichia coli	cfu/100mL	25.6	-	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	ND(0.10)
pH, lab	s.u.		-	7.63
Phosphorus	mg/L	7.2	0.0207	0.0230
Turbidity	NTU		-	58.4
Un-ionized ammonia	mg/L		-	0.000602
Field Parameters				
Conductivity, field	mS/cm		1.07	1.45
Dissolved oxygen (DO), field	mg/L		0.35	0.01
Oxidation reduction potential (ORP), field	millivolts		-166	-96
pH, field	s.u.		7.31	6.42
Temperature, field	Deg C		13.66	10.9
Turbidity, field	NTU		8.3	14.2

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

001302

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-061819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:			6/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:					Duplicate		Duplicate
Parameters	**Units**	**TLP [1]**					
Metals							
Arsenic (dissolved)	mg/L		-	0.00417	0.00438	-	-
Boron (dissolved)	mg/L		-	0.077	0.073	-	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	ND(0.000010)	-	-
Chromium (dissolved)	mg/L		-	0.00193	0.00131	-	-
Cobalt (dissolved)	mg/L		-	0.00118	0.00120	-	-
Copper (dissolved)	mg/L		-	0.00058	0.00033	-	-
Iron (dissolved)	mg/L	48.3	6.83	9.96	10.6	0.051	0.052
Lead (dissolved)	mg/L		-	ND(0.000050)	ND(0.000050)	-	-
Manganese (dissolved)	mg/L	17.1	4.85	5.33	5.46	1.98	1.95
Mercury (dissolved)	mg/L		-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		-	0.00241	0.00231	-	-
Zinc (dissolved)	mg/L		-	0.0020	0.0010	-	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	491	-	-	413	415
Ammonia-N	mg/L	4.0	16.8	-	-	7.3	6.30
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	ND(3.0)	-	-
Chemical oxygen demand (COD)	mg/L		-	33	35	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.23	-	-	7.70	8.19
Escherichia coli	cfu/100mL	25.6	0	3	1	4	3
Nitrate (as N)	mg/L	1.3	0.15	-	-	3.44	10.1
Nitrite (as N)	mg/L		-	ND(0.050)	0.053	-	-
Oil and grease	mg/L		-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		-	7.45	7.44	-	-
Phenolics (total)	mg/L		-	ND(0.0010)	ND(0.0010)	-	-
Phosphorus	mg/L	7.2	0.0108	-	-	0.0186	0.0198
Total kjeldahl nitrogen (TKN)	mg/L		-	12.9	13.9	-	-
Total suspended solids (TSS)	mg/L		-	67	41	-	-
Turbidity	NTU		-	-	-	17.1	15.2
Un-ionized ammonia	mg/L		-	-	-	0.00567	0.00490
Field Parameters							
Conductivity, field	mS/cm		1.44	1.640	1.640	1.63	1.63
Dissolved oxygen (DO), field	mg/L		1.08	0.29	-	1.8	-
Oxidation reduction potential (ORP), field	millivolts		-137	-89	-	16	-
pH, field	s.u.		7.14	6.87	6.87	6.46	6.46
Temperature, field	Deg C		19.79	20.97	20.97	12.3	12.3
Turbidity, field	NTU		35.2	650	-	58.4	-

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-061719-JC-001	GW-045804-090419-JC-003	GW-045804-112719-JC-008
Sample Date:			6/17/2019	9/4/2019	11/27/2019
Parameters	**Units**	**TLP [1]**			
Metals					
Arsenic (dissolved)	mg/L		-	0.00041	-
Boron (dissolved)	mg/L		-	0.075	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00126	-
Cobalt (dissolved)	mg/L		-	ND(0.00010)	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	2.80	3.95	2.10
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	0.722	0.726	0.990
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00085	-
Zinc (dissolved)	mg/L		-	0.0017	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	296	-	489
Ammonia-N	mg/L	4.0	5.6	-	19.3
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	66	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.02	-	6.75
Escherichia coli	cfu/100mL	25.6	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	11.1	-
pH, lab	s.u.		-	7.28	-
Phenolics (total)	mg/L		-	0.0020	-
Phosphorus	mg/L	7.2	0.0422	-	0.0519
Total kjeldahl nitrogen (TKN)	mg/L		-	11.5	-
Total suspended solids (TSS)	mg/L		-	10.4	-
Turbidity	NTU		-	-	19.2
Un-ionized ammonia	mg/L		-	-	0.0213
Field Parameters					
Conductivity, field	mS/cm		1.4	1.690	2.28
Dissolved oxygen (DO), field	mg/L		0.77	1.26	0.21
Oxidation reduction potential (ORP), field	millivolts		-112	-51	-116
pH, field	s.u.		6.53	6.89	6.46
Temperature, field	Deg C		21.06	20.88	16.92
Turbidity, field	NTU		5	0	0.5

Notes:

ND Not detected at the associated reporting limit.
38.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW106-15**	**MW106-15**	**MW106-15**
Sample ID:			**GW-45804-061819-JC-016**	**GW-045804-090419-JC-002**	**GW-045804-112719-JC-013**
Sample Date:			**6/18/2019**	**9/4/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [1]			
Metals					
Arsenic (dissolved)	mg/L		-	0.00155	-
Boron (dissolved)	mg/L		-	0.152	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00110	-
Cobalt (dissolved)	mg/L		-	0.00017	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	4.03	2.36	1.08
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	1.33	1.07	1.63
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00080	-
Zinc (dissolved)	mg/L		-	ND(0.0010)	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	493	-	503
Ammonia-N	mg/L	4.0	3.3	-	1.68
Biochemical oxygen demand (BOD)	mg/L		-	3.8	-
Chemical oxygen demand (COD)	mg/L		-	36	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.2	-	12.0
Escherichia coli	cfu/100mL	25.6	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	0.24
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	6.2	-
pH, lab	s.u.		-	7.57	-
Phenolics (total)	mg/L		-	0.0018	-
Phosphorus	mg/L	7.2	0.0639	-	0.0156
Total kjeldahl nitrogen (TKN)	mg/L		-	4.04	-
Total suspended solids (TSS)	mg/L		-	2.8	-
Turbidity	NTU		-	-	18.6
Un-ionized ammonia	mg/L		-	-	0.00241
Field Parameters					
Conductivity, field	mS/cm		1.51	1.720	1.95
Dissolved oxygen (DO), field	mg/L		0.23	0.33	0
Oxidation reduction potential (ORP), field	millivolts		-147	-91	-54
pH, field	s.u.		7.29	6.98	6.8
Temperature, field	Deg C		17.59	18.85	10.12
Turbidity, field	NTU		24.4	0	7.5

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW1-08**	**MW1-08**
Sample ID:			**GW-45804-061819-TS-012**	**GW-045804-112719-JC-011**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [1]		
Metals				
Iron (dissolved)	mg/L	48.3	2.00	0.260
Manganese (dissolved)	mg/L	17.1	0.729	0.453
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	352	289
Ammonia-N	mg/L	4.0	3.0	3.16
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.07	9.55
Escherichia coli	cfu/100mL	25.6	0	0
Nitrate (as N)	mg/L	1.3	0.036	ND(0.020)
Phosphorus	mg/L	7.2	0.220	0.282
Turbidity	NTU		-	6.34
Un-ionized ammonia	mg/L		-	0.0116
Field Parameters				
Conductivity, field	mS/cm		0.951	0.962
Dissolved oxygen (DO), field	mg/L		0	0
Oxidation reduction potential (ORP), field	millivolts		-175	-142
pH, field	s.u.		7.02	7.32
Temperature, field	Deg C		15.35	6.83
Turbidity, field	NTU		0	3.9

Notes:

ND	Not detected at the associated reporting limit.
28.2	Exceeded Trigger Level Program Concentration.
(1)	TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW2-08**	**MW2-08**
Sample ID:			**GW-45804-061719-JC-015**	**GW-045804-112619-JC-001**
Sample Date:			**6/17/2019**	**11/26/2019**
Parameters	**Units**	**TLP** [(1)]		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.00566	0.00068
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	250	197
Ammonia-N	mg/L	4.0	ND(1.0)	ND(0.010)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.28	9.21
Escherichia coli	cfu/100mL	25.6	0	ND(2)
Nitrate (as N)	mg/L	1.3	0.038	ND(0.020)
Phosphorus	mg/L	7.2	0.0111	0.106
Turbidity	NTU		-	72.1
Un-ionized ammonia	mg/L		-	ND(0.000018)
Field Parameters				
Conductivity, field	mS/cm		1.05	0.385
Dissolved oxygen (DO), field	mg/L		5.09	3.39
Oxidation reduction potential (ORP), field	millivolts		-93	161
pH, field	s.u.		7.16	6.94
Temperature, field	Deg C		15.97	8.7
Turbidity, field	NTU		220	32.7

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

001307

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW3-08**	**MW3-08**
Sample ID:			**GW-45804-061819-JC-017**	**GW-045804-112719-JC-016**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [(1)]		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.0226	0.00074
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	240	255
Ammonia-N	mg/L	4.0	ND(0.020)	ND(0.020)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	2.35	3.04
Escherichia coli	cfu/100mL	25.6	0	1
Nitrate (as N)	mg/L	1.3	0.054	ND(0.10)
Phosphorus	mg/L	7.2	0.0143	0.0223
Turbidity	NTU		-	20.1
Un-ionized ammonia	mg/L		-	ND(0.000055)
Field Parameters				
Conductivity, field	mS/cm		0.898	1.45
Dissolved oxygen (DO), field	mg/L		0	0.33
Oxidation reduction potential (ORP), field	millivolts		5	99
pH, field	s.u.		7.2	7.21
Temperature, field	Deg C		19.29	6.4
Turbidity, field	NTU		15.5	8.3

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW4-09**	**MW4-09**
Sample ID:			**GW-45804-061819-JC-003**	**GW-045804-112719-JC-015**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [1]		
Metals				
Iron (dissolved)	mg/L	48.3	0.15	ND(0.10)
Manganese (dissolved)	mg/L	17.1	0.240	0.0582
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	316	307
Ammonia-N	mg/L	4.0	1.3	ND(0.020)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	1.97	2.46
Escherichia coli	cfu/100mL	25.6	-	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)
Phosphorus	mg/L	7.2	0.0086	0.0214
Turbidity	NTU		-	7.96
Un-ionized ammonia	mg/L		-	ND(0.000029)
Field Parameters				
Conductivity, field	mS/cm		1.68	1.89
Dissolved oxygen (DO), field	mg/L		0	1.08
Oxidation reduction potential (ORP), field	millivolts		-64	16
pH, field	s.u.		6.93	6.84
Temperature, field	Deg C		15.85	8.85
Turbidity, field	NTU		22.1	12.5

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-061819-TS-005	GW-45804-061819-JC-006	GW-045804-090519-JC-009	GW-045804-112719-JC-012
Sample Date:			6/18/2019	6/18/2019	9/5/2019	11/27/2019
Sample Type:				Duplicate		
Parameters	**Units**	**TLP [1]**				
Metals						
Arsenic (dissolved)	mg/L		-	-	0.00020	-
Boron (dissolved)	mg/L		-	-	0.114	-
Cadmium (dissolved)	mg/L		-	-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	-	0.00103	-
Cobalt (dissolved)	mg/L		-	-	ND(0.00010)	-
Copper (dissolved)	mg/L		-	-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	5.05	5.01	3.51	3.22
Lead (dissolved)	mg/L		-	-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	1.86	1.85	1.59	1.45
Mercury (dissolved)	mg/L		-	-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	-	0.00085	-
Zinc (dissolved)	mg/L		-	-	ND(0.0010)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	489	487	-	574
Ammonia-N	mg/L	4.0	16.1	14.4	-	12.8
Biochemical oxygen demand (BOD)	mg/L		-	-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	-	21	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	6.33	6.74	-	8.53
Escherichia coli	cfu/100mL	25.6	-	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020)	-	ND(0.10)
Nitrite (as N)	mg/L		-	-	ND(0.050)	-
Oil and grease	mg/L		-	-	ND(5.0)	-
pH, lab	s.u.		-	-	7.44	-
Phenolics (total)	mg/L		-	-	0.0034	-
Phosphorus	mg/L	7.2	0.136	0.133	-	0.206
Total kjeldahl nitrogen (TKN)	mg/L		-	-	14.2	-
Total suspended solids (TSS)	mg/L		-	-	4.8	-
Turbidity	NTU		-	-	-	40.2
Un-ionized ammonia	mg/L		-	-	-	0.0132
Field Parameters						
Conductivity, field	mS/cm		1.83	1.83	1.680	1.87
Dissolved oxygen (DO), field	mg/L		0.43	-	2.45	0
Oxidation reduction potential (ORP), field	millivolts		-132	-	-	-141
pH, field	s.u.		7.13	7.13	6.83	6.81
Temperature, field	Deg C		6.81	6.81	18.57	8.46
Turbidity, field	NTU		0	-	1.5	0.6

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

MW103-09 Analytical Results - PWQO Comparison
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09
Sample ID:			GW-45804-061819-JC-010	GW-045804-112619-JC-004
Sample Date:			6/18/2019	11/26/2019
Parameters	**Units**	**PWQO [1]**		
Metals				
Iron (dissolved)	mg/L	0.3	5.46	4.67
Manganese (dissolved)	mg/L		1.96	2.65
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		300	296
Ammonia-N	mg/L		1.7	0.95
Dissolved organic carbon (DOC) (dissolved)	mg/L		8.60	11.6
Escherichia coli	cfu/100mL	100	-	0
Nitrate (as N)	mg/L		ND(0.020)	ND(0.10)
pH, lab	s.u.	6.5-8.5	-	7.63
Phosphorus	mg/L	0.01	0.0207	0.0230
Turbidity	NTU		-	58.4
Un-ionized ammonia	mg/L	0.02	-	0.000602
Field Parameters				
Conductivity, field	mS/cm		1.07	1.45
Dissolved oxygen (DO), field	mg/L	>4	0.35	0.01
Oxidation reduction potential (ORP), field	millivolts		-166	-96
pH, field	s.u.	6.5-8.5	7.31	6.42
Temperature, field	Deg C		13.66	10.9
Turbidity, field	NTU		8.3	14.2

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.

ND Not detected at the associated reporting limit.

16.7 Exceeded PWQO

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:				GW-45804-061819-TS-004	GW-045804-090519-JC-005	GW-045804-090519-JC-006	GW-045804-112819-JC-017	GW-045804-112819-JC-018
Sample Date:				6/18/2019	9/5/2019	9/5/2019	11/28/2019	11/28/2019
Sample Type:						Duplicate		Duplicate
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**					
Metals								
Arsenic (dissolved)	mg/L		0.010	-	ND(0.0010)	ND(0.0010)	-	-
Boron (dissolved)	mg/L		5.0	-	0.13	0.12	-	-
Cadmium (dissolved)	mg/L		0.005	-	ND(0.000050)	ND(0.000050)	-	-
Chromium (dissolved)	mg/L		0.05	-	ND(0.0050)	ND(0.0050)	-	-
Cobalt (dissolved)	mg/L		/	-	ND(0.0010)	ND(0.0010)	-	-
Copper (dissolved)	mg/L		1.0	-	0.0738	0.0759	-	-
Iron (dissolved)	mg/L	10.6	0.30	0.11	6.82[b]	6.58[b]	6.64[b]	6.53[b]
Lead (dissolved)	mg/L		0.01	-	ND(0.00050)	ND(0.00050)	-	-
Manganese (dissolved)	mg/L	2.1	0.05	1.47[b]	0.873[b]	0.889[b]	1.06[b]	1.01[b]
Mercury (dissolved)	mg/L		0.001	-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		/	-	0.0052	0.0054	-	-
Zinc (dissolved)	mg/L		5.0	-	0.077	0.062	-	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	996	30-500	598[b]	-	-	583[b]	616[b]
Ammonia-N	mg/L	0.2	/	2.1[a]	-	-	0.742[a]	0.748[a]
Biochemical oxygen demand (BOD)	mg/L		/	-	ND(3.0)	ND(3.0)	-	-
Chemical oxygen demand (COD)	mg/L		/	-	21	22	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	6.38[b]	-	-	8.26[b]	7.49[b]
Escherichia coli	none	5	0	-	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	0.24	-	-	6.85[a]	6.85[a]
Nitrite (as N)	mg/L		1.0	-	ND(0.050)	ND(0.050)	-	-
Oil and grease	mg/L		/	-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		6.5-8.5	-	7.26	7.23	-	-
Phenolics (total)	mg/L		/	-	0.0013	0.0033	-	-
Phosphorus	mg/L	0.5	/	0.0038	-	-	ND(0.0030)	ND(0.0030)
Total kjeldahl nitrogen (TKN)	mg/L		/	-	0.75	0.78	-	-
Total suspended solids (TSS)	mg/L		/	-	15.4	5.4	-	-
Turbidity	NTU		5.0	-	-	-	28.1[b]	27.3[b]
Un-ionized ammonia	mg/L		/	-	-	-	0.00122	0.00122
Field Parameters								
Conductivity, field	mS/cm		/	2.5	2.270	2.270	2.44	2.44
Dissolved oxygen (DO), field	mg/L		/	6.76	6.7	-	3.13	-
Oxidation reduction potential (ORP), field	millivolts		/	96	26	-	-41	-
pH, field	s.u.		6.5-8.5	6.88	7	7	6.75	6.75
Temperature, field	Deg C		15	15.69[b]	15.58[b]	15.65[b]	13.4	13.4
Turbidity, field	NTU		5.0	3.1[b]	2.04	-	23.8[b]	-

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).
(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.
6.36[a] Exceedance of the ODWQS.
6.67[b] Exceedance of the Tier I Trigger Level.

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-7**	**TW-7**
Sample ID:				**GW-45804-061819-JC-011**	**GW-045804-112619-JC-006**
Sample Date:				**6/18/2019**	**11/26/2019**
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.222	ND(0.010)
Manganese (dissolved)	mg/L	2.1	0.05	0.161[b]	0.0322
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	159	94
Ammonia-N	mg/L	0.2	/	ND(1.0)	0.019
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	3.02	4.37
Escherichia coli	none	5	0	-	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)
pH, lab	s.u		6.5-8.5	-	8.97[b]
Phosphorus	mg/L	0.5	/	0.0030	0.0282
Turbidity	NTU		5.0	-	41.1[b]
Un-ionized ammonia			/	-	0.00127
Field Parameters					
Conductivity, field	mS/cm		/	1.521	0.445
Dissolved oxygen (DO), field	mg/L		/	0.2	0
Oxidation reduction potential (ORP), field	millivolts		/	-245	-86
pH, field	s.u.		6.5-8.5	8.32[b]	8.42
Temperature, field	Deg C		15	12.8	12.04
Turbidity, field	NTU		5.0	3.8	32.1[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).
(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.
2.981[a] Exceedance of the ODWQS.
567[b] Exceedance of the Tier I Trigger Level.

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-8**	**TW-8**
Sample ID:				**GW-45804-061719-TS-002**	**GW-045804-112719-JC-014**
Sample Date:				**6/17/2019**	**11/27/2019**
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.011	1.66[b]
Manganese (dissolved)	mg/L	2.1	0.05	0.00252	0.656[b]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	308	381
Ammonia-N	mg/L	0.2	/	1.7[a]	0.479[a]
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	2.77	3.81
Escherichia coli	none	5	0	-	0
Nitrate (as N)	mg/L	0.5	10.0	1.08[a]	0.67[a]
Phosphorus	mg/L	0.5	/	0.0458	0.0180
Turbidity	NTU		5.0	-	41.3[b]
Un-ionized ammonia			/	-	0.00263
Field Parameters					
Conductivity, field	mS/cm		/	0.842	1.08
Dissolved oxygen (DO), field	mg/L		/	5.86	7.78
Oxidation reduction potential (ORP), field	millivolts		/	84	68
pH, field	s.u.		6.5-8.5	7	7.45
Temperature, field	Deg C		15	17.35[b]	8.19
Turbidity, field	NTU		5.0	9.9[b]	26.3[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).

(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.

0.961[a] Exceedance of the ODWQS.

587[b] Exceedance of the Tier I Trigger Level.

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**SW1-09**	**SW1-09**
Sample ID:			**SW-45804-061719-JC-005**	**SW-045804-112819-JC-004**
Sample Date:			**6/17/2019**	**11/28/2019**
Parameters	**Units**	**PWQO** [1]		
Metals				
Iron	mg/L	0.3	0.324	0.363
Manganese	mg/L		0.127	0.113
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		238	164
Ammonia-N	mg/L		0.020	0.316
Dissolved organic carbon (DOC) (dissolved)	mg/L		4.23	5.92
Escherichia coli	cfu/100mL	100	52	280
Nitrate (as N)	mg/L		0.62	0.98
Phosphorus	mg/L	0.01	0.0171	0.0625
Turbidity	NTU		-	23.3
Un-ionized ammonia	mg/L	0.02	-	0.000524
Field Parameters				
Conductivity, field	mS/cm		2.08	1.5
Dissolved oxygen (DO), field	mg/L	>4	7.6	11.64
Oxidation reduction potential (ORP), field	millivolts		111	32
pH, field	s.u.	6.5-8.5	7.28	7.11
Temperature, field	Deg C		9.41	3.02
Turbidity, field	NTU		3.3	31.2

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

001315

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**SW2-09**	**SW2-09**
Sample ID:			**SW-45804-061719-JC-003**	**SW-045804-112819-JC-001**
Sample Date:			**6/17/2019**	**11/28/2019**
Parameters	**Units**	**PWQO [1]**		
Metals				
Iron	mg/L	0.3	0.575	1.22
Manganese	mg/L		0.0861	0.134
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		259	160
Ammonia-N	mg/L		0.028	0.096
Dissolved organic carbon (DOC) (dissolved)	mg/L		9.60	10.0
Escherichia coli	cfu/100mL	100	68	450
Nitrate (as N)	mg/L		0.088	0.38
Phosphorus	mg/L	0.01	0.0332	0.0620
Turbidity	NTU		-	36.8
Un-ionized ammonia	mg/L	0.02	-	0.0000205
Field Parameters				
Conductivity, field	mS/cm		0.887	1.2
Dissolved oxygen (DO), field	mg/L	>4	9.87	11.51
Oxidation reduction potential (ORP), field	millivolts		85	194
pH, field	s.u.	6.5-8.5	7.61	5.34
Temperature, field	Deg C		21.13	2.44
Turbidity, field	NTU		10.2	53

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

001316

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**SW3-09**	**SW3-09**	**SW3-09**
Sample ID:			**SW-45804-061719-JC-004**	**SW-045804-112819-JC-002**	**SW-045804-112819-JC-003**
Sample Date:			**6/17/2019**	**11/28/2019**	**11/28/2019**
Sample Type:					**Duplicate**
Parameters	**Units**	**PWQO [1]**			
Metals					
Iron	mg/L	0.3	0.481	1.13	1.19
Manganese	mg/L		0.0842	0.120	0.121
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L		260	152	153
Ammonia-N	mg/L		0.052	0.073	0.073
Dissolved organic carbon (DOC) (dissolved)	mg/L		9.27	10.7	11.1
Escherichia coli	cfu/100mL	100	170	480	400
Nitrate (as N)	mg/L		0.169	0.25	0.27
Phosphorus	mg/L	0.01	0.0225	0.0823	0.0503
Turbidity	NTU		-	27.8	30.2
Un-ionized ammonia	mg/L	0.02	-	0.0000475	0.0000472
Field Parameters					
Conductivity, field	mS/cm		0.957	1.08	1.08
Dissolved oxygen (DO), field	mg/L	>4	11.84	-	-
Oxidation reduction potential (ORP), field	millivolts		102	-	-
pH, field	s.u.	6.5-8.5	7.49	6.73	6.73
Temperature, field	Deg C		20.65	2.24	2.24
Turbidity, field	NTU		9.6	46.2	-

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-061719-JC-001	SW-45804-061719-JC-002	SW-045804-112819-JC-007
Sample Date:			6/17/2019	6/17/2019	11/28/2019
Sample Type:				Duplicate	
Parameters	**Units**	**PWQO [1]**			
Metals					
Arsenic	mg/L	0.005	-	-	0.00052
Boron	mg/L	0.2	-	-	0.042
Cadmium	mg/L	0.0002	-	-	0.0000075
Chromium	mg/L	0.001	-	-	ND(0.00050)
Cobalt	mg/L	0.0009	-	-	0.00024
Copper	mg/L	0.005	-	-	0.0013
Iron	mg/L	0.3	0.066	0.060	0.141
Lead	mg/L	0.005	-	-	0.000129
Manganese	mg/L		0.169	0.142	0.109
Mercury	mg/L	0.0002	-	-	ND(0.0000050)
Nickel	mg/L	0.025	-	-	0.00166
Zinc	mg/L	0.03	-	-	0.0045
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L		172	165	175
Ammonia-N	mg/L		0.079	0.067	0.862
Biochemical oxygen demand (BOD)	mg/L		-	-	ND(3.0)
Chemical oxygen demand (COD)	mg/L		-	-	29
Dissolved organic carbon (DOC) (dissolved)	mg/L		10.6	10.8	10.4
Escherichia coli	cfu/100mL	100	16	4	300
Nitrate (as N)	mg/L		ND(0.020)	ND(0.020)	0.374
Nitrite (as N)	mg/L		-	-	0.010
Nitrite/Nitrate	mg/L		-	-	0.384
Oil and grease	mg/L		-	-	ND(5.0)
pH, lab	s.u.	6.5-8.5	-	-	7.82
Phenolics (total)	mg/L	0.001	-	-	0.0098
Phosphorus	mg/L	0.01	0.177	0.210	0.110
Total kjeldahl nitrogen (TKN)	mg/L		-	-	2.53
Total suspended solids (TSS)	mg/L		-	-	4.6
Turbidity	NTU		-	-	6.05
Un-ionized ammonia	mg/L	0.02	-	-	0.00203
Field Parameters					
Conductivity, field	mS/cm		0.874	0.874	1.02
Dissolved oxygen (DO), field	mg/L	>4	8.58	-	7.88
Oxidation reduction potential (ORP), field	millivolts		33	-	124
pH, field	s.u.	6.5-8.5	7.39	7.39	7.29
Temperature, field	Deg C		22.65	22.65	2.26
Turbidity, field	NTU		456	-	10.1

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.

ND Not detected at the associated reporting limit.

8.44 Concentrations is in excess of the PWQO.

* PWQO for dissolved oxygen is temperature dependent.

Table 4.5

SW-4 Monthly Sampling Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:				STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	SW-45804-061719-JC-001	SW-45804-061719-JC-002	STORM WATER POND
Sample Type:											Duplicate	
Sample Date:				1/29/2019	2/11/2019	3/14/2019	4/3/2019	5/22/2019	6/6/2019	6/17/2019	6/17/2019	7/9/2019
Parameters	Units	PWQO[1]	ECA Discharge Criteria [2]									
Metals		a	b									
Aluminum	mg/L	0.075		0.31[a]	0.168[a]	0.227[a]	--	--	--	--	--	--
Iron	mg/L	0.3		0.199	0.180	0.271	--	--	--	0.066	0.060	--
Lead	mg/L	0.005		0.000159	0.000135	0.000189	0.000209	ND(0.000050)	ND(0.000050)	--	--	ND(0.000050)
Magnesium	mg/L			33.5	35.2	37.6	--	--	--	--	--	--
Manganese	mg/L			0.0382	0.110	0.138	--	--	--	0.169	0.142	--
Mercury	mg/L	0.0002		ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--	ND(0.000010)
Molybdenum	mg/L	0.04		0.0106	0.0104	0.0104	--	--	--	--	--	--
Nickel	mg/L	0.025		0.00210	0.00213	0.00236	0.00255	0.00231	0.00203	--	--	0.00154
Sodium	mg/L			59.5	64.8	73.0	--	--	--	--	--	--
Arsenic	mg/L	0.005		0.00061	0.00061	0.00065	0.00054	0.00074	0.00079	--	--	0.00100
Boron	mg/L	0.2		0.035	0.036	0.036	0.026	0.037	0.039	--	--	0.047
Cadmium	mg/L	0.0002		ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000011	ND(0.000010)	0.0000066	--	--	ND(0.0000050)
Chromium	mg/L	0.001		0.00060	ND(0.00050)	0.00068	ND(0.00050)	ND(0.00050)	ND(0.00050)	--	--	ND(0.00050)
Cobalt	mg/L	0.0009		0.00024	0.00026	0.00031	0.00064	0.00028	0.00031	--	--	0.00016
Copper	mg/L	0.005		0.0010	ND(0.0010)	0.0010	0.0012	ND(0.0010)	ND(0.0010)	--	--	ND(0.0010)
Zinc	mg/L	0.03		0.0092	0.0102	0.0098	0.0142	0.0037	ND(0.0030)	--	--	ND(0.0030)
Bismuth	mg/L			ND(0.000050)	ND(0.000050)	ND(0.000050)	--	--	--	--	--	--
Calcium	mg/L			124	128	128	--	--	--	--	--	--
Selenium	mg/L	0.1		0.000054	ND(0.000050)	0.000057	--	--	--	--	--	--
General Chemistry												
Nitrate (as N)	mg/L		2.93	1.49	1.47	1.23	0.70	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L			0.011	0.011	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.010)	--	--	ND(0.050)
Ammonia-N	mg/L			0.187	0.329	0.220	0.73	0.150	ND(10)	0.079	0.067	0.13
Phosphorus	mg/L	0.01	0.4	0.0750[a]	0.0705[a]	0.0600[a]	0.0823[a]	0.0504[a]	0.0310[a]	0.0178[a]	0.0158[a]	0.0322[a]
Alkalinity, total (as CaCO3)	mg/L			--	--	--	--	--	--	172	165	--
Biochemical oxygen demand (BOD)	mg/L			ND(3.0)	ND(2.0)	ND(3.0)	ND(2.0)	2.4	3.5	--	--	ND(3.0)
Biochemical oxygen demand (carbonaceous)	mg/L		15	ND(3.0)	ND(2.0)	ND(3.0)	ND(2.0)	2.0	2.8	--	--	ND(3.0)
Chemical oxygen demand (COD)	mg/L			27	17	28	32	33	39	--	--	35
Conductivity	umhos/cm			1120	1210	1230	874	1010	1020	--	--	862
Dissolved organic carbon (DOC) (dissolved)	mg/L			8.56	8.53	8.29	7.56	8.76	10.5	10.6	10.8	12.2
Dissolved oxygen (DO) (dissolved)	mg/L			9.49	12.2	11.3	9.29	8.17	9.00	--	--	8.61
Escherichia coli	cfu/100mL	100	100	6	0	15	1	1	0	16	4	81
Nitrite/Nitrate	mg/L			--	--	--	--	--	ND(0.022)	--	--	ND(0.11)
Oil and grease, animal and vegetable	mg/L			ND(5.0)	ND(2.0)	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.001		0.0005[a]	ND(0.0010)	0.0005[a]	0.0010	0.0013[a]	0.0007[a]	--	--	0.0005[a]
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.15	8.04	8.07	7.84	8.26	8.33	--	--	8.21
Temperature, field	Deg C			1.0	1.0	2.0	2.0	11.0	19.0	--	--	18.0
Total kjeldahl nitrogen (TKN)	mg/L			1.42	1.47	1.12	1.63	1.57	1.20	--	--	1.38
Total nitrogen	mg/L			2.92	2.95	2.35	2.33	1.57	1.20	--	--	1.38
Total suspended solids (TSS)	mg/L		15	3.6	3.5	3.1	3.7	3.8	4.7	--	--	3.2
Turbidity	NTU			--	--	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L	0.02	0.05	0.00284	0.00389	0.00302	0.00590	0.00642	ND(0.70)[b]	--	--	0.0083
Field Parameters												
Conductivity, field	mS/cm			--	--	--	--	--	--	0.874	0.874	--
Dissolved oxygen (DO), field	mg/L	>4		--	--	--	--	--	--	0.04[a]	--	--
Oxidation reduction potential (ORP), field	millivolts			--	--	--	--	--	--	33	--	--
pH, field	s.u.	6.5-8.5	6.5-8.5	--	--	--	--	--	--	7.39	7.39	--
Temperature, field	Deg C		23	--	--	--	--	--	--	22.65	22.65	--
Turbidity, field	NTU			--	--	--	--	--	--	456	--	--
Misc												
Oil and grease	mg/L			ND(5.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	--	--	ND(2.0)
Oil and grease, animal and vegetable	mg/L			--	--	ND(1.0)	--	--	--	--	--	--
Mineral oil and grease	mg/L			ND(2.5)	ND(1.0)	--	--	--	--	--	--	--

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
Value Exceedance of the PWQO
Value Exceedance of the ECA Discharge Criteria
J Estimated concentration.
* The PWQO for dissolved oxygen is temperature dependent

GHD 045804 (8)

Table 4.5

SW-4 Monthly Sampling Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:				STORMWATER POND	STORMWATER POND	STORMWATER POND	STORMWATER POND	SW-045804-112819-JC-007	STORMWATER POND
Sample Type:									
Sample Date:				8/7/2019	9/10/2019	10/21/2019	11/22/2019	11/28/2019	12/16/2019
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria [2]**						
Metals		a	b						
Aluminum	mg/L	0.075		--	--	--	--	--	--
Iron	mg/L	0.3		--	--	--	--	0.141	--
Lead	mg/L	0.005		ND(0.000050)	0.000083	0.000066	0.000073	0.000129	0.000092
Magnesium	mg/L			--	--	--	--	--	--
Manganese	mg/L			--	--	--	--	0.109	--
Mercury	mg/L	0.0002		ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)
Molybdenum	mg/L	0.04		--	--	--	--	--	--
Nickel	mg/L	0.025		0.00160	0.00154	0.00176	0.00191	0.00166	0.00204
Sodium	mg/L			--	--	--	--	--	--
Arsenic	mg/L	0.005		0.00096	0.00104	0.00061	0.00053	0.00052	0.00067
Boron	mg/L	0.2		0.054	0.060	0.065	0.047	0.042	0.054
Cadmium	mg/L	0.0002		ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	0.0000075	0.0000054
Chromium	mg/L	0.001		0.00055	[illegible][3]	[illegible][3]	[illegible][3]	ND(0.00050)	0.00060
Cobalt	mg/L	0.0009		0.00017	0.00026	0.00015	0.00023	0.00024	0.00030
Copper	mg/L	0.005		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	0.0014
Zinc	mg/L	0.03		ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0045	0.0059
Bismuth	mg/L			--	--	--	--	--	--
Calcium	mg/L			--	--	--	--	--	--
Selenium	mg/L	0.1		--	--	--	--	--	--
General Chemistry									
Nitrate (as N)	mg/L		2.93	ND(0.10)	ND(0.020)	0.169	0.353	0.374	0.30
Nitrite (as N)	mg/L			ND(0.050)	ND(0.010)	0.014	ND(0.010)	0.010	ND(0.050)
Ammonia-N	mg/L			0.369	0.021	0.166	0.390	0.862	1.27
Phosphorus	mg/L	0.01	0.4	[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]
Alkalinity, total (as CaCO3)	mg/L			--	--	--	--	175	--
Biochemical oxygen demand (BOD)	mg/L			2.3	2.3	ND(2.0)	3.8	ND(3.0)	ND(3.0)
Biochemical oxygen demand (carbonaceous)	mg/L		15	ND(2.0)	2.3	ND(2.0)	4.0	--	ND(3.0)
Chemical oxygen demand (COD)	mg/L			40	52	36	32	29	27
Conductivity	umhos/cm			910	915	823	981	--	1060
Dissolved organic carbon (DOC) (dissolved)	mg/L			11.7	13.5	11.6	10.2	10.4	9.78
Dissolved oxygen (DO) (dissolved)	mg/L			7.70	7.88	8.67	10.8	--	9.28
Escherichia coli	cfu/100mL	100	100	16	9	[illegible][4]	8	[illegible][4]	[illegible][4]
Nitrite/Nitrate	mg/L			ND(0.11)	ND(0.022)	0.183	0.353	0.384	0.3
Oil and grease, animal and vegetable	mg/L			--	--	--	--	--	--
Phenolics (total)	mg/L	0.001		[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]	[illegible][3]
pH, lab	s.u.	6.5-8.5	6.5-8.5	7.86	[illegible][4]	7.95	7.89	7.82	7.99
Temperature, field	Deg C			25.0	19.0	9.0	1.2	--	1.0
Total kjeldahl nitrogen (TKN)	mg/L			1.62	1.87	1.37	1.81	2.53	2.27
Total nitrogen	mg/L			1.62	1.87	1.55	2.16	--	2.57
Total suspended solids (TSS)	mg/L		15	5.9	8.7	3.9	5.1	4.6	2.4
Turbidity	NTU			--	--	--	--	6.05	--
Un-ionized ammonia	mg/L	0.02	0.05	0.0177	0.0028	0.00303	0.00333	0.00203	0.0134
Field Parameters									
Conductivity, field	mS/cm			--	--	--	--	1.02	--
Dissolved oxygen (DO), field	mg/L	>4		--	--	--	--	[illegible]	--
Oxidation reduction potential (ORP), field	millivolts			--	--	--	--	124	--
pH, field	s.u.	6.5-8.5	6.5-8.5	--	--	--	--	7.29	--
Temperature, field	Deg C		23	--	--	--	--	2.26	--
Turbidity, field	NTU			--	--	--	--	10.1	--
Misc									
Oil and grease	mg/L			ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(5.0)	ND(5.0)
Oil and grease, animal and vegetable	mg/L			--	--	--	--	--	--
Mineral oil and grease	mg/L			--	--	--	--	--	--

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
[illegible] Exceedance of the PWQO
[illegible] Exceedance of the ECA Discharge Criteria
J Estimated concentration.
* The PWQO for dissolved oxygen is temperature dependent

EW107-15 Daily Pumping Log
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Period Start (PUMP ON)	Period End (PUMP OFF)	Pumping Day #	Duration (hrs)	Flow Rate (m^3/hr)	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
9-Mar-19	9-Mar-19	1	2.72	0.2	540.0	0.540	540.0	0.540	540.0	0.540
15-May-19	15-May-19	2	0.08	2.5	210.0	0.210	750.0	0.750	375.0	0.375
30-May-19	30-May-19	3	0.03	2.5	80.0	0.080	830.0	0.830	276.7	0.277
31-May-19	31-May-19	4	2.33	2.55	5950.0	5.950	6,780.0	6.780	1,695.0	1.695
31-May-19	31-May-19	4	0.28	1.9	540.0	0.540	7,320.0	7.320	1,830.0	1.830
31-May-19	31-May-19	4	0.7	0.77	540.0	0.540	7,860.0	7.860	1,965.0	1.965
1-Jun-19	1-Jun-19	5	1	1.88	1880.0	1.880	9,740.0	9.740	1,948.0	1.948
10-Jul-19	10-Jul-19	6	5.42	2.5	13540.0	13.540	23,280.0	23.280	3,880.0	3.880
18-Jul-19	18-Jul-19	7	0.08	2.5	210.0	0.210	23,490.0	23.490	3,355.7	3.356
19-Jul-19	19-Jul-19	8	1.45	0.63	910.0	0.910	24,400.0	24.400	3,050.0	3.050
23-Jul-19	23-Jul-19	9	0.45	0.57	260.0	0.260	24,660.0	24.660	2,740.0	2.740
23-Jul-19	23-Jul-19	9	0.85	0.56	480.0	0.480	25,140.0	25.140	2,793.3	2.793
23-Jul-19	23-Jul-19	9	8.27	2.5	20670.0	20.670	45,810.0	45.810	5,090.0	5.090
23-Jul-19	23-Jul-19	9	0.98	1.26	1240.0	1.240	47,050.0	47.050	5,227.8	5.228
23-Jul-19	24-Jul-19	9	10.75	2	21500.0	21.500	68,550.0	68.550	7,616.7	7.617
24-Jul-19	24-Jul-19	10	1.52	1.98	3000.0	3.000	71,550.0	71.550	7,155.0	7.155
29-Jul-19	29-Jul-19	10	0.33	2.21	740.0	0.740	72,290.0	72.290	7,229.0	7.229
29-Jul-19	29-Jul-19	10	0.2	1.63	330.0	0.330	72,620.0	72.620	7,262.0	7.262
30-Jul-19	30-Jul-19	11	6.65	2.08	13830.0	13.830	86,450.0	86.450	7,859.1	7.859
7-Aug-19	7-Aug-19	12	5.77	2.12	12230.0	12.230	98,680.0	98.680	8,223.3	8.223
9-Aug-19	9-Aug-19	13	6.45	2.11	13610.0	13.610	112,290.0	112.290	8,637.7	8.638
13-Aug-19	13-Aug-19	14	7.03	2	14070.0	14.070	126,360.0	126.360	9,025.7	9.026
19-Aug-19	19-Aug-19	15	12.47	1.85	23060.0	23.060	149,420.0	149.420	9,961.3	9.961
21-Aug-19	21-Aug-19	16	0.17	1.85	310.0	0.310	149,730.0	149.730	9,358.1	9.358
22-Aug-19	22-Aug-19	17	0.32	1.95	620.0	0.620	150,350.0	150.350	8,844.1	8.844
22-Aug-19	22-Aug-19	16	0.15	1	150.0	0.150	150,500.0	150.500	9,406.3	9.406
28-Aug-19	29-Aug-19	18	16.93	1.5	25400.0	25.400	175,900.0	175.900	9,772.2	9.772
30-Aug-19	30-Aug-19	19	0.22	1.88	410.0	0.410	176,310.0	176.310	9,279.5	9.279
3-Sep-19	3-Sep-19	20	0.15	1.91	290.0	0.290	176,600.0	176.600	8,830.0	8.830
3-Sep-19	3-Sep-19	19	0.35	2.15	750.0	0.750	177,350.0	177.350	9,334.2	9.334
6-Sep-19	6-Sep-19	21	0.17	1.46	240.0	0.240	177,590.0	177.590	8,456.7	8.457
6-Sep-19	7-Sep-19	21	18.52	1.9	35180.0	35.180	212,770.0	212.770	10,131.9	10.132
10-Sep-19	10-Sep-19	22	0.12	1.81	210.0	0.210	212,980.0	212.980	9,680.9	9.681
10-Sep-19	11-Sep-19	23	18.48	2.05	37890.0	37.890	250,870.0	250.870	10,907.4	10.907
11-Sep-19	11-Sep-19	24	0.15	2.08	310.0	0.310	251,180.0	251.180	10,465.8	10.466
11-Sep-19	11-Sep-19	24	0.3	2.08	620.0	0.620	251,800.0	251.800	10,491.7	10.492
16-Sep-19	16-Sep-19	24	0.23	2.08	490.0	0.490	252,290.0	252.290	10,512.1	10.512
19-Sep-19	19-Sep-19	25	5.55	2.15	11930.0	11.930	264,220.0	264.220	10,568.8	10.569
20-Sep-19	20-Sep-19	26	0.03	2.11	70.0	0.070	264,290.0	264.290	10,165.0	10.165
23-Sep-19	23-Sep-19	27	0.18	2.11	390.0	0.390	264,680.0	264.680	9,803.0	9.803
23-Sep-19	23-Sep-19	28	0.28	2.11	600.0	0.600	265,280.0	265.280	9,474.3	9.474
25-Sep-19	25-Sep-19	27	1.82	2.11	3830.0	3.830	269,110.0	269.110	9,967.0	9.967
26-Sep-19	26-Sep-19	28	7.93	2.15	17060.0	17.060	286,170.0	286.170	10,220.4	10.220
27-Sep-19	27-Sep-19	29	3.42	2.15	7350.0	7.350	293,520.0	293.520	10,121.4	10.121
27-Sep-19	28-Sep-19	30	14.68	2.18	32010.0	32.010	325,530.0	325.530	10,851.0	10.851
28-Sep-19	28-Sep-19	31	9.92	2.15	21320.0	21.320	346,850.0	346.850	11,188.7	11.189
30-Sep-19	30-Sep-19	31	0.47	2.15	1000.0	1.000	347,850.0	347.850	11,221.0	11.221

EW107-15 Daily Pumping Log
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Period Start (PUMP ON)	Period End (PUMP OFF)	Pumping Day #	Duration (hrs)	Flow Rate (m^3/hr)	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
1-Oct-19	1-Oct-19	32	5.02	2.15	10790.0	10.790	358,640.0	358.640	11,207.5	11.208
8-Oct-19	8-Oct-19	33	5.98	2.15	12860.0	12.860	371,500.0	371.500	11,257.6	11.258
10-Oct-19	10-Oct-19	34	0.42	2.15	900.0	0.900	372,400.0	372.400	10,952.9	10.953
11-Oct-19	11-Oct-19	35	0.2	2.15	430.0	0.430	372,830.0	372.830	10,652.3	10.652
16-Oct-19	16-Oct-19	36	0.2	2.2	440.0	0.440	373,270.0	373.270	10,368.6	10.369
21-Oct-19	21-Oct-19	37	0.23	2.2	510.0	0.510	373,780.0	373.780	10,102.2	10.102
23-Oct-19	23-Oct-19	38	0.42	2.25	940.0	0.940	374,720.0	374.720	9,861.1	9.861
23-Oct-19	23-Oct-19	38	5.97	2.25	13420.0	13.420	388,140.0	388.140	10,214.2	10.214
1-Nov-19	1-Nov-19	39	0.25	2.25	560.0	0.560	388,700.0	388.700	9,966.7	9.967
1-Nov-19	1-Nov-19	39	3.22	2.25	7240.0	7.240	395,940.0	395.940	10,152.3	10.152
7-Nov-19	7-Nov-19	40	2.88	2.25	6490.0	6.490	402,430.0	402.430	10,060.8	10.061
8-Nov-19	8-Nov-19	41	8.48	2.25	19090.0	19.090	421,520.0	421.520	10,281.0	10.281
14-Nov-19	14-Nov-19	42	0.25	2.25	560.0	0.560	422,080.0	422.080	10,049.5	10.050
18-Nov-19	18-Nov-19	43	0.32	2.25	710.0	0.710	422,790.0	422.790	9,832.3	9.832
20-Nov-19	20-Nov-19	44	0.28	2.35	670.0	0.670	423,460.0	423.460	9,624.1	9.624
21-Nov-19	21-Nov-19	45	10.93	2.35	25690.0	25.690	449,150.0	449.150	9,981.1	9.981
25-Nov-19	25-Nov-19	46	0.3	2.35	710.0	0.710	449,860.0	449.860	9,779.6	9.780
28-Nov-19	28-Nov-19	47	0.43	2.3	1000.0	1.000	450,860.0	450.860	9,592.8	9.593
28-Nov-19	28-Nov-19	47	0.12	2.3	270.0	0.270	451,130.0	451.130	9,598.5	9.599
2-Dec-19	2-Dec-19	48	0.33	2.3	770.0	0.770	451,900.0	451.900	9,414.6	9.415
3-Dec-19	3-Dec-19	49	0.38	2.3	880.0	0.880	452,780.0	452.780	9,240.4	9.240
4-Dec-19	4-Dec-19	50	5.05	2.3	11610.0	11.610	464,390.0	464.390	9,287.8	9.288
5-Dec-19	5-Dec-19	51	0.28	2.3	650.0	0.650	465,040.0	465.040	9,118.4	9.118
10-Dec-19	10-Dec-19	52	0.27	2.3	610.0	0.610	465,650.0	465.650	8,954.8	8.955
11-Dec-19	11-Dec-19	53	0.28	2.3	650.0	0.650	466,300.0	466.300	8,798.1	8.798
12-Dec-19	12-Dec-19	54	0.1	2.3	230.0	0.230	466,530.0	466.530	8,639.4	8.639
12-Dec-19	13-Dec-19	52	9.62	2.3	22120.0	22.120	488,650.0	488.650	9,397.1	9.397
13-Dec-19	13-Dec-19	55	0.33	2.3	770.0	0.770	489,420.0	489.420	8,898.5	8.899
17-Dec-19	17-Dec-19	56	0.1	2.3	230.0	0.230	489,650.0	489.650	8,743.8	8.744
18-Dec-19	18-Dec-19	57	0.22	2.3	500.0	0.500	490,150.0	490.150	8,599.1	8.599
19-Dec-19	19-Dec-19	58	0.82	2.33	1900.0	1.900	492,050.0	492.050	8,483.6	8.484
24-Dec-19	24-Dec-19	59	0.1	2.3	230.0	0.230	492,280.0	492.280	8,343.7	8.344
30-Dec-19	30-Dec-19	60	0.08	2.2	180.0	0.180	492,460.0	492.460	8,207.7	8.208

	Total Available Pumping Days	Total Days Pumping	Percent of Days with pumping	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
2019 TOTALS	**60**	**60**	**100.00%**	**492,460.0**	**492.460**	**8,305.6**	**8.306**

Note:

a total volume and average daily volume based on recorded periods only

Appendices

Appendix A
Environmental Compliance Approval
(No. 7251 8GKRPD and No. 2844 9YNGZC)

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2844-9YNGZC
Issue Date: February 1, 2017

Orgaworld Canada Ltd.
150 Kent Street
London, Ontario
N6A 1L3

Site Location: Source Separated Organics Processing Facility
5123 Hawthorne Road South
Part of West Half of Lot 27, Concession 6
City of Ottawa
K1G 3Y3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters

below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	**Elevation** (metre)	**Storage Volume** (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

    - inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

    - overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide

over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water

and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

all in accordance with supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Application" means the application for an environmental compliance approval submitted to the Ministry for approval by or on behalf of the Owner and dated March 11, 2015;

"Approval" means this entire document and any schedules attached to it, and the Application;

"BOD_5"(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"$CBOD_5$"means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"COD" means Chemical Oxygen Demand;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"DOC" means Dissolved Organic Carbon;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the *Environmental Protection Act, R.S.O. 1990, c.E.19* , as amended;

"Leachate Contaminated Sewage"means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Orgaworld Canada Ltd., and its successors and assignees;

"OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

"Substantial Completion" has the same meaning as "substantial performance" in the *Construction Lien Act* ; and

"Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these terms and conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with this Approval.

(3) Where there is a conflict between a provision of this environmental compliance approval and any document submitted by the Owner, the conditions in this environmental compliance approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Owner, the Application shall take precedence unless it is clear that the purpose of the document was to amend the Application

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The terms and conditions of this Approval are severable. If any term and condition of this environmental compliance approval, or the application of any requirement of this environmental compliance approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation

to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of address of Owner or operating authority;

(b) change of Owner or operating authority or both, including address of new Owner or operating authority, or both;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* ; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the "Initial Return" or "Notice of Change" filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this environmental compliance approval.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the Substantial Completion of the Works,a set of as-built drawings showing the Works as "constructed" shall be completed and submitted by the Owner to the District Manager.These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works or at operational office of the Owner for the operational life of the Works.

(2) The Owner shall inform in writing to the District Manager when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The Owner shall inform the District Manager of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after **two (2) years** of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

5. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the Owner shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 4.(2). The Owner shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the Owner shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 5.(2) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the Owner shall ensure that the contents of the SWM Pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner.

(8) The Owner shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to.

(9) Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

(10) The Owner shall notify the District Manager orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(13) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or Owner's operational headquarters for inspection by the Ministry.The logbook shall include the following:

(a) the name of the Works;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The Owner shall not store any end-product, including leaves and yard waste outdoors until the Owner prepares a Conditions Assessment and implementation plan approved by the District Manager. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

PART IV - GENERAL

7. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall

include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the Owner.

9. GROUNDWATER MONITORING

Groundwater Monitoring Program

(1) The Owner shall, upon the issuance of this Approval, carry out the following groundwater monitoring program. Samples shall be collected from the specified groundwater monitoring wells at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Groundwater Monitoring

Unconfined Shallow Aquifer

MW1-08*, MW2-08*, MW3-08*, MW4-09*, & MW103-09*.

MW5-09**, MW101-13**, MW102-09**, MW104-13**, MW105-13**, MW106-15** & EW107-15**.

Deep Bedrock Aquifer

TW-4*, TW-7* & TW-8*.

Frequency	*Semi Annual (i.e. two times in a year) ** Tri-Annual (i.e. three time in a year)
Sample Type	Grab
Parameters	Alkalinity, Total Ammonia Nitrogen, Dissolved Organic Carbon, *E-coli* , Iron, Manganese, Nitrate-N, and Total Phosphorous.

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after three (3) years of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall compare analytical monitoring results obtained pursuant to Subsection (1) Table 3 - Groundwater Monitoring with the trigger level concentrations for the trigger parameter listed in Tables 4 and 5.

Table 4
Trigger Level Concentrations
Unconfined Shallow Aquifer

Parameter	**Trigger Level** (milligram per litre if not specified)
Alkalinity	633
Total Ammonia Nitrogen	4.0
Dissolved Organic Carbon	34.6
E-coli	25.6 CFU/100 mL
Iron	48.3
Manganese	17.1
Nitrate-N	1.3
Total Phosphorous	7.2

Table 5
Trigger Parameters
Deep Bedrock Aquifer

Parameter	**Trigger Level** (milligram per litre if not specified)
Alkalinity	996
Total Ammonia Nitrogen	0.2
Dissolved Organic Carbon	18.4
E-coli	5.0 CFU/100 mL
Iron	10.6
Manganese	2.1
Nitrate-N	0.5
Total Phosphorous	0.5

(5) The trigger level program shall be implemented using the following three (3) Tiers to verify the results and direct potential contingency implementation:

Tier I (Routine Monitoring Program)

Tier I Routine Monitoring Program (RMP) involves the sampling of all on-site groundwater monitoring wells at the frequency specified in Table 3. All groundwater monitoring activities completed at the site will be considered Tier I RMP unless two (2) or more trigger parameters exceed there respective trigger levels in a simple sample.

Tier II (Confirmation Monitoring Program)

If during a single monitoring event, two (2) or more trigger parameters exceed the established (see Tables 4 and 5) Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring Program (CMP) shall be implemented.

The Tier II CMP consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next schedule monitoring event in order to confirm the Tier I exceedance of the two (2) or more trigger parameters.

If the concentrations reported in the duplicate sample return to below their respective trigger levels, then Tier I RMP will resume.

If the Tier I exceedance is confirmed, then the next step shall be a re-evaluation of the degree, nature, and potential source(s) of the trigger level impact(s) identified in Tier I including the implication of the exceedance in terms of the potential for impacts to down-gradient off-site water users.

If the Tier II CMP and the subsequent evaluation indicate that the facility operations are having a detrimental effect on water quality migrating off-site, then Tier III Contingency Measures and Compliance Monitoring Program shall be implemented.

Tier III (Contingency Measures and Compliance Monitoring Program)

Tier III Contingency Measures and Compliance Monitoring Program (CMCMP) involves assessment and implementation of contingency measures in the event of imminent off-site groundwater quality impairment.

Contingency measures to be evaluated should include extraction of impacted groundwater and/or surface water for on-site treatment or off-site disposal, or acquisition of groundwater rights and registration of a contaminated attenuation zone (CAZ) on title of adjacent lands.

Tier III CMCMP should also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented.

The Tier III CMCMP details should be determined in conjunction with the development and implementation of preferred contingency measure(s).

The compliance monitoring parameters, locations, and monitoring frequency should be determined at the time of implementation of contingency measures.

Lastly, appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed.

(6) The Owner shall notify the District Manager orally, as soon as possible, and in writing within

seven (7) days in the event a trigger exceedance occurs.

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the District Manager requires from time to time.

SCHEDULE 'A'

1. Environmental Compliance Approval Application for Industrial Sewage Works submitted by Ben Constable, Conestoga-Rovers & Associates (CRA), and signed by Mike Rooke, Compliance Officer, Orgaworld Canada Ltd., dated March 11, 2015, and all supporting documentation and information.

2. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

3. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

4. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

5. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

6. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

7. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

8. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

9. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

10. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

11. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla,

P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

12. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

13. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

14. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

15. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

16. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.(6) is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works"as constructed" are maintained for future references.

4. Conditions 4 and 8 are included to enable the Owner to evaluate and demonstrate the performance of the Works,on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

5. Conditions 5, 6 and 7 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry.

6. Condition 9 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7251-8GKRPD issued on May 30, 2011.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2017

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AA/
c: District Manager, MOECC Ottawa District Office
Ben Constable, Conestoga-Rovers & Associates (CRA)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

CONTENT COPY OF ORIGINAL

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as *"substantial performance"* in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate.*

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate,* the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate,* or the application of any

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director,* in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works,* other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate,* and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works,* a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works,* carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWMPond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner*shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate.*

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works,*the *Owner*shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works*prepared in accordance with Condition (8) is submitted to the *District Manager*for comments and concurrance;

(2) Upon commencement of operation of the *Works,*the *Owner*shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works*and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;* and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works.* Upon request, the *Owner* shall make the manual available to *Ministry* staff.

(4) The *Owner* shall keep the **SWMPond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWMPond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWMPond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWMPond.**

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner* shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner* shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works* to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works,* the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;* and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works.* Upon request, the *Owner* shall make the manual available to *Ministry* staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,* the O*wner* shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit;

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works,* the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works,* the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works,* on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

CONTENT COPY OF ORIGINAL

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry ofthe Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Appendix B
Background Correspondence

Appendix B.1
Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Ministry of the Environment
and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action
en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

January 3, 2017

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

MINISTRY OF THE ENVIRONMENT
JAN 11 2017
OTTAWA

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
2015 Groundwater and Surface Water Monitoring Report
Trigger Level Program
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the above noted report signed by Conestoga Rovers & Associates March 31, 2016 describing groundwater impacts related to the Orgaworld Organics Facility in Ottawa. The report also provides the Trigger Level Program (TLP) to protect groundwater from the impact of this new facility.

The consultant provides an assessment of the physical hydrogeology of the site. A shallow aquifer exists at the bedrock overburden interface. Water level monitoring has confirmed the inferred groundwater flow direction in the upper unconfined aquifer is to the east with some level of limited discharge to ditches located along the north site boundary. The Surface Water Unit should review this report as groundwater that does not meet Provincial Water Quality Objectives for ammonia may at times discharge to these ditches.

A deep aquifer exists in sandstone. Based on in-situ hydraulic testing the consultant has deemed there is no hydraulic connection between the deep aquifer and the unconfined shallow aquifer. Inferred groundwater flow in the deep aquifer is to the west. Contaminants of concerns identified are ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater quality mapping of ammonia, DOC, iron and manganese confirm that a plume extends in the shallow aquifer northeastward, originating in and around the northeast corner of the Organic Composting Facility. Some impacts have been detected in the deep aquifer.

A TLP has been proposed recognizing that past site activities and up gradient water quality issues exist and that an alternative method has been developed to assess the net impact of this new facility, bearing in mind that groundwater impairment must not occur. I have reviewed the proposed TLP and find it is acceptable to me.

I find the monitoring program rationalization acceptable to me.

In general, I agree with the conclusion and recommendations made by the consultant. Current remediation efforts must continue to improve groundwater quality at all down gradient monitoring wells relative to facility start up and any additional work as per the TLP. If a Tier III trigger is reached I should be consulted.

Robert W. Holland, P.Geo.
RWH/dv

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

Appendix B.2
Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Oxford Street, Waterloo, Ontario, Canada N2V 1C2
Telephone: 519 884 0510 Fax: 519 884 0525
www.craworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

REGISTERED COMPANY ISO 9001 ENVIRONMENTAL MANAGEMENT

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

	Field Test Parameters			Laboratory Test Parameters							
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3/4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	Collection Method
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4 [8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

o Samples are collected annually (typically spring)

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry*[1]	*SW General Chemistry*[2]	*Metals*[3/4]	*Bacteriological Components*[5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix B.3
Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

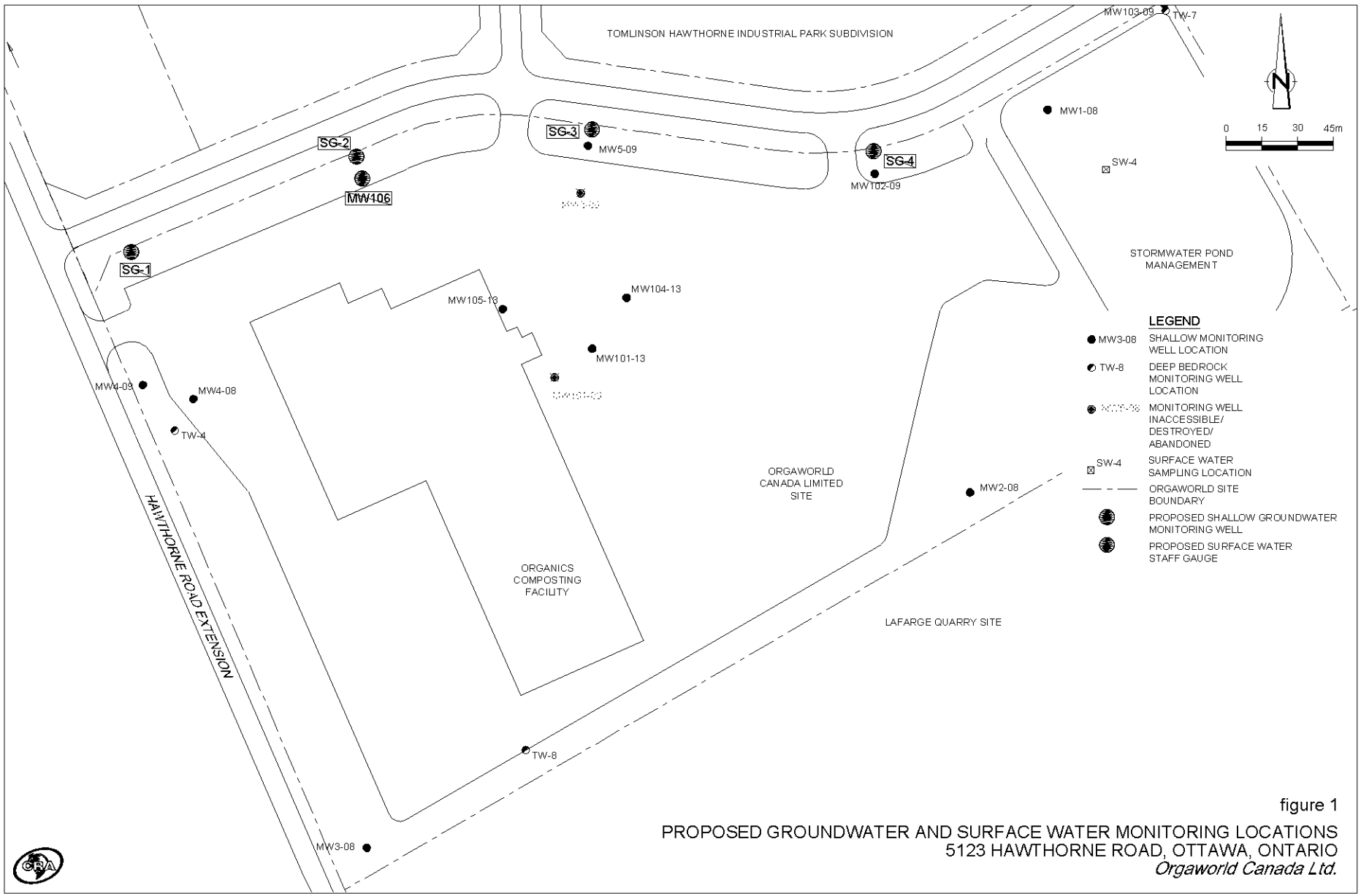


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

001380

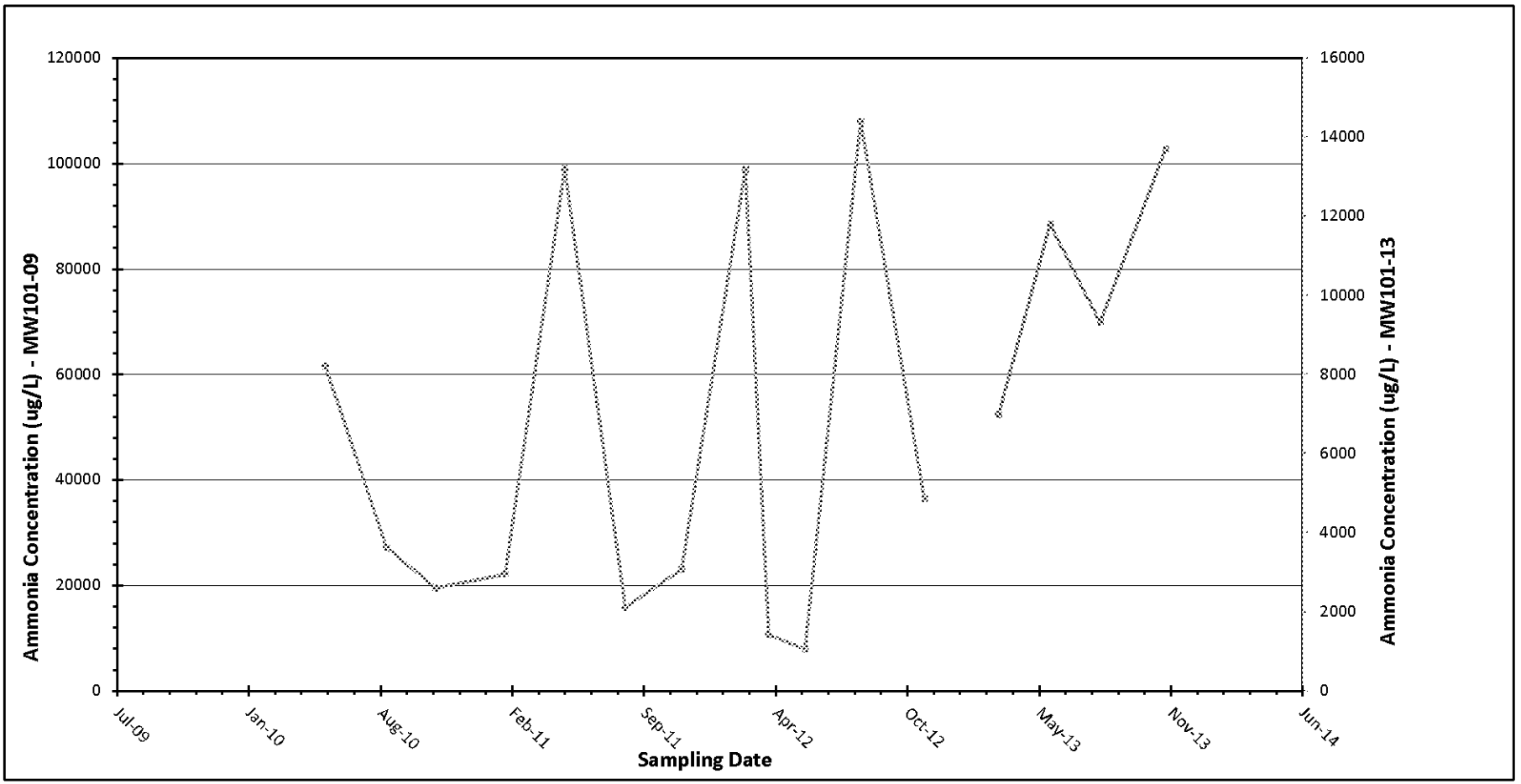


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

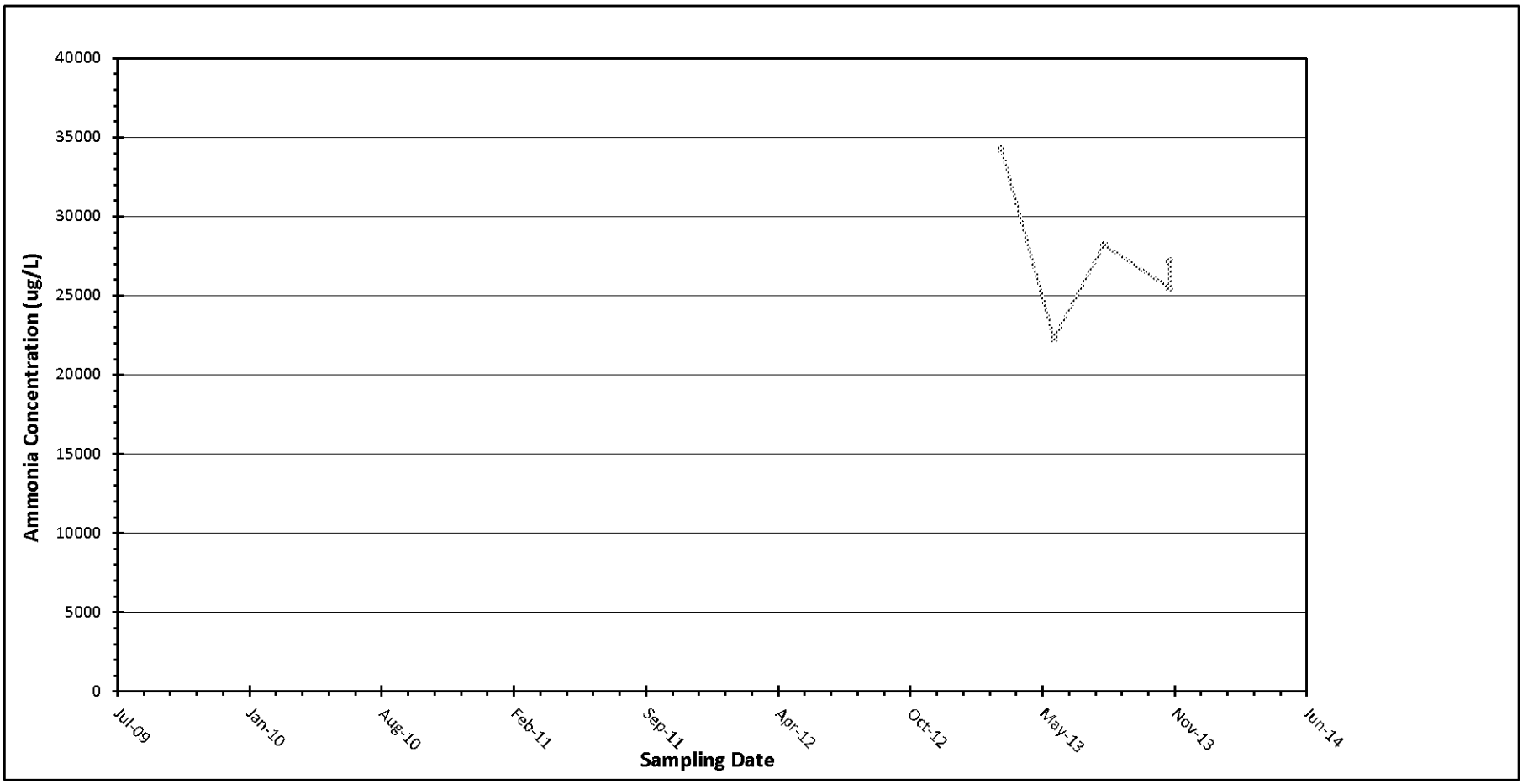


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

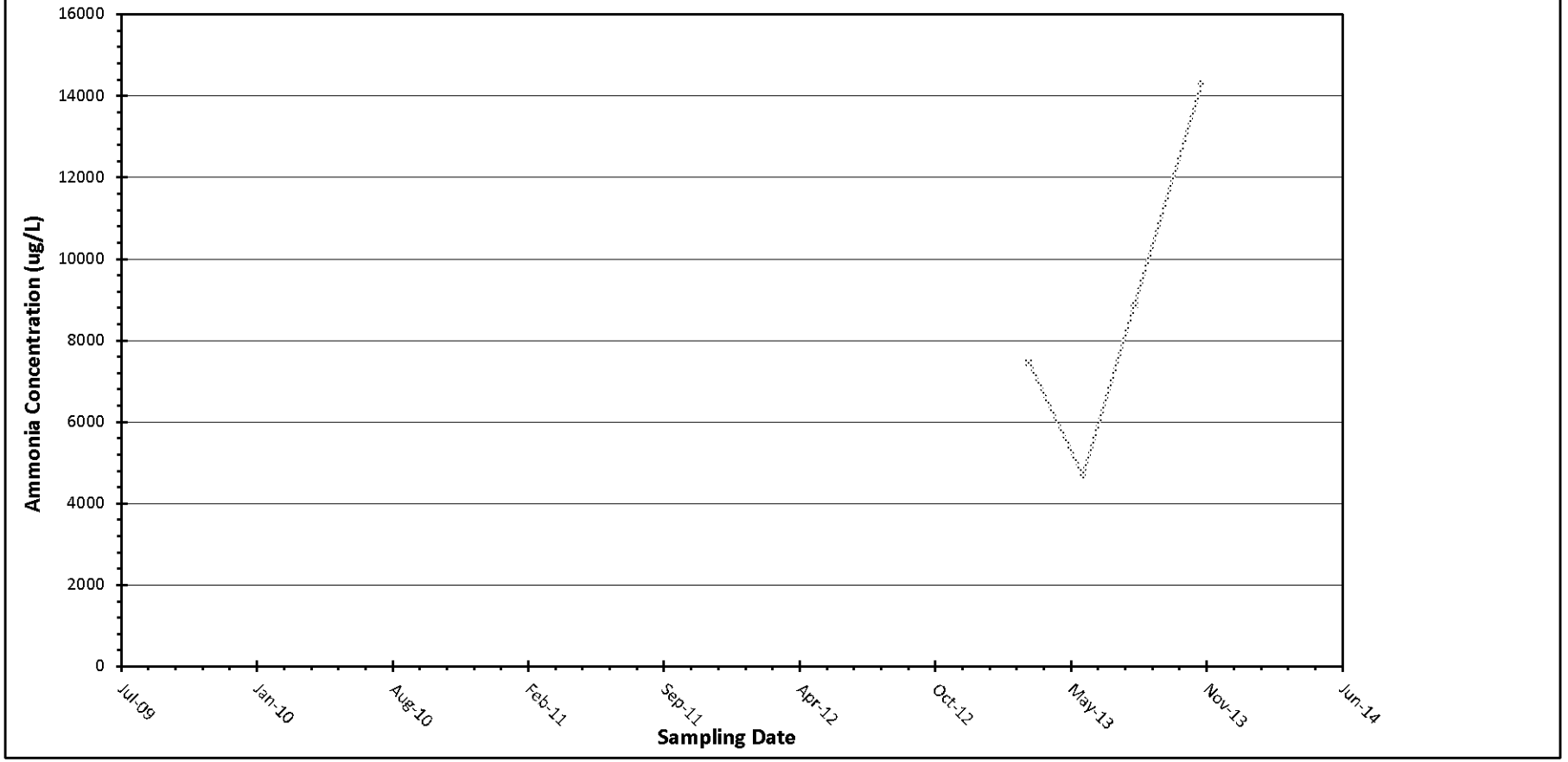


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

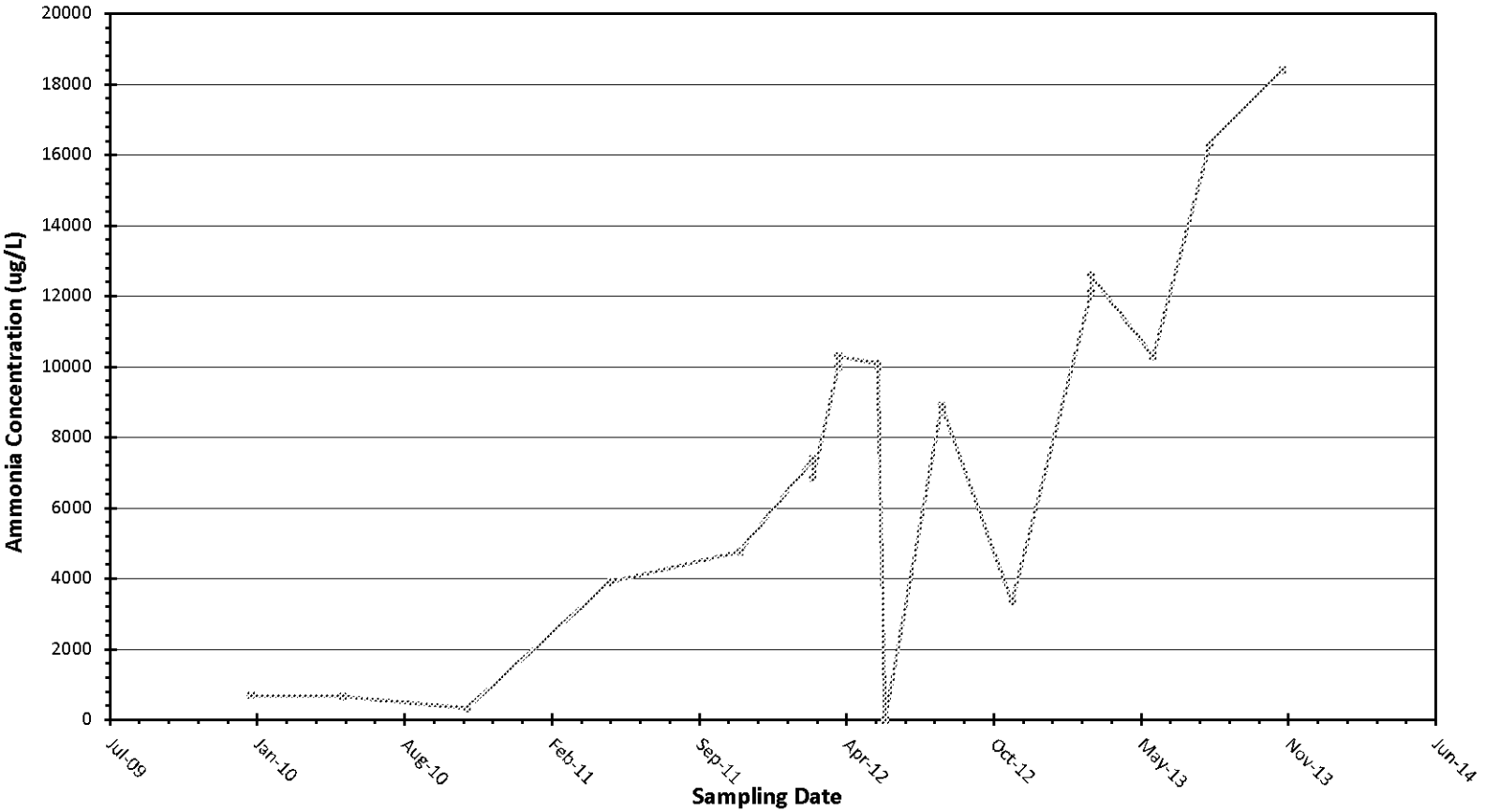


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

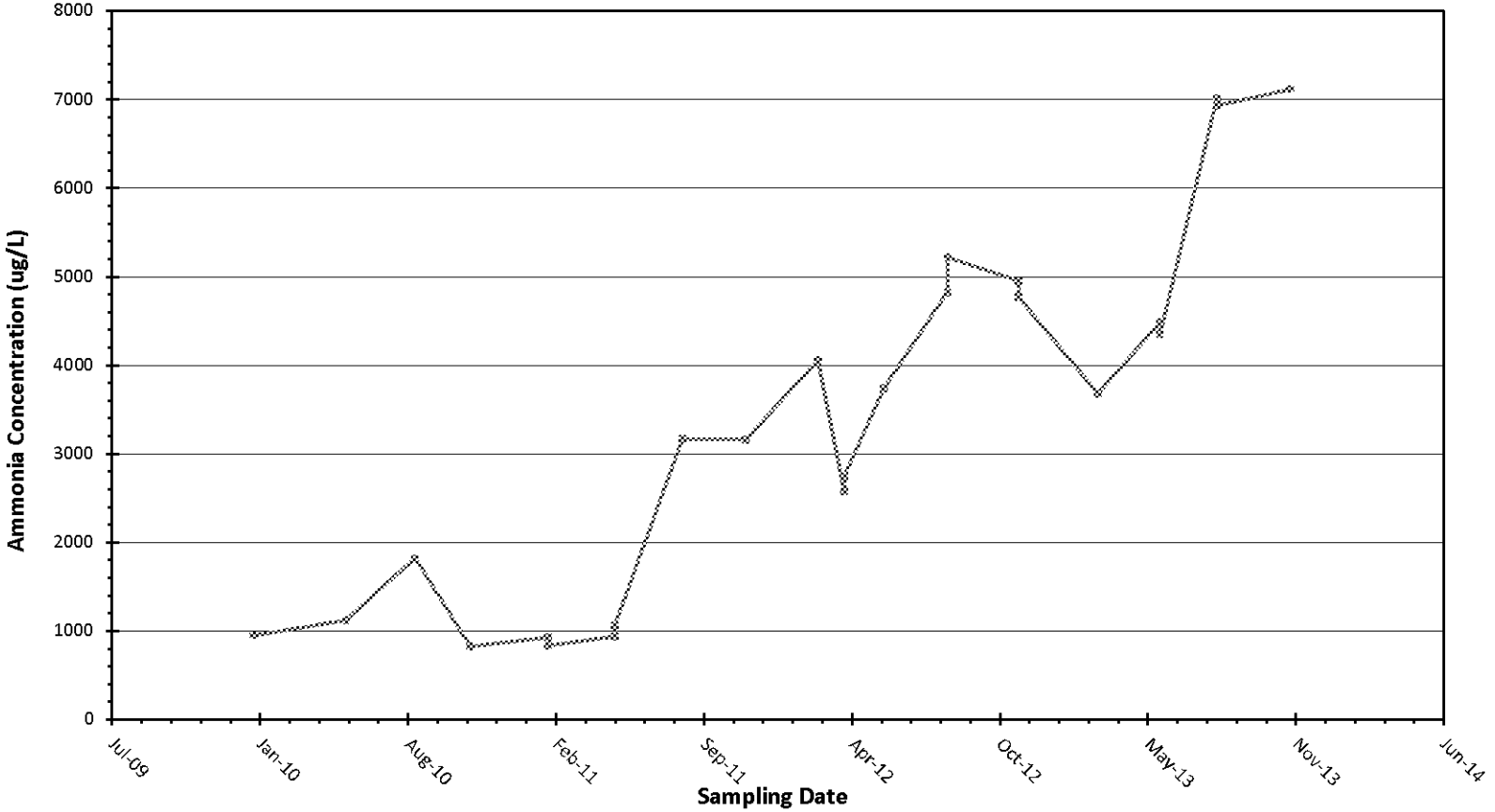


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

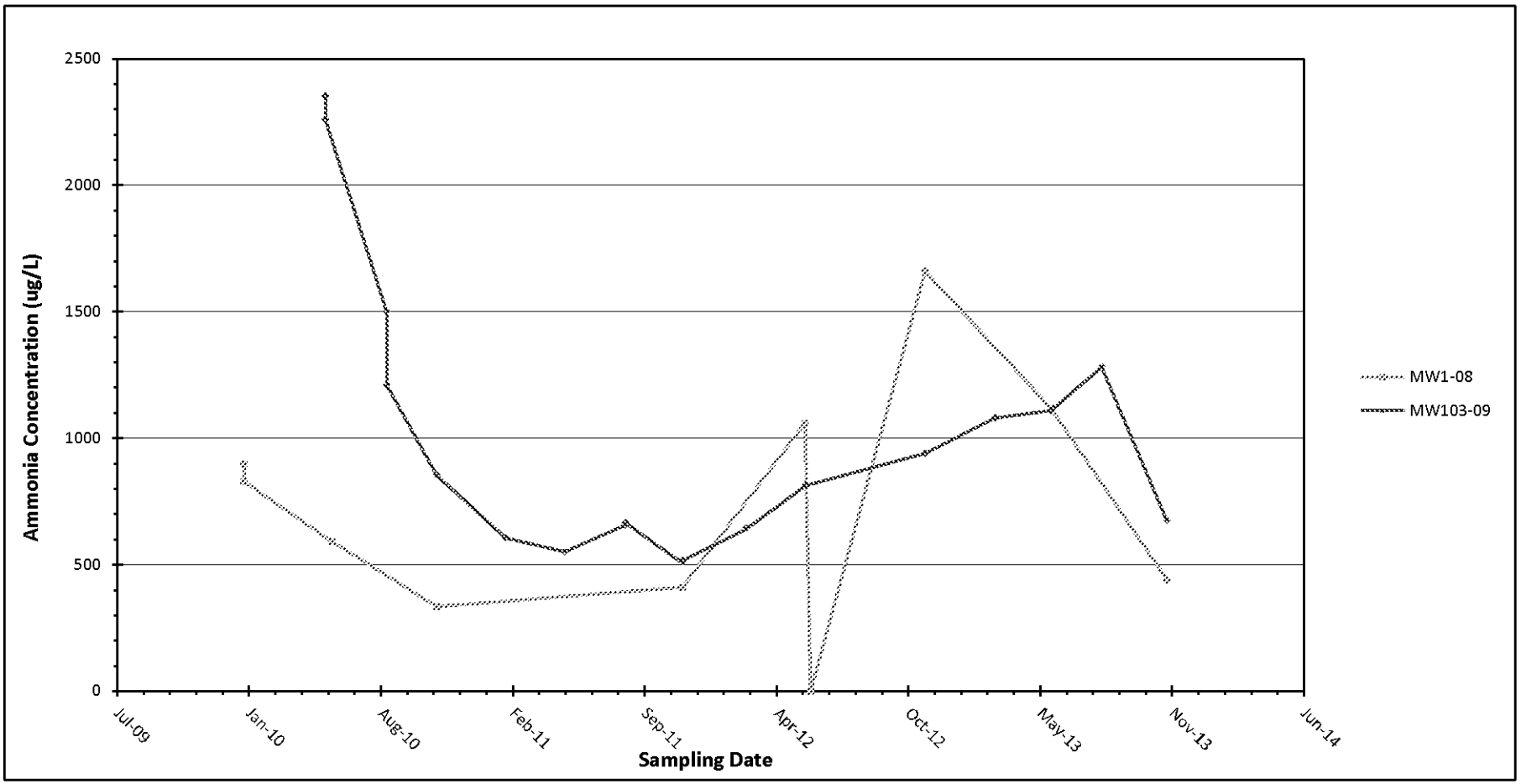


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

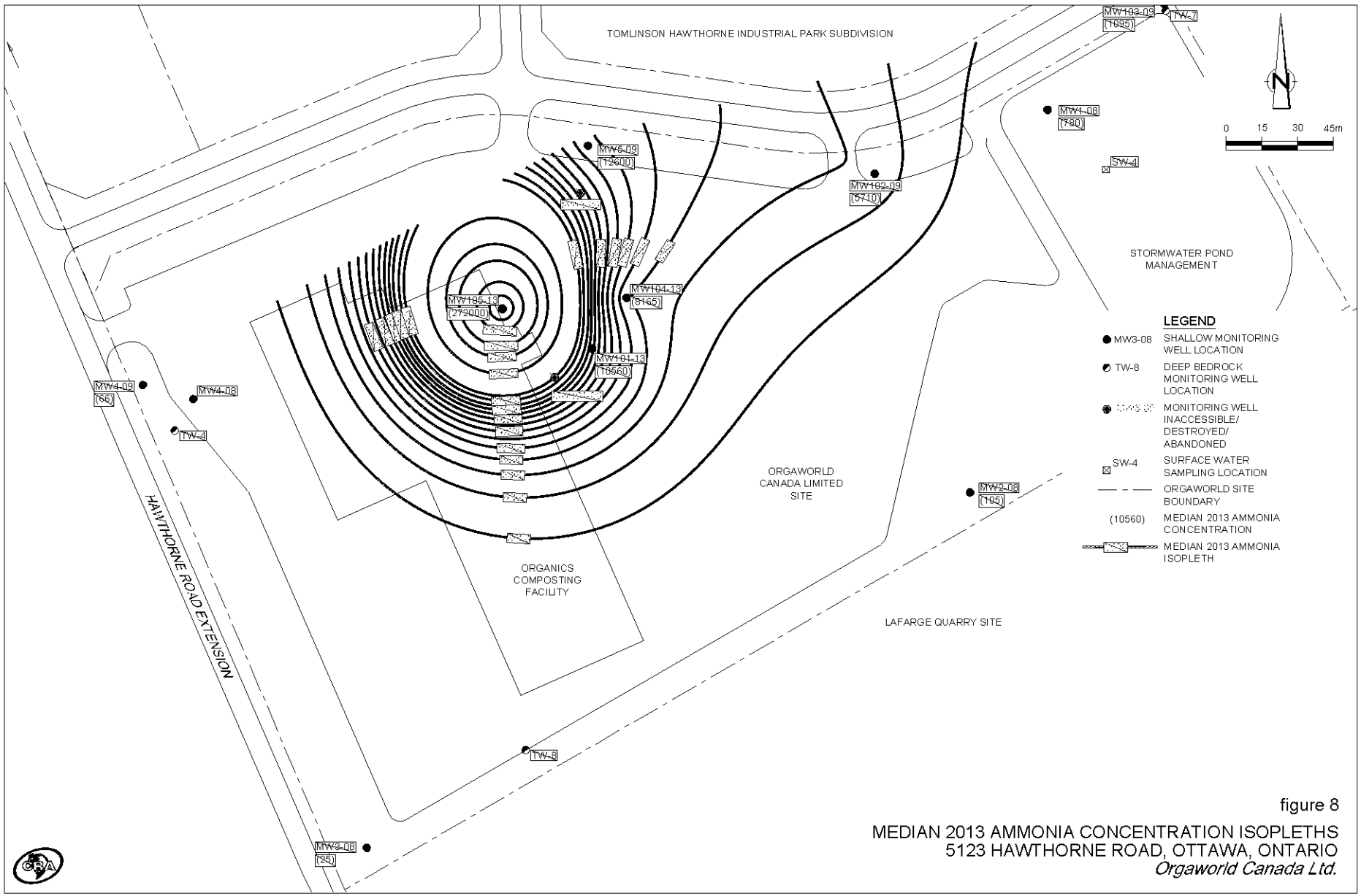


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

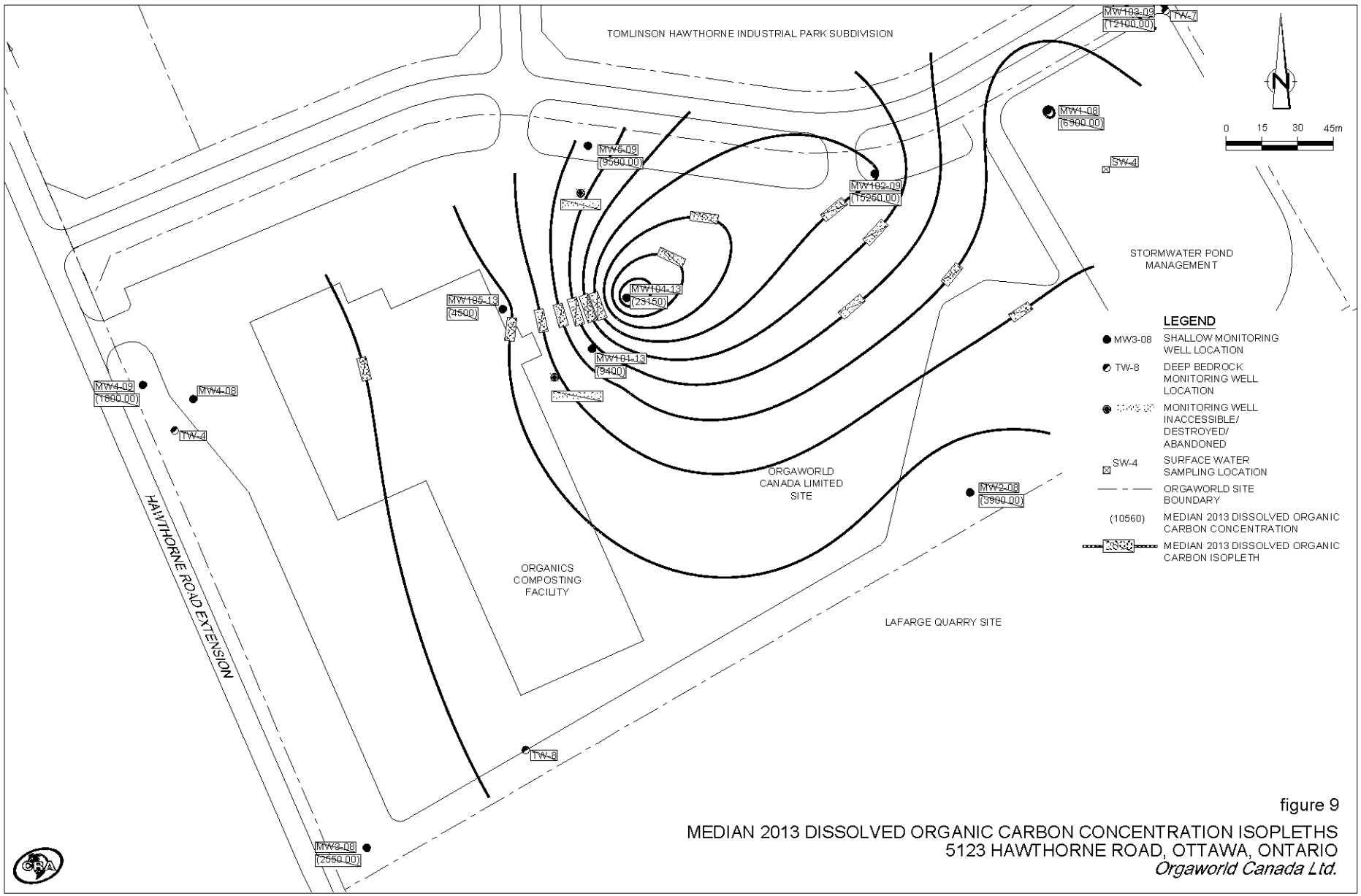


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

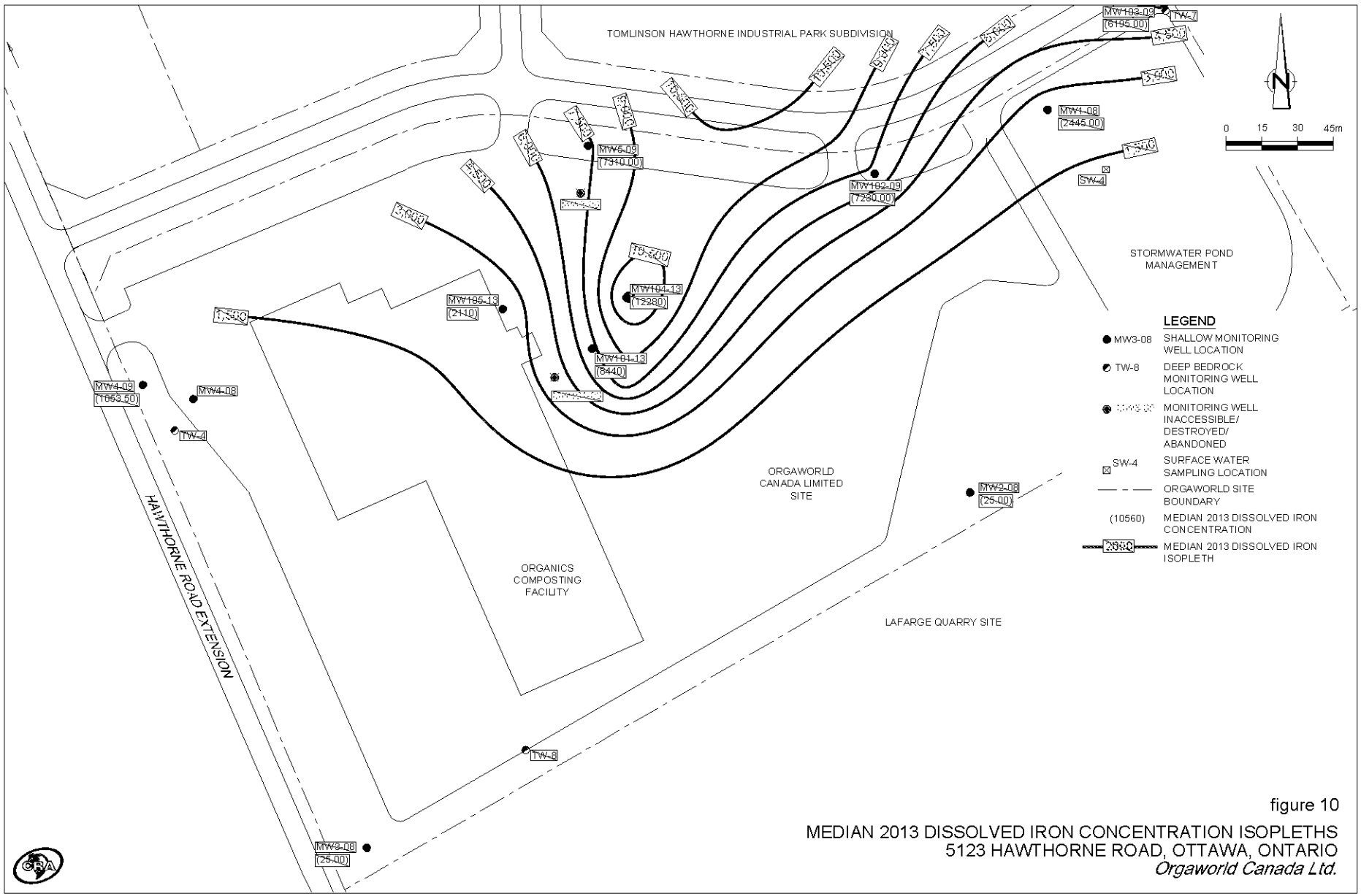


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

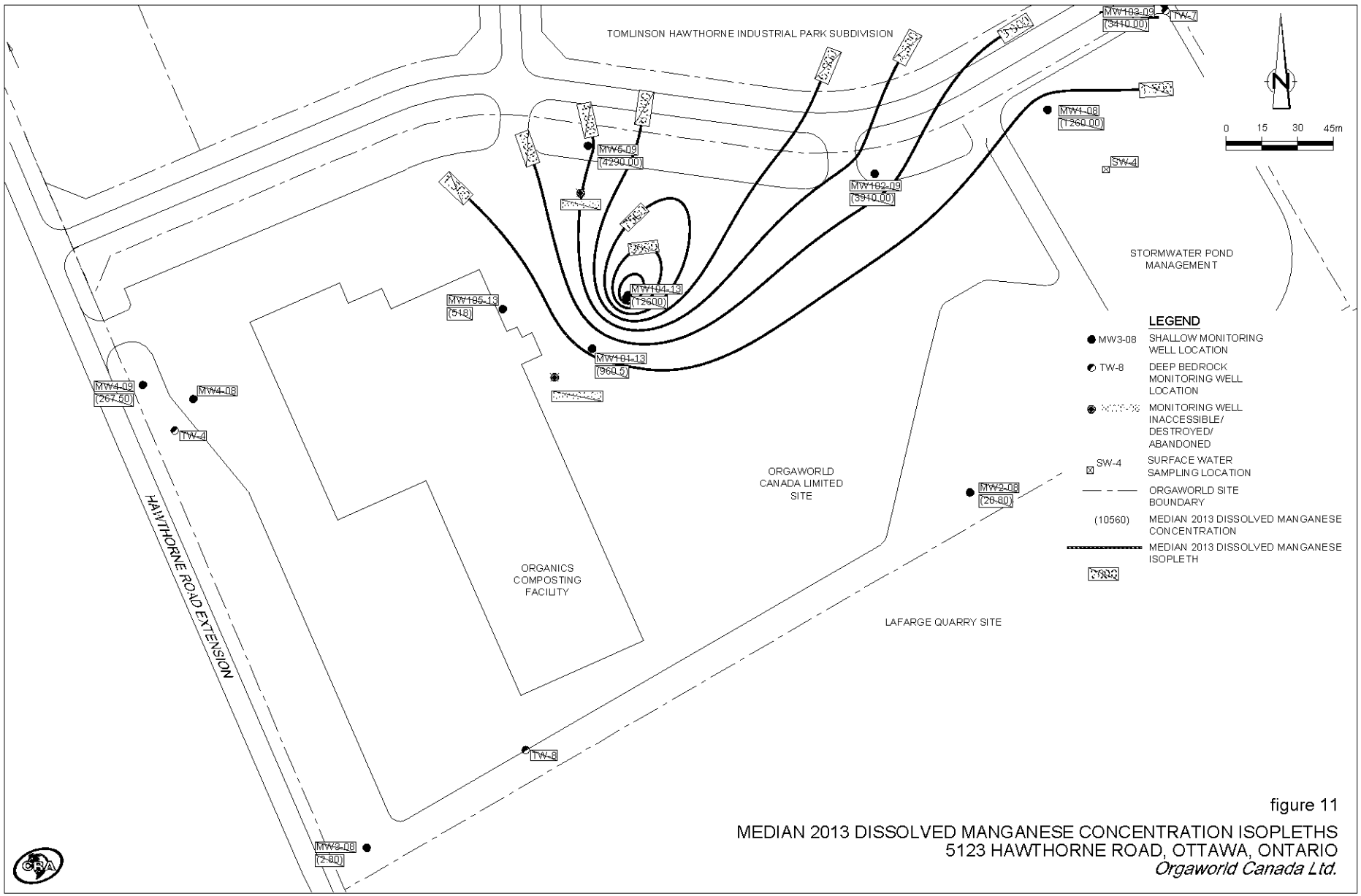


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

001390

Appendix C
Stratigraphic and Instrumentation Logs

Appendix C.1
Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.06 93.00 91.89						
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug					
	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS1		35		0.0
1				SS2		27		0.0
2			Well Screen					
3	END OF BOREHOLE @ 2.97m BGS	88.92						
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

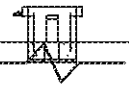
WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING 93.99 TOP OF RISER 93.78 GROUND SURFACE 93.17						
	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

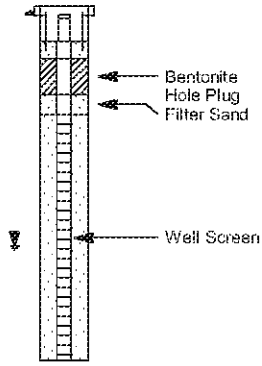
OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug; Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40				
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						



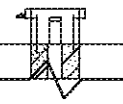
WELL DETAILS
Screened interval:
92.54 to 90.40m
0.63 to 2.77m BGS
Length: 2.13m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.02 to 92.71m
0.15 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.71 to 90.40m
0.46 to 2.77m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1
2
3
4
5
6
7
8
9
10
11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug			
	BEDROCK - fractured limestone					
1						
2						
3						
4						
5						
6						
7						
8						
9			Filter Sand			
10			Well Screen			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
12						
13						
14						
15						
16						
17						
	END OF BOREHOLE @ 17.37m BGS	86.18				
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand			
19						
20						
21						
22						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/29/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
1	- becoming very dense at 1.68m BGS	93.28				
2	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth		Filter Sand Well Screen	RC1	93	63
3	END OF BOREHOLE @ 2.84m BGS	92.22				

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

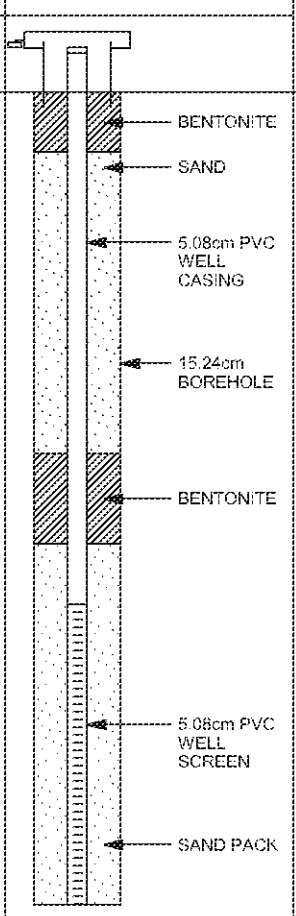
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	97.54
	TOP OF RISER	97.45
	GROUND SURFACE	96.58
0	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist	
1.0	- coarse sand, wood pieces, roots at 1.12m BGS	
1.5	- wood pieces, roots at 1.75m BGS	
2.0	- concrete chips at 1.88m BGS	
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29
3.5	- REFUSAL at 3.50m BGS	93.07
	BEDROCK	
4.0	END OF BOREHOLE @ 4.11m BGS	92.46

MONITORING WELL



WELL DETAILS
Screened interval.
93.99 to 92.46m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack.
94.29 to 92.46m
2.29 to 4.11m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		33		0.
2SS		33	11	10.0
3SS		54	86	0.1
4SS		67	55	0.2
5SS		8		0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804-WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug				
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS1		54	13
2			Filter Sand Well Screen	SS2		83	74
3	END OF BOREHOLE @ 2.77m BGS	91.59		SS3		0	7
4							
5							
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
93.12 to 91.59m
1.24 to 2.77m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.06 to 93.42m
0.30 to 0.94m BGS
Material: Bentonite
Sand Pack:
93.42 to 91.59m
0.94 to 2.77m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

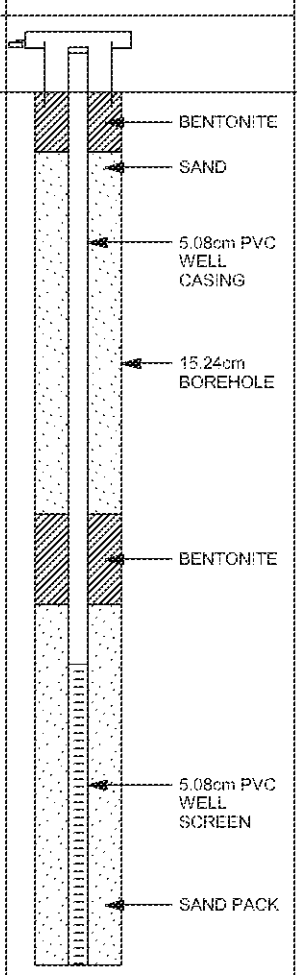
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	94.57
	TOP OF RISER	94.50
	GROUND SURFACE	93.36
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay	
1.68	- red silty sand (or covered brick) at 1.68m BGS - spoon wet at 1.83m BGS	
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92
3.51	- increasing clay, becoming wet at 3.51m BGS	
4.24	- cobble, rootmat, black at 4.24m BGS	
4.42	END OF BOREHOLE @ 4.42m BGS	88.94

MONITORING WELL



WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		54	14	0.0
2SS		54	12	0.1
3SS		29	13	0.0
4SS		71	25	0.1
5SS		25	8	0.0
6SS		29	6	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	94.98						
	GROUND SURFACE	93.83						
	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist							
		93.07						
1	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist		Bentonite Hole Plug	SS1		83	43	13.1
2				SS2		86		17.1
3				SS3		75	29	21.3
				SS4		33	16	23.9
4			Filter Sand	SS5		17	7	2.3
		89.26	Well Screen					
5	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet			SS6		100	20	0.0
				SS7		83	26	0.0
6		87.89		SS8		57		0.0
7	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet							
		86.21						
8	END OF BOREHOLE @ 7.62m BGS							
9								
10								
11								

WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.82 93.81						
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist		Bentonite Hole Plug	SS1		50	38	0.0
1				SS2		35		4.6
2				SS3		50	13	0.0
3				SS4		25	15	4.3
3.65	- becoming wet at 3.65m BGS			SS5		100		
4			Filter Sand					
5			Well Screen	SS6		42	54	0.0
5.50		88.32		SS7		50	15	0.0
6	SM - TILL - silty sand with some gravel, brown, moist to wet			SS8		100		1.5
6.98	END OF BOREHOLE @ 6.98m BGS	86.83		SS9		100		0.0
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.76 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	91.69						
	GROUND SURFACE	90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand / Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12		SS6		33		0.0
5	END OF BOREHOLE @ 4.72m BGS	85.96						
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.96						
	GROUND SURFACE	82.94						
	TOPSOIL	82.79						
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft		Bentonite Hole Plug	SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS			SS2		100	3	0.0
2			Filter Sand					
			Well Screen	SS3		100		0.0
3								
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	84.00 83.10						
0	TOPSOIL	82.95	Bentonite Hole Plug					
1	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS			SS1		83	15	0.0
2	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS	81.42	Filter Sand Well Screen	SS2		50	25	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20		SS3		100	27	0.0
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS

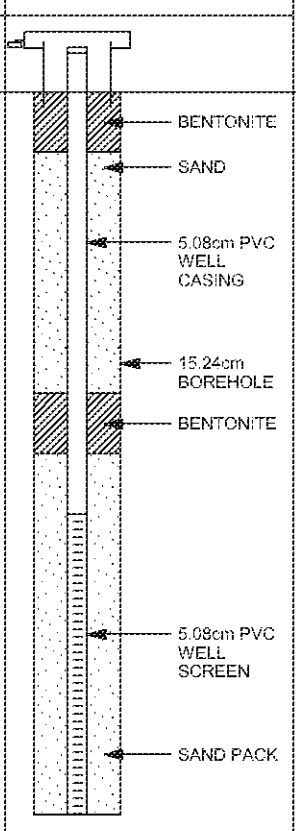
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	96.23
	TOP OF RISER	96.15
	GROUND SURFACE	95.67
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS	
1.0		
1.5		
2.0		
2.5		
3.0	- dense, becoming wet at 3.05m BGS	
3.5		
	END OF BOREHOLE @ 3.66m BGS	92.01
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		

MONITORING WELL



WELL DETAILS
Screened interval:
93.54 to 92.01m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.15 to 93.84m
1.52 to 1.83m BGS
Material: BENTONITE
Sand Pack:
93.84 to 92.01m
1.83 to 3.66m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		58	7	0.1
2SS		50	7	0.1
3SS		25	7	0.2
4SS		29	5	0.1
5SS		25	32	0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
0	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
4.0	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened Interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 26, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-GT005.GPJ CRA_CORP.GDT 6/3/13

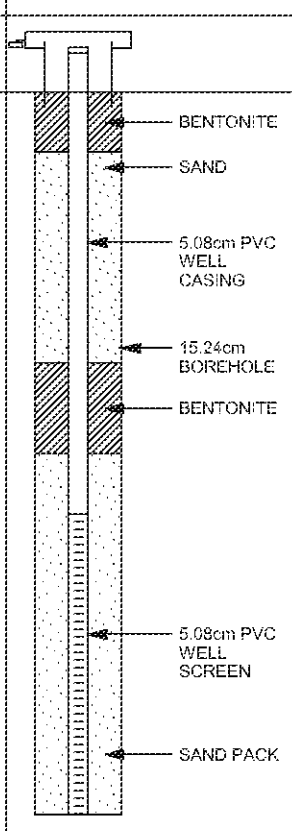
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING 93.90 TOP OF RISER 93.79 GROUND SURFACE 92.99	
0	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick)	
0.5	- increasing sand at 0.66m BGS	
1.0		
1.5		
2.0	- 0.43m coarse beige sand at 1.98m BGS	
2.5	- wet at 2.29m BGS - ~2.54cm root mat at 2.74m BGS	
3.0	CL/ML-SILTY CLAY, soft, grey, wet	90.09
3.5	END OF BOREHOLE @ 3.66m BGS	89.33
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		

MONITORING WELL



WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.46m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.16 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		25		0.0
2SS		75	24	0.1
3SS		67	19	0.1
4SS		83	24	0.1
5SS		63	4	0.2

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

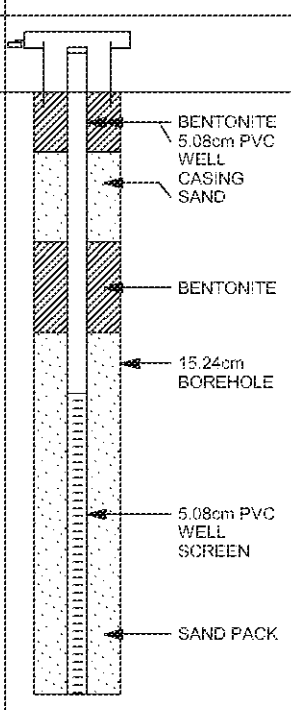
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	93.42
	TOP OF RISER	93.33
	GROUND SURFACE	92.38
0	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist	
1.0	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS	
3.0	- REFUSAL at 3.05m BGS	89.33
	END OF BOREHOLE @ 3.05m BGS	

MONITORING WELL



WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		29	6	0.1
2SS		38	16	0.1
3SS		83	26	0.0
4SS		50		0.2
5SS		4		0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804/WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	94.63 94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0			▽				
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0			WELL DETAILS Screened interval: 92.92 to 91.40m m AMSL 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.23 to 94.60m m AMSL 1.83 to 0.46m BGS Material: Bentonite Sand Pack: 93.23 to 91.40m m AMSL 1.83 to 3.66m BGS Material: No. 3 Silica Sand				
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-20(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER TOP OF CASING	-0.46 -0.61					
	GRASS AND TOPSOIL	0.05					
	FILL - concrete, red brick, ashphalt, sand, gravel, moist			1		12	
				2		10	64
				3		15	13
				4		4	
	- wet at 4.27m BGS		▽	5		13	38
	- concrete at 4.95m BGS			6		13	59
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18		7		12	
				8		14	26
				9		6	
	END OF BOREHOLE @ 6.38m BGS	6.38					

WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-00MAR-2015\MW-OT006.GPJ CRA_CORP.GDT 3/10/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	TOPSOIL - sandy, medium brown, dry						
1	rock fragments	1.07					
	SILTY SAND - medium brown	1.22					
	CLEARSTONE - dry	1.37					
2	rock fragments	1.68					
	LIMESTONE - grey	2.13					
3							
4							
5	- highly fractured at 5.18m BGS						
	END OF BOREHOLE @ 5.49m BGS	5.49					
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-QT006.GPJ CRA_CORP.GDT 2/23/16

Appendix C.2
Deep Bedrock Water Well and Stratigraphic Logs

OCT 07 '98 08:09 BEAVER ROAD BUILDING

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK	TRACT	SURVEY	LOT
Ottawa Carleton	Gloucester		6			26

OWNER (NAME)	OWNER (ADDRESS)	DATE COMPLETED
...ver Road Building Ltd.	P.O. Box 4206 st. "E" Ottawa, Ontario K1S 5B2	...19 ...4 ...93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH (FEET) FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
...y	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

FRESH OR SALTY	KIND OF WATER
FRESH / SALTY	...SULPHUR / MINERALS / GAS
FRESH / SALTY	SULPHUR / MINERALS / GAS
FRESH / SALTY	SULPHUR / MINERALS / GAS
FRESH / SALTY	SULPHUR / MINERALS / GAS
FRESH / SALTY	SULPHUR / MINERALS / GAS

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FEET FROM	TO
6 1/4	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC	.188	6	31
6 1/8	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC		31	75
6	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC		75	135

SCREEN — MANUFACTURER'S NAME | DIAMETER | SLOT NO. | LENGTH | MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN

PLUGGING & SEALING RECORD

DEPTH SET AT FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT SAND PACKER, ETC.)
31	0	Grouted - Cement (18)

METHOD OF CONSTRUCTION	WELL USE	STATUS OF WELL
CABLE TOOL / ROTARY (CONVENTIONAL) / ROTARY (REVERSE) / ROTARY (AIR) / AIR PERCUSSION / BORING / DIAMOND / JETTING / DRIVING / ...ING / OTHER	WATER SUPPLY / OBSERVATION WELL / TEST HOLE / RECHARGE WELL / DOMESTIC / STOCK / IRRIGATION / INDUSTRIAL / COMMERCIAL / MUNICIPAL / PUBLIC SUPPLY / COOLING OR AIR CONDITIONING / OTHER / ...GROUND, INSUFFICIENT SUPPLY / ...GROUND, POOR QUALITY / UNFINISHED / DEWATERING	...WATER SUPPLY / ...GROUND, INSUFFICIENT SUPPLY / ...GROUND, POOR QUALITY / UNFINISHED / DEWATERING

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
PUMP / BAILER	15-20 ...PM	1 HOURS MINUTES

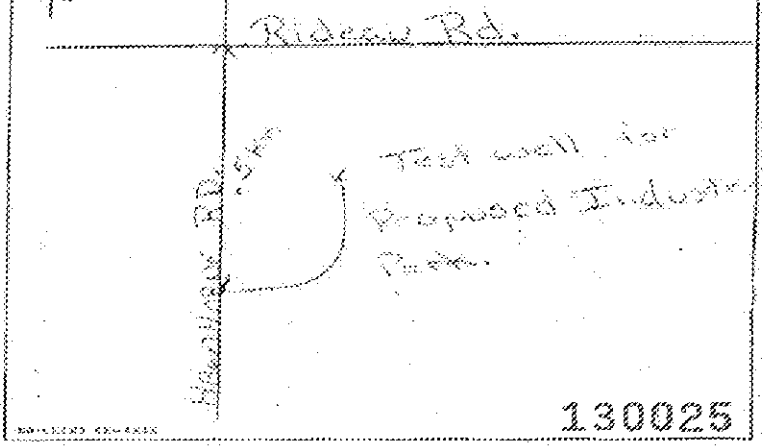
STATIC LEVEL	PUMPING LEVEL (AFTER PUMPING)	WATER LEVELS DURING	10 MINUTES	20 MINUTES	30 MINUTES	40 MINUTES
31 ...FEET	130 ...FEET	40 ...FEET	38	32 ...FEET	31 ...FEET	31

FINAL WATER LEVEL	WELL YIELD (L.P.M.)	RECOMMENDED PUMP DEPTH	RECOMMENDED PUMP RATE
...FEET		125 ...FEET	5 ...P.M.

POWER SOURCE TEST	DISINFECTED
ENGINE / MOTOR	CHLORINE / OZONE

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



MUNICIPALITY: ...ESTON

130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1558

ADDRESS OF WELL CONTRACTOR	WELL TECHNICIAN'S LICENCE NUMBER
P.O. Box 490 Stittsville, Ontario K2S 1A5	

NAME OF WELL TECHNICIAN	WELL TECHNICIAN'S LICENCE NUMBER
S. Miller	1087

SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
[signature]	...19 ...7 ...93

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/80) FORM 9

001418

OCT 07 '93 08:10 BEAVER ROAD BUILDERS

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-2

Ottawa Carleton — Gloucester — 6 — 26

Beaver Road Builders — P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2 — 16 — 8 — 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General Colour	Most common material	Other materials	General description	Depth (feet)
Brown	Sand	Stone		0 – 5
Gray	Hardpan	Boulders		5 – 28
Gray	Sandstone		Hard	28 – 100

WATER RECORD

Water found at: NOT TESTED

CASING & OPEN HOLE RECORD

Inside diameter	Material	Weight	Depth (feet)
6 1/4	Steel	.188	0 – 39
5 15/16	Open hole		39 – 100

SCREEN

PLUGGING & SEALING RECORD

Depth set at (feet)		Material and type
37.5	0	Cement - Grouted

20 — 1

Static level	Water level on completion	Pumping test method	Pumping rate	Duration of pumping	Final water level
7'6"	14'6"	13'11"	14	14'4"	14'6"

Recommended pumping rate: 50 — Recommended pump setting: 5

GENERAL STATUS OF WELL: Water supply

WATER USE: Domestic

METHOD OF CONSTRUCTION: Rotary (air)

LOCATION OF WELL

Overburden and bedrock

Lot 26 — Concession 2 — 390 feet — 150 feet — Front Road

135946

Name of well contractor: Capital Water Supply Ltd.

Well contractor's licence number: 1558

Address of well contractor: 490 Bilberville, Ontario K2S 1A6

Name of well technician: Miller/T. Harrison

Well technician's licence number: 10097/12251

Date: Oct 12 — 93

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/89) FORM 7

001419

Ministry of the Environment

Ontario

WATER WELL RECORD

TEST WELL TW-3

1/2 Lot 20 Conc. 2 Rideau Road Builders

Ottawa Carleton | Gloucester | 6 | 20

Beaver Road Builders | P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2 | Oct. 16, 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	FROM	TO
Grey & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: ☐ FRESH ☐ UNKNOWN ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS

NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	STEEL	.188	0	32
6 1/16	OPEN HOLE		32	100

SCREEN

PLUGGING & SEALING RECORD

DIAMETER OF BOREHOLE	DEPTH SET AT	MATERIAL AND TYPE
20"&8"	0	Grouted cement (3)

PUMPING TEST

METHOD OF PUMPING: ☒ PUMP ☐ BAILER

STATIC LEVEL	WATER LEVEL END OF PUMPING	PUMPING RATE	DURATION OF PUMPING	WATER LEVEL AT END OF PUMPING	RECOVERY TIME
21'6"	24'4"	15-20	3 hrs	24'4"	24'6"

FINAL STATUS OF WELL: ☒ WATER SUPPLY

WATER USE: ☒ DOMESTIC

METHOD OF CONSTRUCTION: ☒ AIR PERCUSSION

LOCATION OF WELL

Rideau Road

Hawthorne Road

250 metres

135944

Capital Water Supply Ltd. | 1556

Box 490, Smiths Falls, Ontario K7A 4A6

S. Miller/T. Garrison | 93097/92251

Oct. 18, 93

CONTRACTOR'S COPY

OFFICE USE ONLY

001420

Ontario Ministry of the Environment

Measurements recorded in: [x] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068332

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 651 Colby Drive	Waterloo	Ontario	N2V1C1	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Suitlot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[x] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[x] Air percussion
[ ] Other, specify

Well Use

[ ] Public [x] Commercial [ ] Not used
[x] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[x] Industrial
[ ] Other, specify: Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	13.10

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
26.51	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump Intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

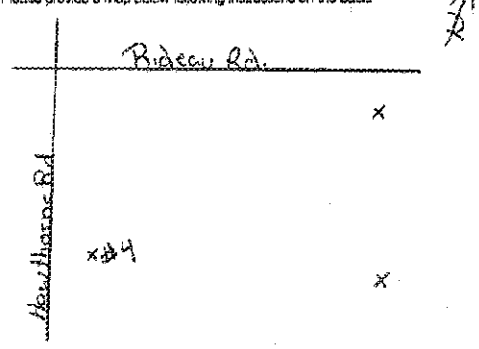
Well production (l/min / GPM):

Disinfected? [x] Yes [ ] No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	14.15		
1	15.97	1	16.76
2	16.98	2	15.74
3	17.30	3	15.20
4	17.43	4	15.
5	17.50	5	14.91
10	17.88	10	14.71
15		15	
20	18.16	20	14.54
25	18.23	25	14.51
30	18.26	30	14.47
40	18.34	40	14.41
50	18.39	50	14.38
60	18.41	60	14.35

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361766	Miller, Stephan

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2011/04/08

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [x] No	2011/04/08	Audit No. Z 80711
	Date Work Completed	Date Received 2011-04-11

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

001421

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068335 A 068336

Page ___ of ___

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	4 57 7 4 3	5 0 1 4 8 4 8		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
27.12	[ ] Fresh [X] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	12.80	15.7
12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ___ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

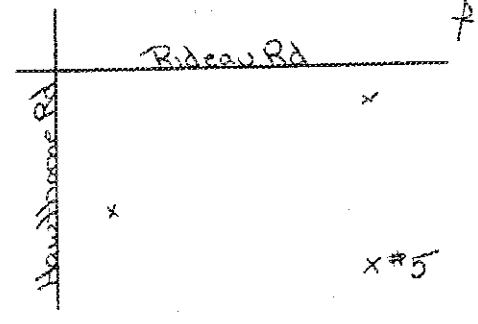
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	6.85		
1	8.03	1	8.97
2	8.35	2	8.69
3	8.60	3	8.55
4	8.76	4	8.46
5	8.88	5	8.40
10	9.20	10	8.23
15		15	
20	9.49	20	8.04
25	9.62	25	7.99
30	9.68	30	7.93
40	9.82	40	7.84
50	9.91	50	7.77
60	9.99	60	7.69

Sketch - Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361760	Miller, Stephon	0297		2008/09/26

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [X] No	2008/09/02	Audit No. Z 8441 10
	Date Work Completed: 2008/09/26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

001422

Ontario Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below): A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Spencie Drive	Kanata	Ontario	K2K2A9	613 [illegible]

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457102	5012760		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium-Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) Air ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☒ Industrial
☐ Other, specify — Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Open Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

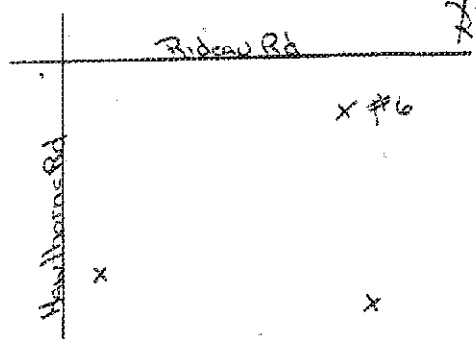
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		3.18		
1		3.24	1	
2		4.23	2	
3		5.19	3	
4			4	
5		6.53	5	
10		8.06	10	
15		9.99	15	22.80
20		11.53	20	19.40
25		12.92	25	17.12
30		14.08	30	15.13
40			40	11.82
50			50	9.47
60			60	7.96

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361766	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		20080916

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	20080916	Audit No. Z 94[illegible]
	Date Work Completed: 20080826	Received: [illegible]

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
	FILL, sand and gravel, packed, brown		19cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
	SANDSTONE, very hard, grey and white	90.94					
	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804\WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
	LIMESTONE, grey, broken rock						
	SANDSTONE, very hard, grey and white	92.94	19cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804\WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix D
QA/QC Assessment Memorandum and Laboratory Analytical Reports

Memorandum

March 30, 2020

To:	Ben Kempel	Ref. No.:	045804-58
From:	Pascal Renella/vl/11		450-902-4349

Subject: Data Quality Assessment and Validation

Laboratory:	ALS Canada Ltd	Date(s) Sampled:	June 17 – November 28, 2019
Lab Job No.:	L2295339, L2295371, L2341968, L2343281, L2388150, L2389044, L2389558, L2389602, L2389575		
Sampled By:	Trevor Saunders, Jacquelyn Curphey		
Media Sampled:	Groundwater & Surface Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☒	☐	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐ Initial: PR				

The following results are qualified due to holding time exceedance:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L2295339	06/17/2019	SW-45804-061719-JC-001	Escherichia coli	16	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-002	Escherichia coli	4	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-003	Escherichia coli	68	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-004	Escherichia coli	170	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-005	Escherichia coli	52	J	cfu/ 100mL

GHD
3001, rue Joseph-A.-Bombardier, Laval, Québec H7P 6C6 Canada
T 450 973 4166 W www.ghd.com
SMQ ISO 9001:2008

L2295339	06/17/2019	SW-45804-061719-JC-006	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/17/2019	GW-45804-061719-TS-014	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/17/2019	GW-45804-061719-JC-015	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/18/2019	GW-45804-061819-TS-012	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/18/2019	GW-45804-061819-JC-013	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/18/2019	GW-45804-061819-JC-016	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/18/2019	GW-45804-061819-JC-017	Escherichia coli	0	UJ	cfu/100mL
L2295371	06/18/2019	GW-45804-061819-TS-007	Orthophosphate (dissolved)	1.67	J	mg/L

The following results are qualified due to field blank detection:

L2295339	06/17/2019	SW-45804-061719-JC-001	Ammonia-N	0.079	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-002	Ammonia-N	0.067	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-003	Ammonia-N	0.028	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-004	Ammonia-N	0.052	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Ammonia-N	0.020	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Dissolved organic carbon (DOC) (dissolved)	4.23	J+	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-003	Nitrate (as N)	0.088	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-004	Nitrate (as N)	0.169	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Nitrate (as N)	0.62	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-001	Ammonia-N	5.6	U	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-002	Ammonia-N	1.7	U	mg/L

L2295371	06/18/2019	GW-45804-061819-JC-003	Ammonia-N	1.3	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-008	Ammonia-N	11.6	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-010	Ammonia-N	1.7	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-016	Ammonia-N	3.3	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-004	Ammonia-N	2.1	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-012	Ammonia-N	3.0	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-001	Dissolved organic carbon (DOC) (dissolved)	3.02	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-015	Dissolved organic carbon (DOC) (dissolved)	5.28	J+	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-002	Dissolved organic carbon (DOC) (dissolved)	2.77	U	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-014	Dissolved organic carbon (DOC) (dissolved)	5.62	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-003	Dissolved organic carbon (DOC) (dissolved)	1.97	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-006	Dissolved organic carbon (DOC) (dissolved)	6.74	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-008	Dissolved organic carbon (DOC) (dissolved)	9.47	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-010	Dissolved organic carbon (DOC) (dissolved)	8.60	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-011	Dissolved organic carbon (DOC) (dissolved)	3.02	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-013	Dissolved organic carbon (DOC) (dissolved)	9.23	J+	mg/L

L2295371	06/18/2019	GW-45804-061819-JC-017	Dissolved organic carbon (DOC) (dissolved)	2.35	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-004	Dissolved organic carbon (DOC) (dissolved)	6.39	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-005	Dissolved organic carbon (DOC) (dissolved)	6.33	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-012	Dissolved organic carbon (DOC) (dissolved)	8.07	J+	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-001	Dissolved organic carbon (DOC) (dissolved)	9.21	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-002	Dissolved organic carbon (DOC) (dissolved)	6.76	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-003	Dissolved organic carbon (DOC) (dissolved)	7.29	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-004	Dissolved organic carbon (DOC) (dissolved)	11.6	J+	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-006	Dissolved organic carbon (DOC) (dissolved)	4.37	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-007	Dissolved organic carbon (DOC) (dissolved)	10.7	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-002	Turbidity	1.26	U	NTU
L2388150	11/26/2019	GW-045804-112619-JC-003	Turbidity	1.42	U	NTU
L2389558	11/28/2019	SW-045804-112819-JC-004	Dissolved organic carbon (DOC) (dissolved)	5.92	J+	mg/L

The following results are qualified due to field duplicate variability:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L2295339	06/17/2019	SW-45804-061719-JC-001	Escherichia coli	16	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-002	Escherichia coli	4	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-010	Chromium (dissolved)	0.00193	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Chromium (dissolved)	0.00131	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Copper (dissolved)	0.00067	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Copper (dissolved)	0.00020	UJ	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Copper (dissolved)	0.00058	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Copper (dissolved)	0.00033	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Zinc (dissolved)	0.0032	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Zinc (dissolved)	0.0010	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Escherichia coli	3	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-011	Escherichia coli	1	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-005	Phenolics (total)	0.0013	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-006	Phenolics (total)	0.0033	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Phenolics (total)	0.0010	UJ	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Phenolics (total)	0.0090	J	mg/L

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L2343281	09/05/2019	GW-045804-090519-JC-005	Total suspended solids (TSS)	15.4	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-006	Total suspended solids (TSS)	5.4	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Total suspended solids (TSS)	67	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Total suspended solids (TSS)	41	J	mg/L
L2389602	11/28/2019	GW-045804-112819-JC-017	Iron (dissolved)	0.44	J	mg/L
L2389602	11/28/2019	GW-045804-112819-JC-018	Iron (dissolved)	0.64	J	mg/L

Notes:

J	Estimated Concentration
UJ	Not Detected; Estimated Reporting Limit
U	Not Detected
J+	Estimated Concentration; Result may be bias high
N	Nitrogen
NTU	Nephelometric Turbidity Units
CFU	Colony Forming Unit

GHD Limited (Waterloo)
ATTN: Pascal Renella
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Date Received: 25-APR-19
Report Date: 01-MAY-19 11:29 (MT)
Version: FINAL

Client Phone: 450-973-4165

Certificate of Analysis

Lab Work Order #: L2263274
Project P.O. #: 73510913-1
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-1 GW-45804-042519-04									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	1980		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	935		0.50	mg/L	29-APR-19	*80-100			
pH	8.08		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	1420	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	525		10	mg/L	26-APR-19	*30-500			
Ammonia, Total (as N)	0.213		0.010	mg/L	29-APR-19				
Chloride (Cl)	111	DLDS	2.5	mg/L	29-APR-19	250			
Fluoride (F)	0.15	DLDS	0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L	29-APR-19			10	
Nitrite (as N)	0.156	DLDS	0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	0.66		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0049		0.0030	mg/L	29-APR-19		0.01		
Sulfate (SO4)	510	DLDS	1.5	mg/L	29-APR-19	*500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	6.27		0.50	mg/L	29-APR-19	*5			
Total Organic Carbon	6.78		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00034		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00744		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.062		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	0.000021		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	242		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00190		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000188		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	80.2		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	1.96		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00746		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00202		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	8.10		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	0.000051		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	133	DLHC	0.50	mg/L	26-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0096		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.0044		0.0010	mg/L	26-APR-19		*0.001		
L2263274-2 GW-45804-042519-05									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-2 GW-45804-042519-05									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	564		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	136		0.50	mg/L	29-APR-19	*80-100			
pH	7.46		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	373	DLDS	20	mg/L	29-APR-19	500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	85		10	mg/L	26-APR-19	30-500			
Ammonia, Total (as N)	0.059		0.010	mg/L	29-APR-19				
Chloride (Cl)	9.25		0.50	mg/L	29-APR-19	250			
Fluoride (F)	0.034		0.020	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10	
Nitrite (as N)	0.012		0.010	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	0.30		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0156		0.0030	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	179		0.30	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	4.99		0.50	mg/L	29-APR-19	5			
Total Organic Carbon	5.31		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0075		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00023		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00154		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.054		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	32.9		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00014		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00451		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.013		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000182		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	13.2		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.313		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00166		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00188		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	2.30		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	65.3		0.50	mg/L	29-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0080		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	<0.0010		0.0010	mg/L	26-APR-19		0.001		
L2263274-3 GW-45804-042519-06									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-3 GW-45804-042519-06									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	92.8		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	17.7		0.50	mg/L	29-APR-19	*80-100			
pH	6.36		0.10	pH units	26-APR-19	*6.5-8.5	*6.5-8.5		
Total Dissolved Solids	75	DLDS	13	mg/L	29-APR-19	500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	<10		10	mg/L	26-APR-19	**30-500			
Ammonia, Total (as N)	0.012		0.010	mg/L	29-APR-19				
Chloride (Cl)	2.14		0.50	mg/L	29-APR-19	250			
Fluoride (F)	<0.020		0.020	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10	
Nitrite (as N)	<0.010		0.010	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0110		0.0030	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	28.2		0.30	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	3.67		0.50	mg/L	29-APR-19	5			
Total Organic Carbon	3.78		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0093		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00016		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00038		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.048		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	4.32		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00442		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.017		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000444		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	1.68		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.0400		0.00050	mg/L	29-APR-19	0.05			
Molybdenum (Mo)-Dissolved	0.000422		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00120		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	0.250		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	9.49		0.50	mg/L	29-APR-19	200		20	
Zinc (Zn)-Dissolved	0.0046		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	<0.0010		0.0010	mg/L	26-APR-19		0.001		
L2263274-4 GW-45804-042519-07									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-4 GW-45804-042519-07									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	2750		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	1060		1.3	mg/L	29-APR-19	*80-100			
pH	8.04		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	1950	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	1130	DLM	50	mg/L	30-APR-19	*30-500			
Ammonia, Total (as N)	0.066		0.010	mg/L	29-APR-19				
Chloride (Cl)	216	DLDS	2.5	mg/L	29-APR-19	250			
Fluoride (F)	<0.10	DLDS	0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L	29-APR-19			10	
Nitrite (as N)	<0.050	DLDS	0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	4.40		0.15	mg/L	26-APR-19				
Phosphorus, Total	1.80	DLHC	0.0060	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	272	DLDS	1.5	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	154	DLM	2.5	mg/L	29-APR-19	*5			
Total Organic Carbon	161	DLM	2.5	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	26-APR-19	0.1	**0.015		
Arsenic (As)-Dissolved	0.0030	DLHC	0.0010	mg/L	26-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.0123	DLHC	0.0010	mg/L	26-APR-19			1	
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	26-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	26-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	275	DLHC	0.50	mg/L	26-APR-19				
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	26-APR-19			0.05	
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	26-APR-19		**0.0009		
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	26-APR-19	1	**0.001		
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	26-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	26-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	90.6	DLHC	0.050	mg/L	26-APR-19				
Manganese (Mn)-Dissolved	0.820	DLHC	0.0050	mg/L	26-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.0219	DLHC	0.00050	mg/L	26-APR-19		0.04		
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	26-APR-19		0.025		
Potassium (K)-Dissolved	17.2	DLHC	0.50	mg/L	26-APR-19				
Selenium (Se)-Dissolved	0.00944	DLHC	0.00050	mg/L	26-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	291	DLHC	0.50	mg/L	26-APR-19	*200		*20	
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	26-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.181	DLM	0.010	mg/L	26-APR-19		*0.001		
L2263274-5 GW-45804-042519-08									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-5 GW-45804-042519-08									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	1200		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	315		0.50	mg/L	29-APR-19	*80-100			
pH	7.96		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	828	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	417		10	mg/L	26-APR-19	30-500			
Ammonia, Total (as N)	0.030		0.010	mg/L	29-APR-19				
Chloride (Cl)	32.0		2.5	mg/L	29-APR-19	250			
Fluoride (F)	<0.10		0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10		0.10	mg/L	29-APR-19			10	
Nitrite (as N)	<0.050		0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	2.88		0.15	mg/L	26-APR-19				
Phosphorus, Total	1.18	DLHC	0.0060	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	177		1.5	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	65.8	DLM	2.5	mg/L	29-APR-19	*5			
Total Organic Carbon	69.5	DLM	2.5	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0267		0.0050	mg/L	29-APR-19	0.1	*0.015		
Arsenic (As)-Dissolved	0.00246		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00395		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.078		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	79.0		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	0.00306		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00048		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00126		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.100		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000478		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	28.6		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.291		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00890		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00290		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	7.96		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	0.000166		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	172	DLHC	0.50	mg/L	26-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0049		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.0718		0.0010	mg/L	26-APR-19		*0.001		
L2263274-6 GW-45804-042519-09									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3
L2263274-6 GW-45804-042519-09								
Sampled By: CLIENT on 25-APR-19 @ 17:00								
Matrix: WATER								
Physical Tests								
Conductivity	417		3.0	umhos/cm	26-APR-19			
Hardness (as CaCO3)	63.0		0.50	mg/L	29-APR-19	*80-100		
pH	7.51		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5	
Total Dissolved Solids	306	DLDS	20	mg/L	29-APR-19	500		
Anions and Nutrients								
Alkalinity, Total (as CaCO3)	113		10	mg/L	26-APR-19	30-500		
Ammonia, Total (as N)	<0.010		0.010	mg/L	29-APR-19			
Chloride (Cl)	4.93		0.50	mg/L	29-APR-19	250		
Fluoride (F)	<0.020		0.020	mg/L	29-APR-19			1.5
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10
Nitrite (as N)	<0.010		0.010	mg/L	29-APR-19			1
Total Kjeldahl Nitrogen	2.50		0.15	mg/L	26-APR-19			
Phosphorus, Total	0.735		0.0030	mg/L	29-APR-19		*0.01	
Sulfate (SO4)	86.4		0.30	mg/L	29-APR-19	500		
Organic / Inorganic Carbon								
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19			
Dissolved Organic Carbon	36.1	DLM	2.5	mg/L	29-APR-19	*5		
Total Organic Carbon	35.0		0.50	mg/L	26-APR-19			
Dissolved Metals								
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19			
Aluminum (Al)-Dissolved	0.0257		0.0050	mg/L	29-APR-19	0.1	*0.015	
Arsenic (As)-Dissolved	0.00191		0.00010	mg/L	29-APR-19		0.005	0.025
Barium (Ba)-Dissolved	0.00170		0.00010	mg/L	29-APR-19			1
Boron (B)-Dissolved	0.073		0.010	mg/L	29-APR-19		0.2	5
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005
Calcium (Ca)-Dissolved	17.3		0.050	mg/L	29-APR-19			
Chromium (Cr)-Dissolved	0.00236		0.00050	mg/L	29-APR-19			0.05
Cobalt (Co)-Dissolved	0.00035		0.00010	mg/L	29-APR-19		0.0009	
Copper (Cu)-Dissolved	0.00148		0.00020	mg/L	29-APR-19	1	*0.001	
Iron (Fe)-Dissolved	0.079		0.010	mg/L	29-APR-19	0.3	0.3	
Lead (Pb)-Dissolved	0.000460		0.000050	mg/L	29-APR-19		0.001	0.01
Magnesium (Mg)-Dissolved	4.82		0.050	mg/L	29-APR-19			
Manganese (Mn)-Dissolved	0.0768		0.00050	mg/L	29-APR-19	*0.05		
Molybdenum (Mo)-Dissolved	0.00461		0.000050	mg/L	29-APR-19		0.04	
Nickel (Ni)-Dissolved	0.00257		0.00050	mg/L	29-APR-19		0.025	
Potassium (K)-Dissolved	2.19		0.050	mg/L	29-APR-19			
Selenium (Se)-Dissolved	0.000130		0.000050	mg/L	29-APR-19		0.1	0.01
Sodium (Na)-Dissolved	66.9		0.50	mg/L	29-APR-19	200		*20
Zinc (Zn)-Dissolved	0.0059		0.0010	mg/L	29-APR-19	5	0.02	
Aggregate Organics								
Phenols (4AAP)	0.0459		0.0010	mg/L	26-APR-19		*0.001	

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines

#2: Ontario PWQO (July 1994)

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
CINT	Cooling initiated. Samples were received packed with ice or ice packs and were sampled the same day as received.

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DOC-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

Reference Information

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
Alkalinity, Total (as CaCO3)		30	29		mg/L	1.2	20	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
Alkalinity, Total (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	20	26-APR-19
WG3035325-22 LCS								
Alkalinity, Total (as CaCO3)			101.9		%		85-115	26-APR-19
WG3035325-26 LCS								
Alkalinity, Total (as CaCO3)			101.9		%		85-115	26-APR-19
WG3035325-21 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	26-APR-19
WG3035325-25 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	26-APR-19
Batch R4618721								
WG3037667-4 DUP		**WG3037667-3**						
Alkalinity, Total (as CaCO3)		173	173		mg/L	0.3	20	30-APR-19
WG3037667-2 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	30-APR-19
WG3037667-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	30-APR-19
CL-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Chloride (Cl)			99.9		%		90-110	29-APR-19
WG3037081-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Chloride (Cl)			101.2		%		75-125	29-APR-19
DOC-WT	Water							
Batch R4617650								
WG3036115-3 DUP		**L2262728-1**						
Dissolved Organic Carbon		6.57	7.30		mg/L	11	25	29-APR-19
WG3036115-2 LCS								
Dissolved Organic Carbon			97.4		%		70-130	29-APR-19
WG3036115-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-APR-19
WG3036115-4 MS		**L2262728-1**						

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DOC-WT	Water							
Batch R4617650								
WG3036115-4 MS		**L2262728-1**						
Dissolved Organic Carbon			97.4		%		70-130	29-APR-19
EC-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
Conductivity		3630	3660		umhos/cm	0.8	10	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
Conductivity		92.8	92.8		umhos/cm	0.0	10	26-APR-19
WG3035325-22 LCS								
Conductivity			99.4		%		90-110	26-APR-19
WG3035325-26 LCS								
Conductivity			100.0		%		90-110	26-APR-19
WG3035325-21 MB								
Conductivity			<3.0		umhos/cm		3	26-APR-19
WG3035325-25 MB								
Conductivity			<3.0		umhos/cm		3	26-APR-19
F-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Fluoride (F)			99.5		%		90-110	29-APR-19
WG3037081-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Fluoride (F)			98.8		%		75-125	29-APR-19
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-4 DUP		**WG3035288-3**						
Aluminum (Al)-Dissolved		<0.0050	0.0053	RPD-NA	mg/L	N/A	20	29-APR-19
Arsenic (As)-Dissolved		0.00034	0.00033		mg/L	1.1	20	29-APR-19
Barium (Ba)-Dissolved		0.00744	0.00754		mg/L	1.4	20	29-APR-19
Boron (B)-Dissolved		0.062	0.063		mg/L	1.0	20	29-APR-19
Cadmium (Cd)-Dissolved		0.0000205	0.0000174		mg/L	16	20	29-APR-19
Calcium (Ca)-Dissolved		242	248		mg/L	2.4	20	29-APR-19
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	29-APR-19

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-4 DUP		**WG3035288-3**						
Cobalt (Co)-Dissolved		0.00024	0.00023		mg/L	2.1	20	29-APR-19
Copper (Cu)-Dissolved		0.00190	0.00191		mg/L	0.4	20	29-APR-19
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
Lead (Pb)-Dissolved		0.000188	0.000195		mg/L	3.2	20	29-APR-19
Magnesium (Mg)-Dissolved		80.2	85.2		mg/L	6.1	20	29-APR-19
Manganese (Mn)-Dissolved		1.96	2.01		mg/L	2.5	20	29-APR-19
Molybdenum (Mo)-Dissolved		0.00746	0.00752		mg/L	0.8	20	29-APR-19
Nickel (Ni)-Dissolved		0.00202	0.00207		mg/L	2.4	20	29-APR-19
Potassium (K)-Dissolved		8.10	8.16		mg/L	0.7	20	29-APR-19
Selenium (Se)-Dissolved		0.000051	<0.000050	RPD-NA	mg/L	N/A	20	29-APR-19
Sodium (Na)-Dissolved		133	130		mg/L	2.1	20	26-APR-19
Zinc (Zn)-Dissolved		0.0096	0.0096		mg/L	0.1	20	29-APR-19
WG3035288-2 LCS								
Aluminum (Al)-Dissolved			105.6		%		80-120	26-APR-19
Arsenic (As)-Dissolved			98.1		%		80-120	26-APR-19
Barium (Ba)-Dissolved			98.7		%		80-120	26-APR-19
Boron (B)-Dissolved			94.7		%		80-120	26-APR-19
Cadmium (Cd)-Dissolved			100.8		%		80-120	26-APR-19
Calcium (Ca)-Dissolved			94.9		%		80-120	26-APR-19
Chromium (Cr)-Dissolved			97.8		%		80-120	26-APR-19
Cobalt (Co)-Dissolved			94.5		%		80-120	26-APR-19
Copper (Cu)-Dissolved			99.0		%		80-120	26-APR-19
Iron (Fe)-Dissolved			105.0		%		80-120	26-APR-19
Lead (Pb)-Dissolved			103.9		%		80-120	26-APR-19
Magnesium (Mg)-Dissolved			100.1		%		80-120	26-APR-19
Manganese (Mn)-Dissolved			100.5		%		80-120	26-APR-19
Molybdenum (Mo)-Dissolved			96.9		%		80-120	26-APR-19
Nickel (Ni)-Dissolved			97.7		%		80-120	26-APR-19
Potassium (K)-Dissolved			103.5		%		80-120	26-APR-19
Selenium (Se)-Dissolved			97.2		%		80-120	26-APR-19
Sodium (Na)-Dissolved			102.9		%		80-120	26-APR-19
Zinc (Zn)-Dissolved			92.0		%		80-120	26-APR-19
WG3035288-1 MB								
Aluminum (Al)-Dissolved			<0.0050				0.005	

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	26-APR-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	26-APR-19
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	26-APR-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	26-APR-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-APR-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-APR-19
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-APR-19
WG3035288-5 MS		**WG3035288-6**						
Aluminum (Al)-Dissolved			91.8		%		70-130	29-APR-19
Arsenic (As)-Dissolved			96.1		%		70-130	29-APR-19
Barium (Ba)-Dissolved			87.2		%		70-130	29-APR-19
Boron (B)-Dissolved			N/A	MS-B	%		-	29-APR-19
Cadmium (Cd)-Dissolved			96.8		%		70-130	29-APR-19
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	29-APR-19
Chromium (Cr)-Dissolved			90.8		%		70-130	29-APR-19
Cobalt (Co)-Dissolved			90.5		%		70-130	29-APR-19
Copper (Cu)-Dissolved			89.2		%		70-130	29-APR-19
Iron (Fe)-Dissolved			85.8		%		70-130	29-APR-19
Lead (Pb)-Dissolved			93.7		%		70-130	29-APR-19
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	29-APR-19
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	29-APR-19
Molybdenum (Mo)-Dissolved			93.3		%		70-130	29-APR-19

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-5 MS		**WG3035288-6**						
Nickel (Ni)-Dissolved			87.8		%		70-130	29-APR-19
Potassium (K)-Dissolved			89.3		%		70-130	29-APR-19
Selenium (Se)-Dissolved			103.2		%		70-130	29-APR-19
Sodium (Na)-Dissolved			N/A	MS-B	%		-	29-APR-19
Zinc (Zn)-Dissolved			86.8		%		70-130	29-APR-19
NH3-F-WT	Water							
Batch R4618406								
WG3037011-3 DUP		**L2258890-6**						
Ammonia, Total (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037011-7 DUP		**L2263283-1**						
Ammonia, Total (as N)		0.020	0.020		mg/L	0.5	20	29-APR-19
WG3037011-2 LCS								
Ammonia, Total (as N)			96.7		%		85-115	29-APR-19
WG3037011-6 LCS								
Ammonia, Total (as N)			94.7		%		85-115	29-APR-19
WG3037011-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037011-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037011-4 MS		**L2258890-6**						
Ammonia, Total (as N)			101.9		%		75-125	29-APR-19
WG3037011-8 MS		**L2263283-1**						
Ammonia, Total (as N)			87.5		%		75-125	29-APR-19
NO2-IC-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Nitrite (as N)			101.1		%		90-110	29-APR-19
WG3037081-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Nitrite (as N)			103.6		%		75-125	29-APR-19
NO3-IC-WT	Water							

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Nitrate (as N)		0.154	0.152		mg/L	1.0	20	29-APR-19
WG3037081-2 LCS								
Nitrate (as N)			101.6		%		90-110	29-APR-19
WG3037081-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Nitrate (as N)			101.7		%		75-125	29-APR-19
P-T-COL-WT	Water							
Batch R4615058								
WG3035987-3 DUP		**L2262838-4**						
Phosphorus, Total		0.0150	0.0147		mg/L	1.8	20	29-APR-19
WG3035987-2 LCS								
Phosphorus, Total			103.5		%		80-120	29-APR-19
WG3035987-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	29-APR-19
WG3035987-4 MS		**L2262838-4**						
Phosphorus, Total			97.3		%		70-130	29-APR-19
PH-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
pH		7.29	7.28	J	pH units	0.01	0.2	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
pH		6.36	6.35	J	pH units	0.01	0.2	26-APR-19
WG3035325-22 LCS								
pH			7.01		pH units		6.9-7.1	26-APR-19
WG3035325-26 LCS								
pH			7.01		pH units		6.9-7.1	26-APR-19
PHENOLS-4AAP-WT	Water							
Batch R4615187								
WG3035693-11 DUP		**L2263274-6**						
Phenols (4AAP)		0.0459	0.0461		mg/L	0.5	20	26-APR-19
WG3035693-10 LCS								
Phenols (4AAP)			87.9		%		85-115	26-APR-19
WG3035693-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	26-APR-19
WG3035693-12 MS		**L2263274-6**						

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R4615187								
WG3035693-12 MS		**L2263274-6**						
Phenols (4AAP)			N/A	MS-B	%		-	26-APR-19
SO4-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Sulfate (SO4)		1.85	1.88		mg/L	1.5	20	29-APR-19
WG3037081-2 LCS								
Sulfate (SO4)			99.96		%		90-110	29-APR-19
WG3037081-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Sulfate (SO4)			99.5		%		75-125	29-APR-19
SOLIDS-TDS-WT	Water							
Batch R4618320								
WG3036840-3 DUP		**L2262029-2**						
Total Dissolved Solids		192	192		mg/L	0.3	20	29-APR-19
WG3036840-2 LCS								
Total Dissolved Solids			95.0		%		85-115	29-APR-19
WG3036840-1 MB								
Total Dissolved Solids			<10		mg/L		10	29-APR-19
TKN-WT	Water							
Batch R4614093								
WG3035348-3 DUP		**L2262459-9**						
Total Kjeldahl Nitrogen		0.35	0.31		mg/L	13	20	26-APR-19
WG3035348-2 LCS								
Total Kjeldahl Nitrogen			101.3		%		75-125	26-APR-19
WG3035348-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	26-APR-19
WG3035348-4 MS		**L2262459-9**						
Total Kjeldahl Nitrogen			110.1		%		70-130	26-APR-19
TOC-WT	Water							
Batch R4614865								
WG3035302-3 DUP		**L2263274-1**						
Total Organic Carbon		6.78	6.85		mg/L	1.0	20	26-APR-19
WG3035302-2 LCS								
Total Organic Carbon			96.7		%		80-120	26-APR-19

Quality Control Report

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	Water							
Batch R4614865								
WG3035302-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	26-APR-19
WG3035302-4 MS		**L2263274-1**						
Total Organic Carbon			95.3		%		70-130	26-APR-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2263274-COFC

COC Number: 17 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	GHD LIMITED - ACCT #13791	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Pascal Renella	Quality Control (QC) Report with Report ☑ YES ☐ NO	Priority (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☑ / 2 day [P2-50%] ☐
Phone:	450-973-4165	☐ Compare Results to Criteria on Report - provide details below if box checked	Emergency: 1 Business day [E - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	455 Phillip St	Email 1 or Fax: pascal.renella@ghd.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Waterloo,Ontario	Email 2: See PO	
Postal Code:	N2L 3X2	Email 3:	

Invoice To		Invoice Distribution	
	Same as Report To ☑ YES ☐ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	
	Copy of Invoice with Report ☐ YES ☑ NO		
Company:	GHD Limited	Email 1 or Fax: pascal.renella@ghd.com	
Contact:	Pascal Renella	Email 2:	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	13791	AFE/Cost Center:	PO#:
Job #:	45804-58	Major/Minor Code:	Routing Code:
PO / AFE:	73510913-1	Requisitioner:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L2263274 | ALS Contact: Rick H | Sampler:

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Anions (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Conductivity	Dissolved Metals (Field Filter) -Select	TKN, NH3, TP, TOC, Phenols	DOC (Field Filter)	TDS							SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	GW-458O4-042519-04	25-Apr-19	17:00	Water	5	P3	P3	P3	P3	P3	P3	P3	TWO EXTRA WHITE							
	" -05	↓	↓	Water	5	P3	P3	P3	P3	P3	P3	P3	SETS IN COOLER							
	" -06			Water	5	P3	P3	P3	P3	P3	P3	P3								
	" -07			Water	5	P3	P3	P3	P3	P3	P3	P3	NOT ENOUGH WATER							
	" -08			Water	5	P3	P3	P3	P3	P3	P3	P3	TO FILL ALL CONTAINERS							
	" -09			Water	5	P3	P3	P3	P3	P3	P3	P3								

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO		Frozen ☐ SIF Observations Yes ☐ No ☐
Are samples for human consumption/ use? ☐ YES ☐ NO	ODWS and PWQO Requirments Select Metals: Al,As,Ba,B,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Na,Se,Zn	Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐
		Cooling Initiated ☒
		INITIAL COOLER TEMPERATURES °C: / FINAL COOLER TEMPERATURES °C: 18.0°C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hugh MacEachern	Date: 2019/04/25	Time: 17:40	Received by:	Date:	Time:	Received by:	Date: 25/Apr/2019	Time: 17:34

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2016 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

001451

GHD Limited (Waterloo)
ATTN: Pascal Renella
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Date Received: 31-JUL-19
Report Date: 12-AUG-19 12:47 (MT)
Version: FINAL

Client Phone: 450-973-4165

Certificate of Analysis

Lab Work Order #: L2320919
Project P.O. #: 73510913-1
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-1 GW-45804-073019-JL-100 Sampled By: J. LEADER on 30-JUL-19 @ 10:23 Matrix: WATER							
Physical Tests							
Conductivity	2350		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	906	HTC	1.3	mg/L		06-AUG-19	
pH	7.67		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1310	DLDS	20	mg/L		04-AUG-19	R4739495
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	841	DLHC	50	mg/L		02-AUG-19	R4739081
Ammonia, Total (as N)	64.2	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	118	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.20	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	62.6	DLHC	1.5	mg/L	07-AUG-19	07-AUG-19	R4742627
Phosphorus, Total	1.21	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	313	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	14.8	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	14.1	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0026	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.114	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	244	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.80	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	72.0	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.630	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00323	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	52.6	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	76.9	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	0.033	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.024	DLM	0.010	mg/L		01-AUG-19	R4737245
L2320919-2 GW-45804-073019-JL-101 Sampled By: J. LEADER on 30-JUL-19 @ 12:48							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-2 GW-45804-073019-JL-101 Sampled By: J. LEADER on 30-JUL-19 @ 12:48 Matrix: WATER							
Physical Tests							
Conductivity	2220		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	887	HTC	1.3	mg/L		02-AUG-19	
pH	7.61		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1250	DLDS	20	mg/L		07-AUG-19	R4744503
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	809		10	mg/L		02-AUG-19	R4737304
Ammonia, Total (as N)	59.6	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	120	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.19	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	54.7	DLHC	1.5	mg/L	06-AUG-19	07-AUG-19	R4742622
Phosphorus, Total	1.14	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	367	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	14.1	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	13.0	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0021	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.104	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	240	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.77	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	69.7	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.656	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00279	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	49.1	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	71.8	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.066	DLM	0.010	mg/L		01-AUG-19	R4737245
L2320919-3 GW-45804-073019-JL-102 Sampled By: J. LEADER on 30-JUL-19 @ 16:07							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-3 GW-45804-073019-JL-102 Sampled By: J. LEADER on 30-JUL-19 @ 16:07 Matrix: WATER							
Physical Tests							
Conductivity	2180		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	878	HTC	1.3	mg/L		02-AUG-19	
pH	7.66		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1240	DLDS	20	mg/L		07-AUG-19	R4744503
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	770		10	mg/L		02-AUG-19	R4737304
Ammonia, Total (as N)	56.7	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	115	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.20	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	55.8	DLHC	1.5	mg/L	06-AUG-19	07-AUG-19	R4742622
Phosphorus, Total	1.08	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	371	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	12.7	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	17.1	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0019	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.0984	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	239	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.78	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	68.3	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.664	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00266	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	46.3	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	69.0	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.039	DLM	0.010	mg/L		01-AUG-19	R4737245

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Aluminum (Al)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Iron (Fe)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Manganese (Mn)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Potassium (K)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2320919-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DOC-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
Alkalinity, Total (as CaCO3)		225	223		mg/L	0.8	20	02-AUG-19
WG3122692-2 LCS								
Alkalinity, Total (as CaCO3)			101.5		%		85-115	02-AUG-19
WG3122692-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	02-AUG-19
Batch R4739081								
WG3122887-4 DUP		**WG3122887-3**						
Alkalinity, Total (as CaCO3)		232	232		mg/L	0.1	20	02-AUG-19
WG3122887-2 LCS								
Alkalinity, Total (as CaCO3)			102.4		%		85-115	02-AUG-19
WG3122887-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	02-AUG-19
CL-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Chloride (Cl)		47.8	47.8		mg/L	0.1	20	02-AUG-19
WG3122819-22 LCS								
Chloride (Cl)			101.6		%		90-110	02-AUG-19
WG3122819-21 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Chloride (Cl)			103.2		%		75-125	02-AUG-19
DOC-WT	Water							
Batch R4743212								
WG3125099-3 DUP		**L2322602-1**						
Dissolved Organic Carbon		3.22	3.34		mg/L	3.6	20	07-AUG-19
WG3125099-2 LCS								
Dissolved Organic Carbon			100.0		%		80-120	07-AUG-19
WG3125099-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-19
WG3125099-4 MS		**L2322602-1**						
Dissolved Organic Carbon			99.0		%		70-130	07-AUG-19
EC-WT	Water							

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
Conductivity		449	448		umhos/cm	0.2	10	02-AUG-19
WG3122692-2 LCS								
Conductivity			99.1		%		90-110	02-AUG-19
WG3122692-1 MB								
Conductivity			<3.0		umhos/cm		3	02-AUG-19
F-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Fluoride (F)		0.036	0.037		mg/L	1.7	20	02-AUG-19
WG3122819-22 LCS								
Fluoride (F)			104.7		%		90-110	02-AUG-19
WG3122819-21 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Fluoride (F)			104.8		%		75-125	02-AUG-19
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-4 DUP		**WG3122355-3**						
Aluminum (Al)-Total		1.11	1.10		mg/L	0.7	20	02-AUG-19
Arsenic (As)-Total		0.00120	0.00121		mg/L	1.0	20	02-AUG-19
Barium (Ba)-Total		0.135	0.134		mg/L	1.0	20	02-AUG-19
Boron (B)-Total		0.018	0.018		mg/L	0.4	20	02-AUG-19
Cadmium (Cd)-Total		0.0000199	0.0000194		mg/L	2.5	20	02-AUG-19
Calcium (Ca)-Total		79.5	78.9		mg/L	0.7	20	02-AUG-19
Chromium (Cr)-Total		0.00206	0.00213		mg/L	3.3	20	02-AUG-19
Cobalt (Co)-Total		0.00085	0.00083		mg/L	1.8	20	02-AUG-19
Copper (Cu)-Total		0.0027	0.0026		mg/L	1.8	20	02-AUG-19
Iron (Fe)-Total		1.73	1.70		mg/L	1.4	20	02-AUG-19
Lead (Pb)-Total		0.00103	0.000985		mg/L	4.2	20	02-AUG-19
Magnesium (Mg)-Total		30.7	30.6		mg/L	0.3	20	02-AUG-19
Manganese (Mn)-Total		0.112	0.112		mg/L	0.1	20	02-AUG-19
Molybdenum (Mo)-Total		0.000579	0.000599		mg/L	3.4	20	02-AUG-19
Nickel (Ni)-Total		0.00186	0.00186		mg/L	0.2	20	02-AUG-19
Potassium (K)-Total		2.55	2.54		mg/L	0.5	20	02-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-4 DUP		**WG3122355-3**						
Selenium (Se)-Total		0.000169	0.000161		mg/L	4.7	20	02-AUG-19
Sodium (Na)-Total		28.6	28.5		mg/L	0.3	20	02-AUG-19
Zinc (Zn)-Total		0.0066	0.0070		mg/L	5.5	20	02-AUG-19
WG3122355-2 LCS								
Aluminum (Al)-Total			99.7		%		80-120	02-AUG-19
Arsenic (As)-Total			96.5		%		80-120	02-AUG-19
Barium (Ba)-Total			97.3		%		80-120	02-AUG-19
Boron (B)-Total			91.7		%		80-120	02-AUG-19
Cadmium (Cd)-Total			97.1		%		80-120	02-AUG-19
Calcium (Ca)-Total			97.2		%		80-120	02-AUG-19
Chromium (Cr)-Total			101.3		%		80-120	02-AUG-19
Cobalt (Co)-Total			98.3		%		80-120	02-AUG-19
Copper (Cu)-Total			98.1		%		80-120	02-AUG-19
Iron (Fe)-Total			98.7		%		80-120	02-AUG-19
Lead (Pb)-Total			98.6		%		80-120	02-AUG-19
Magnesium (Mg)-Total			99.6		%		80-120	02-AUG-19
Manganese (Mn)-Total			100.0		%		80-120	02-AUG-19
Molybdenum (Mo)-Total			100.3		%		80-120	02-AUG-19
Nickel (Ni)-Total			99.1		%		80-120	02-AUG-19
Potassium (K)-Total			99.9		%		80-120	02-AUG-19
Selenium (Se)-Total			93.9		%		80-120	02-AUG-19
Sodium (Na)-Total			100.1		%		80-120	02-AUG-19
Zinc (Zn)-Total			95.2		%		80-120	02-AUG-19
WG3122355-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	02-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Boron (B)-Total			<0.010		mg/L		0.01	02-AUG-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	02-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	02-AUG-19
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Copper (Cu)-Total			<0.0010		mg/L		0.001	02-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	02-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-1 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	02-AUG-19
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	02-AUG-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Sodium (Na)-Total			<0.050		mg/L		0.05	02-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-AUG-19
WG3122355-5 MS		**WG3122355-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	02-AUG-19
Arsenic (As)-Total			98.2		%		70-130	02-AUG-19
Barium (Ba)-Total			N/A	MS-B	%		-	02-AUG-19
Boron (B)-Total			93.6		%		70-130	02-AUG-19
Cadmium (Cd)-Total			96.5		%		70-130	02-AUG-19
Calcium (Ca)-Total			N/A	MS-B	%		-	02-AUG-19
Chromium (Cr)-Total			103.8		%		70-130	02-AUG-19
Cobalt (Co)-Total			97.4		%		70-130	02-AUG-19
Copper (Cu)-Total			93.1		%		70-130	02-AUG-19
Iron (Fe)-Total			N/A	MS-B	%		-	02-AUG-19
Lead (Pb)-Total			92.0		%		70-130	02-AUG-19
Magnesium (Mg)-Total			N/A	MS-B	%		-	02-AUG-19
Manganese (Mn)-Total			N/A	MS-B	%		-	02-AUG-19
Molybdenum (Mo)-Total			103.2		%		70-130	02-AUG-19
Nickel (Ni)-Total			96.7		%		70-130	02-AUG-19
Potassium (K)-Total			N/A	MS-B	%		-	02-AUG-19
Selenium (Se)-Total			96.1		%		70-130	02-AUG-19
Sodium (Na)-Total			N/A	MS-B	%		-	02-AUG-19
Zinc (Zn)-Total			95.0		%		70-130	02-AUG-19
NH3-F-WT	Water							
Batch R4745441								
WG3128201-11 DUP		**L2321617-1**						
Ammonia, Total (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-AUG-19
WG3128201-10 LCS								

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-WT	Water							
Batch R4745441								
WG3128201-10 LCS								
Ammonia, Total (as N)			104.7		%		85-115	09-AUG-19
WG3128201-9 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	09-AUG-19
WG3128201-12 MS		**L2321617-1**						
Ammonia, Total (as N)			93.2		%		75-125	09-AUG-19
NO2-IC-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-AUG-19
WG3122819-22 LCS								
Nitrite (as N)			103.0		%		90-110	02-AUG-19
WG3122819-21 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Nitrite (as N)			105.2		%		75-125	02-AUG-19
NO3-IC-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Nitrate (as N)		0.830	0.830		mg/L	0.0	20	02-AUG-19
WG3122819-22 LCS								
Nitrate (as N)			101.1		%		90-110	02-AUG-19
WG3122819-21 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Nitrate (as N)			103.5		%		75-125	02-AUG-19
P-T-COL-WT	Water							
Batch R4743483								
WG3126044-3 DUP		**L2320339-6**						
Phosphorus, Total		0.0839	0.0855		mg/L	1.9	20	08-AUG-19
WG3126044-2 LCS								
Phosphorus, Total			99.0		%		80-120	08-AUG-19
WG3126044-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	08-AUG-19
WG3126044-4 MS		**L2320339-6**						
Phosphorus, Total			94.9		%		70-130	08-AUG-19
PH-WT	Water							

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
pH		6.47	6.45	J	pH units	0.02	0.2	02-AUG-19
WG3122692-2 LCS								
pH			7.01		pH units		6.9-7.1	02-AUG-19
PHENOLS-4AAP-WT	Water							
Batch R4737245								
WG3121581-7 DUP		**L2318400-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-AUG-19
WG3121581-6 LCS								
Phenols (4AAP)			101.2		%		85-115	01-AUG-19
WG3121581-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	01-AUG-19
WG3121581-8 MS		**L2318400-1**						
Phenols (4AAP)			94.3		%		75-125	01-AUG-19
SO4-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Sulfate (SO4)		16.8	16.8		mg/L	0.0	20	02-AUG-19
WG3122819-22 LCS								
Sulfate (SO4)			102.2		%		90-110	02-AUG-19
WG3122819-21 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Sulfate (SO4)			105.0		%		75-125	02-AUG-19
SOLIDS-TDS-WT	Water							
Batch R4739495								
WG3123950-3 DUP		**L2318400-3**						
Total Dissolved Solids		96	95		mg/L	0.3	20	04-AUG-19
WG3123950-2 LCS								
Total Dissolved Solids			100.8		%		85-115	04-AUG-19
WG3123950-1 MB								
Total Dissolved Solids			<10		mg/L		10	04-AUG-19
Batch R4744503								
WG3124100-3 DUP		**L2319505-1**						
Total Dissolved Solids		826	827		mg/L	0.1	20	07-AUG-19
WG3124100-2 LCS								
Total Dissolved Solids			100.3		%		85-115	07-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R4744503								
WG3124100-1 MB								
Total Dissolved Solids			<10		mg/L		10	07-AUG-19
TKN-WT	Water							
Batch R4742622								
WG3124982-3 DUP		**L2320241-2**						
Total Kjeldahl Nitrogen		0.44	0.57	J	mg/L	0.12	0.3	07-AUG-19
WG3124982-2 LCS								
Total Kjeldahl Nitrogen			101.2		%		75-125	07-AUG-19
WG3124982-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-AUG-19
WG3124982-4 MS		**L2320241-2**						
Total Kjeldahl Nitrogen			103.5		%		70-130	07-AUG-19
Batch R4742627								
WG3125405-3 DUP		**L2320801-1**						
Total Kjeldahl Nitrogen		0.95	0.82		mg/L	15	20	07-AUG-19
WG3125405-2 LCS								
Total Kjeldahl Nitrogen			98.4		%		75-125	07-AUG-19
WG3125405-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-AUG-19
WG3125405-4 MS		**L2320801-1**						
Total Kjeldahl Nitrogen			80.3		%		70-130	07-AUG-19
TOC-WT	Water							
Batch R4743210								
WG3125378-3 DUP		**L2318373-1**						
Total Organic Carbon		1.93	1.99		mg/L	3.2	20	07-AUG-19
WG3125378-2 LCS								
Total Organic Carbon			101.6		%		80-120	07-AUG-19
WG3125378-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-AUG-19
WG3125378-4 MS		**L2318373-1**						
Total Organic Carbon			102.3		%		70-130	07-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2320919-COFC

COC Number: 17 - AP

Page 1 of 1 KH

Report To	Contact and company name below will appear on the final report
Company:	GHD LIMITED - ACCT #13791
Contact:	Pascal Renella
Phone:	450-973-4165
	Company address below will appear on the final report
Street:	455 Phillip St
City/Province:	Waterloo,Ontario
Postal Code:	N2L 3X2
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	GHD Limited
Contact:	Pascal Renella

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	pascal.renella@ghd.com
Email 2	See PO
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	pascal.renella@ghd.com
Email 2	

Project Information	
ALS Account # / Quote #:	13791
Job #:	45804-58
PO / AFE:	73510913-1
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2320919 AP **ALS Contact:** Rick H **Sampler:** J. Leader

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days): 4 day [P4-20%] ☐ | 3 day [P3-25%] ☐ | 2 day [P2-50%] ☐

EMERGENCY: 1 Business day [E - 100%] ☐ | Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Anions5 (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Conductivity	~~Total~~ ~~Dissolved~~ Metals (Field Filter) -Select	TKN, NH3, TP, TOC, Phenols	DOC (~~Field Filter~~) Lab Filtr	TDS	Hardness-Calc	Field pH	Field Temp °C	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
									P								
	GW-45804-073019-JL-100	30-JUL-19	10:23	Water	5	R	R	R	R	R	R	R	R	7.13	18.80		
	↓ ↓ ↓ 101	30-JUL-19	12:48	Water	5	R	R	R	R	R	R	R	R	7.16	18.89		
	↓ ↓ ↓ 102	30-JUL-19	16:07	Water	5	R	R	R	R	R	R	R	R	7.15	19.03		

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

LAB filter DOC (Not preserved)

ODWS and PWQO Requirments Select Metals: Al,As,Ba,B,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Na,Se,Zn

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☒ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
1.8				0.4			

SHIPMENT RELEASE (client use)

Released by: Date: July 31, 2019 Time: 8:30

INITIAL SHIPMENT RECEPTION (lab use only)

Received by: COSTAS FARASSIOTIS Date: JULY 31, 2019 Time: 9:00

FINAL SHIPMENT RECEPTION (lab use only)

Received by: Date: 08/01/19 Time: 8:55

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY JUNE 2018 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

001496

Appendix E
2010 – 2019 Analytical Data

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MWD-009	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
Sample Type:				Duplicate		Duplicate			
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0049	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.050)
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.00050)
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L	62.4	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0053	0.0071	0.0016	0.0036	0.0066
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135	0.0147	0.0132	0.0152	0.0326
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	0.0021
Zinc (dissolved)	mg/L	0.0199	0.0462	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0047	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300	279	276	316	322	278	276	250
Ammonia-N	mg/L	0.123	0.077	0.076	0.073	0.053	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	15
Chloride	mg/L	25.1	28.4	31.6	27.5	27.4	21.8	55.7	43.9
Color (apparent)	TCU	10.2	16.9	19.7	38.3	42.9	34.4	16.3	52.4
Conductivity	umhos/cm	1080	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.9	1.7	3.5	9.0	3.1	2.5	ND(5.0)
Escherichia coli	cfu/100mL	0	0	0	0	0	0	2	0
Fecal coliform bacteria	cfu/100mL	0	0	0	1	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	7.97	--	--	--	--	--	--	7.96
Phenol	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.376	0.105	0.090	0.095	0.079	0.075	ND(0.030)	0.340
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	3	1	10	120	430	1	60	0
Total dissolved solids (TDS)	mg/L	736	616	590	766	778	492	1040	780
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	0.20
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	303
Turbidity	NTU	2.70	--	--	--	--	--	--	149
Un-ionized ammonia	mg/L	0.0000080	0.00018	0.00019	0.000095	0.000076	ND(0.00012)	ND(0.000049)	--
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.27	0.602	0.602	1.02	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	4.42	--	--	1.47	1.47	--	1.47	2.87
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	38	38	394	394	--	120	51
pH, field	s.u.	6.05	7.75	7.75	6.82	6.82	7.08	6.58	6.67
Temperature, field	Deg C	9.6	12.5	12.5	8.4	8.4	8.61	8.7	9.81
Turbidity, field	NTU	424	--	--	--	--	150	99	504

001498

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MWD-009	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
Sample Type:				Duplicate		Duplicate			
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit
J Estimated concentration.

001469

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MS-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MS-016	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.024	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00065	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	0.0019	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00048	ND(0.0020)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.000030	ND(0.00050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0273	0.0014	0.0042	0.0055	ND(0.0010)	0.0012	ND(0.00050)	0.0386
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0203	0.0148	0.0165	0.0459	0.0300	0.121	0.0162	0.191
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)	0.0028	0.0043	0.00233	0.0088
Zinc (dissolved)	mg/L	ND(0.0030)	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0013	ND(0.010)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	309	275	295	262	283	250	279	239
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.051	ND(0.113)	ND(0.050)	ND(0.036)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	11	30	12	ND(10)	ND(10)	ND(10)	14
Chloride	mg/L	65.4	46	49.1	46.8	52.5	59.6	44.1	64.3
Color (apparent)	TCU	45.5	34.0	50.7	10.4	13.3	11.2	17.2	17.1
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	2.2	2.9	2.7	1.5	1.7	3.4	2.9
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	1	0	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0	1	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.032
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.76	7.67	7.62	7.62	7.52	7.81	7.62	7.93
Phenol	mg/L	ND(0.0010)	0.0030	0.0012	0.0045	ND(0.0010)	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	0.0017	0.0019	ND(0.0010)
Phosphorus	mg/L	0.301	0.038	0.166	0.074	ND(0.030)	0.042	0.035	0.0779
Sulfate	mg/L	495	292	445	222	456	474	413	506
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5	50	30	170	ND(10)
Total dissolved solids (TDS)	mg/L	1130	714	1020	618	994	982	884	1080
Total Kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	1.34	ND(0.52)	0.18	ND(0.15)	0.23	0.25
Total suspended solids (TSS)	mg/L	642	99.0	209	106	72.8	116	42.0	101
Turbidity	NTU	11.8	13.5	6.82	4.84	44.8	6.42	36.7	70.5
Un-Ionized ammonia	mg/L	ND(0.00042)	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00030	0.00103	ND(0.0017)	0.0021
Field Parameters									
Color	TCU	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm	1.21	1.16	1.46	0.946	434	0.954	1.06	0.965
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73	8.64	8.93	0	1.26
Odor	none	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	16	--	--	105	80	175	-40	78
pH, field	s.u.	7.58	6.09	6.16	7.24	7.48	7.52	8.31	8.32
Temperature, field	Deg C	9.8	11.3	10.4	8.09	8.44	12.6	12.08	13.77
Turbidity, field	NTU	473	393	25	194	--	211	0.3	21

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MS-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MS-016	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	0.094	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	0.212	--	--	--	--	--	--
Acenaphthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Acenaphthylene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Acridine	µg/L	--	ND(4.0)	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	ND(0.040)	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	ND(0.060)	--	--	--	--	--	--
Chrysene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Fluorene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Naphthalene	µg/L	--	0.113	--	--	--	--	--	--
Phenanthrene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Pyrene	µg/L	--	ND(0.020)	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111616-TS-014	GW-45804-060217-TS-015	GW-45804-113017-TS-012	GW-45804-051618-TS-016	GW-45804-110818-TS-015	GW-45804-061819-JC-017	GW-045804-112719-JC-016
Sample Date:		11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.00026	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.022	--	--	-	--	--	--
Cadmium (dissolved)	mg/L	0.000013	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	ND(0.00010)	--	--	--	--	--	--
Copper (dissolved)	mg/L	ND(0.00065)	--	--	--	--	--	--
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.015	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	0.000067	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	ND(0.00050)	0.0185	ND(0.00050)	0.00054	0.00270	0.0226	0.00074
Mercury (dissolved)	mg/L	ND(0.000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0162	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00226	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0089	--	--	--	--	--	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	277	270	286	246	285	240	255
Ammonia-N	mg/L	ND(0.020)	ND(0.111)	ND(0.264)	ND(0.224)	ND(0.218)	ND(0.020)	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	13	--	--	--	--	--	--
Chloride	mg/L	56.9	--	--	-	--	--	--
Color (apparent)	TCU	4.2	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	1.7	ND(3.0)	1.9	ND(5.09)	2.35	3.04
Escherichia coli	cfu/100mL	0	1	1	ND(0)	1	0	1
Fecal coliform bacteria	cfu/100mL	0	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)	ND(0.020)	0.032	0.020	0.954	ND(0.10)
Nitrite (as N)	mg/L	ND(0.010)	--	--	--	--	--	--
pH, lab	s.u.	7.24	--	--	-	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--
Phenolics (total)	mg/L	ND(0.0068)	--	--	--	--	--	--
Phosphorus	mg/L	0.0186	0.0134	0.0245	0.0076	0.0091	0.0143	0.0223
Sulfate	mg/L	361	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	30	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	887	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	0.24	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	11.7	--	--	-	--	--	--
Turbidity	NTU	15.0	--	--	--	--	--	20.1
Un-ionized ammonia	mg/L	ND(0.000045)	--	--	--	--	--	ND(0.000055)
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.953	0.947	0.536	0.501	1.19	0.898	1.46
Dissolved oxygen (DO), field	mg/L	0	0	0	0	0.36	0	0.33
Odor	none	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	65	44	93	70	-11	5	99
pH, field	s.u.	6.96	7.4	7.62	7.44	7.45	7.2	7.21
Temperature, field	Deg C	11.08	11.21	8.56	14.71	10.92	19.29	9.4
Turbidity, field	NTU	14.8	2.2	17.8	9.7	0	15.5	8.3

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111616-TS-014	GW-45804-060217-TS-015	GW-45804-113017-TS-012	GW-45804-051618-TS-016	GW-45804-110818-TS-015	GW-45804-061819-JC-017	GW-045804-112719-JC-016
Sample Date:		11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	--	--	-	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	--	--	--	--	--	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	-	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit
J Estimated concentration.

001473

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051810-MB-006	GW-45804-051711-MMD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001	GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007
Sample Date:		5/18/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	0.052	--	0.072	0.056
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	--	ND(0.00010)	0.00020
Chromium (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	0.00122	--	0.00373	0.00056
Copper (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	0.0014
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	0.320	ND(0.050)
Lead (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	--	0.320	0.416
Mercury (dissolved)	mg/L	--	--	--	ND(0.00010)	--	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0298	0.0180	0.0235	0.0192	--	0.0461	0.0204
Nickel (dissolved)	mg/L	--	--	--	0.0110	--	0.0053	0.0083
Zinc (dissolved)	mg/L	0.0691	0.0131	0.0090	ND(0.0030)	--	0.0053	0.0105
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	367	416	379	388	--	387	405
Ammonia-N	mg/L	0.089	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	ND(10)	--	23	13
Chloride	mg/L	94.6	73.6	70.4	81.3	--	72.3	78
Color (apparent)	TCU	20.3	36.5	77.5	--	91.7	39.4 J	29.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0	--	1.7	1.6
Escherichia coli	cfu/100mL	0	0	ND(2)	--	0	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	--	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)
pH, lab	s.u.	--	--	--	7.54	--	7.67	7.60
Phenol	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--
Phosphorus	mg/L	0.158	0.098	0.478	0.100	--	0.228	0.058
Sulfate	mg/L	--	--	--	--	--	697	731
Total coliform bacteria	cfu/100mL	0	40	2	--	16	2	ND(100)
Total dissolved solids (TDS)	mg/L	1660	1330	1480	1530	--	1540	1450
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	0.21	--	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	--	--	--	24.0	--	1370	100
Turbidity	NTU	--	--	--	--	22.0	4.60 J	10.3
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	--	--	ND(0.00049)	ND(0.0000023)
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03	1.75	1.99
Dissolved oxygen (DO), field	mg/L	--	--	--	--	--	4.98	6.28
Odor	none	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	--	--	--	18	47
pH, field	s.u	7.44	5.95	7.00	6.43	6.27	7.57	5.20
Temperature, field	Deg C	11.7	7.76	10.5	11.89	12.51	12.0	13.4
Turbidity, field	NTU	--	455	389	--	-	355	594

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-006	GW-45804-051711-MMD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001	GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	340	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	--	ND(250)	ND(250)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acridine	µg/L	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluorene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Naphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Pyrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-111413-TS-012	GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Boron (dissolved)	mg/L	0.050	0.052	0.062	0.060	ND(0.10)	0.054	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000048	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	0.00068	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	0.00021	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00050	0.0017
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.220	0.270	0.0861	0.167	0.154	0.207	0.160
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0195	0.0201	0.0233	0.0199	0.0242	0.0198	0.0211
Nickel (dissolved)	mg/L	0.0063	0.0061	0.0051	0.0055	0.0052	0.00675	0.0064
Zinc (dissolved)	mg/L	0.0041	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)	0.0017	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	372	360	338	343	349	336	342
Ammonia-N	mg/L	ND(0.050)	ND(0.067)	ND(0.050)	ND(0.050)	ND(0.050)	0.030	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	21	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	10
Chloride	mg/L	89.2	66.1	68	77.6	82.6	70.8	85.9
Color (apparent)	TCU	61.7	1.7 J	10.9	2.4	1.6	ND(1.0)	ND(2.0)
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.0	ND(1.0)	1.1	1.5	2.3	3.5	1.1
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	0.13	ND(0.10)	ND(0.50)	0.32	0.18	0.18	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.58	7.40	7.66	7.77	7.83	7.79	7.08
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	--	--	--
Phenolics (total)	mg/L	--	--	--	0.0058	0.0029	ND(0.0010)	0.0020
Phosphorus	mg/L	0.109	ND(0.030)	0.032	ND(0.030)	ND(0.030)	ND(0.0030)	0.0038
Sulfate	mg/L	681	621	695	685	755	680	816
Total coliform bacteria	cfu/100mL	ND(10)	9	9	9	1	1	0
Total dissolved solids (TDS)	mg/L	1510	1370	1390	1300	1380	1500	1620
Total kjeldahl nitrogen (TKN)	mg/L	0.18	ND(0.21)	ND(0.15)	ND(0.15)	0.56	ND(0.15)	0.15
Total suspended solids (TSS)	mg/L	361	7.2	10.0	9.5	2.4	ND(2.0)	ND(2.0)
Turbidity	NTU	6.56	0.22	4.22	ND(0.44)	0.69	0.16	1.21
Un-ionized ammonia	mg/L	ND(0.000019)	0.00024	ND(0.00012)	ND(0.00015)	ND(0.0018)	0.00029	0.000194
Field Parameters								
Color	TCU	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm	0.96	2.04	--	1.42	1.4	1.22	1.69
Dissolved oxygen (DO), field	mg/L	7.73	0.58	--	2.21	0	5.67	0
Odor	none	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	99	--	181	-7	106	77
pH, field	s.u.	8.20	7.11	7.07	6.93	8.15	7.58	7.24
Temperature, field	Deg C	10.4	12.52	9.5	15.83	10.14	11.86	10.39
Turbidity, field	NTU	58	57	--	0	0.6	1	2

001476

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-111413-TS-012	GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0061	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051910-MS-059	GW-45804-110210-TS-011	GW-45804-051711-MSD-057	GW-45804-110911-TS-002	GW-45804-051412-MB-002	GW-45564-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-029	GW-45804-111113-TS-015	GW-45804-052914-MB-004	GW-45804-112514-TS-002
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013	5/29/2014	11/25/2014
Sample Type:												
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	--	0.059	--	0.059	0.065	0.070	0.059	0.071
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00010	--	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	--	0.00231	--	0.00186	0.00267	0.00144	0.00061	0.00145
Copper (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.466	0.487	0.301	0.781	0.099	--	ND(0.050)	0.247	1.86	0.221	0.382
Lead (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.529	0.292	0.372	--	0.422	0.317	0.218	0.182	0.234
Mercury (dissolved)	mg/L	--	--	--	--	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0360	0.0317	--	0.0226	0.0462	0.0351	0.0445	0.0397
Nickel (dissolved)	mg/L	--	--	--	--	0.0054	--	0.0110	0.0058	0.0023	0.0022	ND(0.0020)
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0030)	--	0.0073	0.0054	ND(0.0030)	ND(0.0030)	0.0095
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	459	427	376	387	351	--	396	383	350	309	329
Ammonia-N	mg/L	0.117	0.004	0.081	0.052	ND(0.050)	--	ND(0.050)	0.066	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	--	ND(10)	--	13	21	42	ND(10)	ND(10)
Chloride	mg/L	81.4	203	87.3	93.4	76.0	--	80.4	66	67.4	73.5	69
Color (apparent)	TCU	25.4	93.5	139	66.4	--	271	11.2 J	33.5	117	12.0	16.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.0	2.7	3.1	1.7	--	1.8	1.6	2.0	2.0	1.7
Escherichia coli	cfu/100mL	0	0	0	ND(2)	--	0	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	--	0	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.30)	ND(0.10)	ND(0.30)	ND(0.30)	0.13	--	ND(0.10)	ND(0.50)	ND(0.10)	0.24	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	--	--	--	--	7.67	--	7.74	7.73	7.58	7.48	7.72
Phenol	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	0.0040	ND(0.0010)	0.0018	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.974	1.05	1.23	1.49	0.672	--	0.293	0.906	1.75	0.070	0.057
Sulfate	mg/L	--	--	--	--	--	--	718	756	702	646	710
Total coliform bacteria	cfu/100mL	0	4	3	2	--	0	10	ND(10)	ND(10)	5	9
Total dissolved solids (TDS)	mg/L	1950	1920	1700	1730	1740	--	1600	1540	1480	1360	1460
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	0.19	--	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	--	--	--	--	5260	--	526	1710	2950	110	61.2
Turbidity	NTU	--	--	--	--	--	57.0	2.60 J	34.0	19.4	22.0	9.33
Un-ionized ammonia	mg/L	0.00085	0.000021	0.00030	0.00014	--	--	ND(0.0005)	0.0009073	ND(0.000018)	ND(0.00018)	ND(0.00016)
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	NOO	--	--
Conductivity, field	mS/cm	1.96	2.41	2.55	2.48	2.13	2.1	1.88	1.98	2.01	2	0.058
Dissolved oxygen (DO), field	mg/L	--	5.39	--	--	--	--	5.47	8.74	6.45	8.95	6.44
Odor	none	--	--	--	--	--	--	--	--	NOO	--	--
Oxidation reduction potential (ORP), field	millivolts	--	5	--	--	--	--	-78	-6	--	10	19
pH, field	s.u.	7.46	6.99	7.3	7.04	6.27	6.27	6.70	5.54	6.17	7.2	7.21
Temperature, field	Deg C	11.4	11.4	7.68	11.4	10.32	13.03	13.3	14.5	11.2	9.82	10.23
Turbidity, field	NTU	--	--	--	-5	--	--	640	-5	556	54.5	--
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus naphthalene	ug/L	--	--	--	--	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hyorocarbons F3 (C16-C34)	ug/L	570	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F3 minus PAH	ug/L	570	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F4 (C34-C50)	ug/L	1520	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	300
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	3900	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	ug/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	ND(100)	ND(100)	--	--	--	--	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	ug/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	ug/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	ug/L	2090	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(380)	580

001478

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051910-MS-009	GW-45804-110210-TS-011	GW-45804-051711-MSD-007	GW-45804-110911-TS-002	GW-45804-051412-MB-002	GW-45564-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-009	GW-45804-111413-TS-015	GW-45804-052914-MB-004	GW-45804-112514-TS-002
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013	5/29/2014	11/25/2014
Sample Type:												
Parameters	**Units**											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	--	--	--	--	--	--	ND(0.028)	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acridine	ug/L	--	--	--	--	--	--	--	ND(4.0)	--	--	--
Anthracene	ug/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	0.038	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(a)pyrene	ug/L	0.0309	0.0159	0.0050	0.0074	0.0121	--	ND(0.010)	0.0063	ND(0.0050)	0.0064	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(h,j)quinoline (Quinoline)	µg/L	--	--	--	--	--	--	--	ND(0.040)	--	--	--
Benzo(g,h,i)perylene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Carcinogenic potency equivalent	ug/L	--	--	--	--	--	--	--	ND(0.050)	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Dibenz(a,h)anthracene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluoranthene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.039)	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Phenanthrene	ug/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-052815-TS-012	GW-45804-111515-TS-015	GW-45804-051716-TS-008	GW-45804-111516-TS-007	GW-45804-060217-TS-014	GW-45804-112917-TS-008	GW-45804-051518-TS-003	GW-45804-110818-TS-010	GW-45804-051519-JC-003	GW-45804-112719-JC-005
Sample Date:		5/28/2015	11/19/2015	5/17/2016	11/15/2016	6/2/2017	11/29/2017	5/15/2018	11/8/2018	5/16/2019	11/27/2019
Sample Type:											
Parameters	**Units**										
Metals											
Arsenic (dissolved)	mg/L	ND (0.0010)	ND(0.0010)	ND(0.00010)	0.00017	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.064	0.10	0.056	0.074	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	0.000012	0.000021	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND (0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	0.00065	ND(0.0010)	0.00023	0.00036	--	--	--	--	--	--
Copper (dissolved)	mg/L	ND (0.0010)	ND(0.0020)	0.00095	0.00287	--	--	--	--	--	--
Iron (dissolved)	mg/L	0.380	0.13	0.045	0.410	0.055	0.38	ND(0.10) J	0.15	0.15	ND(0.10)
Lead (dissolved)	mg/L	ND (0.0010)	ND(0.00050)	ND(0.000050)	ND(0.000050)	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.169	0.137	0.160	0.126	0.127	0.0711	0.154 J	0.0556	0.249	0.0582
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0415	0.0532	0.0268	0.0450	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.0022	ND(0.0050)	0.00136	0.00142	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0091	ND(0.010)	0.0029	ND(0.0010)	--	--	--	--	--	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	310	346	314	313	322	323	318 J	294	316	307
Ammonia-N	mg/L	ND(0.131)	ND(0.050)	0.037	0.073	ND(0.020)	0.294	ND(0.554) J	ND(0.083)	1.3	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	14	--	--	--	--	--	--
Chloride	mg/L	63.7	71.4	64.4	77.2	--	--	--	--	--	--
Color (apparent)	TCU	17.7	7.8	3.8	13.2	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.3	1.9	2.8	1.3	1.6	3.5	2.0 J	ND(2.35)	1.97	2.46
Escherichia coli	cfu/100mL	0	0	0	0	0	0	ND(0) J	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.10	0.24	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	--	--	--	--	--
pH, lab	s.u.	7.75	7.73	7.84	7.24	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0038	0.0030	ND(0.0010)	0.0034	--	--	--	--	--	--
Phosphorus	mg/L	0.045	ND(0.030)	0.0046	0.0083	0.0061	0.0156	0.0034 J	0.0162	0.0086	0.0214
Sulfate	mg/L	755	716	685	710	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	0	1	1	0	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	1280	1310	1420	1460	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	0.46	0.20	ND(0.15)	0.16	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	23.3	10.4	2.8	5.5	--	--	--	--	--	--
Turbidity	NTU	13.9	9.22	1.41	3.39	--	--	--	--	--	7.96
Un-ionized ammonia	mg/L	0.00041	ND(0.0019)	0.00958	0.000237	--	--	--	--	--	ND(0.000029)
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.68	1.78	1.84	1.58	1.57	1.08	1.62	2.08	1.68	1.89
Dissolved oxygen (DO), field	mg/L	1.63	0	0	0.15	0.19	0	0	2.06	0	1.06
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	191	-99	45	-55	-38	41	-20	-80	-84	16
pH, field	s.u.	6.98	9.21	7.66	7.09	7.15	7.68	7.3	7.38	8.93	6.84
Temperature, field	Deg C	14.98	11.14	15.72	11.96	13.14	10.04	11.6	11.06	15.85	8.85
Turbidity, field	NTU	34.3	5.9	6.5	1.4	26.4	2.4	30	18.2	22.1	12.5
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	ND(250)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	ND(250)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	--	--	--	--	--	--

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-052815-TS-012	GW-45804-111915-TS-015	GW-45804-051716-TS-008	GW-45804-111516-TS-007	GW-45804-060217-TS-014	GW-45804-112917-TS-008	GW-45804-051518-TS-003	GW-45804-110818-TS-010	GW-45804-051619-JC-003	GW-045804-112713-JC-015
Sample Date:		5/28/2015	11/19/2015	5/17/2016	11/15/2016	6/2/2017	11/29/2017	5/15/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:											
Parameters	**Units**										
Semi-Volatiles											
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b,)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-05	MW101-05	MW101-09	MW101-05
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-002	GW-45804-081611-TS-004	GW-45804-111011-TS-009
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011
Sample Type:									
Parameters	**Units**								
Metals									
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0052	0.0096	0.0101	0.0196	ND(0.010)	0.0026
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	0.068	ND(0.050)	0.179	0.252	ND(0.050)	0.058	2.89	0.154
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	98.1	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.462	0.670	0.859	1.61	0.797	1.50	1.66	1.11
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0633	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.190	0.0074	0.0256	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--
General Chemistry									
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	175	831	442	510	499	663	452	477
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1	15.8	23.0
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	8.5	40.6	2.5	12.6
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--
Chloride	mg/L	29.7	38.8	93.4	168	63.7	82.1	87.6	74.1
Color (apparent)	TCU	6.1	161	53.2	187	239	102	114	17.0
Conductivity	umhos/cm	1920	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	266	9.0	93.0	16.7	25.0	9.3	7.7
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2
Fecal coliform bacteria	cfu/100mL	0	50	90	6000	80	160	20	10
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.90	--	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-05	MW101-05	MW101-09	MW101-05
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-002	GW-45804-081611-TS-004	GW-45804-111011-TS-009
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011
Sample Type:									
Parameters	**Units**								
General Chemistry (cont'd)									
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570	0.127	0.134
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	0	80	350	16000	13700	1510	290	210
Total dissolved solids (TDS)	mg/L	1720	1960	1700	1640	1330	2290	1660	1610
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--
Turbidity	NTU	1.04	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0645	0.0623	0.0858
Field Parameters									
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	--	--	0	2.48
Oxidation reduction potential (ORP), field	millivolts	23	-341	-266	-282	-333	--	-279	-238
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.26	6.86	6.97
Temperature, field	Deg C	4.6	14.07	22.3	17.3	11.0	15.99	21.7	17.5
Turbidity, field	NTU	185	--	--	--	--	--	166	15.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnapthnalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-05	MW101-09	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
Sample Type:				Duplicate			
Parameters	**Units**						
Metals							
Aluminum (dissolved)	mg/L	--	--	--	--	ND(0.10)	--
Antimony (dissolved)	mg/L	--	--	--	--	ND(0.050)	--
Arsenic (dissolved)	mg/L	0.0073	--	--	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	--	--	--	--	0.11	--
Beryllium (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Bismuth (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Boron (dissolved)	mg/L	ND(0.050)	--	--	0.064	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	ND(0.00010)	--	--	ND(0.00010)	ND(0.00090)	ND(0.00010)
Calcium (dissolved)	mg/L	--	--	--	--	292	--
Chromium (dissolved)	mg/L	0.0026	--	--	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00080	--	--	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	--	--	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	--	--	1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	ND(0.0010)	--	--	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	--	--	--	--	86.9	--
Manganese (dissolved)	mg/L	0.636	--	--	1.21	1.12	1.17
Mercury (dissolved)	mg/L	ND(0.00010)	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0021	--	--	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	0.0041	--	--	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	--	--	--	--	ND(0.50)	--
Potassium (dissolved)	mg/L	--	--	--	--	24	--
Selenium (dissolved)	mg/L	--	--	--	--	ND(0.0040)	--
Silicon (dissolved)	mg/L	--	--	--	--	ND(10)	--
Silver (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--
Sodium (dissolved)	mg/L	--	--	--	--	54.2	--
Strontium (dissolved)	mg/L	--	--	--	--	1.67	--
Thallium (dissolved)	mg/L	--	--	--	--	ND(0.0030)	--
Tin (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Titanium (dissolved)	mg/L	--	--	--	--	ND(0.020)	--
Tungsten (dissolved)	mg/L	--	--	--	--	ND(0.10)	--
Uranium (dissolved)	mg/L	--	--	--	--	ND(0.050)	--
Vanadium (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Zinc (dissolved)	mg/L	ND(0.0030)	--	--	0.0052	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	--	--	ND(0.040)	--
General Chemistry							
Alkalinity, bicarbonate	mg/L	--	--	--	--	442	--
Alkalinity, carbonate	mg/L	--	--	--	--	ND(10)	--
Alkalinity, hydroxide	mg/L	--	--	--	--	ND(10)	--
Alkalinity, total (as CaCO3)	mg/L	341	288	285	284	445	466
Ammonia-N	mg/L	98.9	10.6	10.6	7.89	108	36.4
Biochemical oxygen demand (carbonaceous)	mg/L	149	ND(2.6)	ND(2.6)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	524	--	--	11	42	114
Chloride	mg/L	--	92.9	95.9	106	87.3	157
Color (apparent)	TCU	310	61.2	48.9	60.4	34.4	169
Conductivity	umhos/cm	--	1910	1820	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	104	5.6	7.3	6.2	9.7	38.0
Escherichia coli	cfu/100mL	2970	28	41	1	30	10
Fecal coliform bacteria	cfu/100mL	150000	100 J	400 J	1	126	20
Nitrate (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	ND(2.0)	--	--	ND(0.20)	--	--
pH, lab	s.u.	7.95	7.37	7.74	7.67	7.75	7.82
Phenol	mg/L	0.0890	--	--	ND(0.0010)	0.0030	0.0260

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-03-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/3/2012	11/13/2012
Sample Type:				Duplicate			
Parameters	**Units**						
General Chemistry (cont'd)							
Phosphorus	mg/L	1.36	0.150	0.143	0.079	0.310	0.138
Sulfate	mg/L	--	--	--	--	--	1060
Total coliform bacteria	cfu/100mL	93000	93000	96000	21	190	110
Total dissolved solids (TDS)	mg/L	1160	1560	1570	1530	1760	2240
Total kjeldahl nitrogen (TKN)	mg/L	127	--	--	9.54	110	40.6
Total suspended solids (TSS)	mg/L	10.0	--	--	6.8	7.2	17.0
Turbidity	NTU	200	7.00	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	--	0.000764	0.000763	--	--	0.668
Field Parameters							
Conductivity, field	mS/cm	2.62	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	--	--	--	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	--	--	--	123	-271	-546
pH, field	s.u.	6.9	5.39	5.39	6.8	9.2	7.70
Temperature, field	Deg C	11.87	13.3	13.3	15.79	24.2	16.6
Turbidity, field	NTU	50.3	169	169	52.3	4.3	0
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	49	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	110	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	--	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	110	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles							
1-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--
Acenaphthene	µg/L	--	--	--	--	ND(0.020)	--
Acenaphthylene	µg/L	--	--	--	--	ND(0.020)	--
Anthracene	µg/L	ND(0.020)	--	--	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L	ND(0.010)	--	--	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Chrysene	µg/L	--	--	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	ND(0.020)	--
Fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Fluorene	µg/L	--	--	--	--	ND(0.020)	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	ND(0.020)	--
Naphthalene	µg/L	--	--	--	--	ND(0.053)	--
Phenanthrene	µg/L	--	--	--	--	ND(0.020)	--
Pyrene	µg/L	--	--	--	--	ND(0.020)	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

G:\HD\045804\(95)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014	GW-45804-051618-TS-021
Sample Date:			8/13/2015	8/13/2015	11/10/2015	6/2/2017	8/30/2017	8/30/2017	11/30/2017	5/16/2018
Sample Type:				Duplicate				Duplicate		
Parameters	**Units**	**TLP2**								
Metals										
Arsenic (dissolved)	mg/L		0.0140	0.0138	ND(0.0010)	--	--	--	--	--
Boron (dissolved)	mg/L		0.23	0.24	0.11	--	--	--	--	--
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	--	--	--	--	--
Chromium (dissolved)	mg/L		0.0321	0.0330	ND(0.0050)	--	--	--	--	--
Cobalt (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	--	--	--	--	--
Copper (dissolved)	mg/L		ND(0.0020)	ND(0.0020)	ND(0.0020)	--	--	--	--	--
Iron (dissolved)	mg/L	10.6	0.45	0.40	0.19	0.304	ND(0.10) J	ND(0.10) J	1.14	ND(0.10)
Lead (dissolved)	mg/L		ND(0.00050)	ND(0.00050)	ND(0.00050)	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	3.52	3.57	1.04	0.593	0.169 J	0.191 J	1.03	0.441
Mercury (dissolved)	mg/L		0.000038 J	0.000018 J	ND(0.000010)	--	--	--	--	--
Molybdenum (dissolved)	mg/L		0.00266	0.00206	0.00068	--	--	--	--	--
Nickel (dissolved)	mg/L		0.0075	0.0075	ND(0.0050)	--	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	--	--	--	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	996	1810	1820	436	344	1280 J	1250 J	442	467
Ammonia-N	mg/L	0.2	81.3	80.7	9.01	18.7	91.1 J	86.0 J	31.3	26.2
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		1340	1380	4.3	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L		2480	2840	38	--	--	--	--	--
Chloride	mg/L		483	460	162	--	--	--	--	--
Color (apparent)	TCU		1100	1110	119	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	19.4	360	1080	10.7	5.6	32.4 J	33.8 J	7.2	12.1
Escherichia coli	cfu/100mL	5	1000 J	4000 J	0	0	0 J	1 J	0	1
Fecal coliform bacteria	cfu/100mL		4000	4000	0	--	--	--	--	--
Nitrate (as N)	mg/L	0.5	ND(0.20)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.050)	--	--	--	--	--
Orthophosphate (dissolved)	mg/L		--	--	--	--	--	--	--	--
pH, lab	s.u.		7.11	7.15	7.52	--	--	--	--	--
Phenolics (total)	mg/L		1.07	1.07	0.0029	--	--	--	--	--
Phosphorus	mg/L	0.5	1.26	1.23	0.281	0.130	0.647 J	0.564 J	0.141	0.181
Sulfate	mg/L		399	391	848	--	--	--	--	--
Total coliform bacteria	cfu/100mL		100000	130000	40	--	--	--	--	--
Total dissolved solids (TDS)	mg/L		3800	3620	1630	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		85.7	86.1	7.98	--	--	--	--	--
Total suspended solids (TSS)	mg/L		12.3	15.6	64.1	--	--	--	--	--
Turbidity	NTU		463	418	61.3	--	--	--	--	--
Un-ionized ammonia	mg/L		0.108	--	0.292	--	--	--	--	--
Field Parameters										
Conductivity, field	mS/cm		5.44	--	2.48	1.7	2.86	--	2.2	1.66
Dissolved oxygen (DO), field	mg/L		1.37	--	3.33	3.13	7.56	--	1.86	13.26
Oxidation reduction potential (ORP), field	millivolts		-362	--	-215	-64	-239	--	-83	-272
pH, field	s.u.		6.59	--	8	7.44	7.23	--	7.54	7.38
Temperature, field	Deg C		21.61	--	16.66	16.04	20.73	--	15.8	15.68
Turbidity, field	NTU		182	--	243	9.7	8.3	--	45.1	10.3

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014	GW-45804-051618-TS-021
Sample Date:			8/13/2015	8/13/2015	11/10/2015	6/2/2017	8/30/2017	8/30/2017	11/30/2017	5/16/2018
Sample Type:				Duplicate				Duplicate		
Parameters	**Units**	**TLF2**								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		--	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(380)	ND(380)	ND(380)	--	--	--	--	--
Semi-Volatiles										
Anthracene	µg/L		ND(0.035)	ND(0.020)	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	--	--	--	--	--
Misc										
Oil and grease	mg/L		--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-051618-TS-022	GW-45804-081518-TS-009	GW-45804-110918-TS-016	GW-45804-061819-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-015
Sample Date:		5/16/2018	8/15/2018	11/9/2018	6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:		Duplicate						
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	--	--	-	--	--	0.0014	--
Boron (dissolved)	mg/L	--	--	-	--	--	ND(0.10)	--
Cadmium (dissolved)	mg/L	--	--	-	--	--	ND(0.000050)	--
Chromium (dissolved)	mg/L	--	--	-	--	--	ND(0.0050)	--
Cobalt (dissolved)	mg/L	--	--	-	--	--	ND(0.0010)	--
Copper (dissolved)	mg/L	--	--	-	--	--	ND(0.0020)	--
Iron (dissolved)	mg/L	ND(0.10)	4.20	0.18	ND(0.10)	--	ND(0.10)	0.63
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.00050)	--
Manganese (dissolved)	mg/L	0.435	1.42	1.21	0.386	--	0.424	1.45
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	ND(0.0050)	--
Zinc (dissolved)	mg/L	--	--	--	--	--	ND(0.010)	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	466	484	514	1150	--	--	380
Ammonia-N	mg/L	28.3	8.79	9.927	65.6	--	--	31.4
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	40	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	247	--	--
Chloride	mg/L	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	-	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	12.1	12.0	9.28	34	--	--	7.88
Escherichia coli	cfu/100mL	1	ND(0)	ND(0)	-	5	--	2
Fecal coliform bacteria	cfu/100mL	--	--	-	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)	0.139	ND(0.10)	--	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	-	--	ND(0.050)	--	--
Orthophosphate (dissolved)	mg/L	--	--	-	1.67	--	--	--
pH, lab	s.u.	--	--	-	--	7.72	--	--
Phenolics (total)	mg/L	--	--	-	--	0.056	--	--
Phosphorus	mg/L	0.181	0.0507	0.0049	2.34	--	--	0.450
Sulfate	mg/L	--	--	-	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	116	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	148	--	--
Turbidity	NTU	--	--	--	--	--	--	55.0
Un-ionized ammonia	mg/L	--	--	--	--	--	--	0.0538
Field Parameters								
Conductivity, field	mS/cm	--	1.88	1.99	2.99	--	--	2.68
Dissolved oxygen (DO), field	mg/L	--	1.25	5.24	0.55	--	--	1.64
Oxidation reduction potential (ORP), field	millivolts	--	-175	-79	-345	--	--	-162
pH, field	s.u.	--	7.12	7.29	7.06	--	--	6.6
Temperature, field	Deg C	--	19.64	14.4	19.5	--	--	15.71
Turbidity, field	NTU	--	1.1	19.5	0	--	--	1.4

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-051618-TS-022	GW-45804-081518-TS-009	GW-45804-110918-TS-016	GW-45804-061819-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-015
Sample Date:		5/16/2018	8/15/2018	11/9/2018	6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:		Duplicate						
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	-	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	-	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	-	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	-	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	-	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	-	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--
Semi-Volatiles								
Anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--
Misc								
Oil and grease	mg/L	--	--	--	--	15.9	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-MB-010	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
Sample Type:										Duplicate	
Parameters	**Units**	**TLP2**									
Metals											
Arsenic (dissolved)	mg/L		0.0045	0.0025	0.0012	0.0063	ND(0.0010)	0.0019	0.0138	0.0146	0.0067
Boron (dissolved)	mg/L		0.076	0.116	0.168	0.160	0.161	0.112	0.161	0.157	0.079
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		0.00227	0.00085	ND(0.00050)	0.00351	ND(0.00050)	ND(0.00050)	0.00166	0.00174	0.00056
Copper (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0026	ND(0.0010)	0.0022	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.6	24.5	4.09	ND(0.050)	12.8	ND(0.050)	0.209	4.76	4.95	16.7
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	2.31	1.21	0.179	0.711	0.0299	0.530	1.18	1.23	1.62
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0543	0.0196	0.0177	0.0270	0.0160	0.0230	0.0263	0.0261	0.0161
Nickel (dissolved)	mg/L		0.0030	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030	0.0046	0.0050	ND(0.0020)
Zinc (dissolved)	mg/L		0.0026	0.0146	0.0074	0.0053	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0052	0.0111
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	995	368	464	408	667	476	480	507 J	519 J	485
Ammonia-N	mg/L	0.2	6.59	11.8	9.02	13.7	22.1	34.9	35.8 J	35.7 J	16.8
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L		74	27	30	55	ND(41)	14	23 J	32 J	26
Chloride	mg/L		157	141	135	164	194	140	114 J	116 J	111
Color (apparent)	TCU		76.5	29.6 J	8.2	121	16.8 J	15.9	39.4 J	35.6 J	101
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.4	14.8	ND(7.8)	5.8	13.0	9.4	9.5	5.8 J	5.8 J	6.7
Escherichia coli	cfu/100mL	5	ND(2)	ND(2)	ND(2)	ND(2)	50	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL		ND(2) J	ND(2)	2	ND(2)	50	0	0 J	0 J	0
Nitrate (as N)	mg/L	0.6	0.21	2.54	2.05	0.18	0.54	0.54	0.91 J	0.94 J	ND(0.50)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
pH, lab	s.u.		7.26	7.82	7.30	7.37	7.23	7.42	7.15 J	7.15 J	7.66
Phenol	mg/L		ND(0.0010)	ND(0.0030)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)	ND(0.0010) J	ND(0.0010) J	ND(0.0010)
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.6	0.397	0.313	ND(0.030)	1.12	ND(0.030)	0.032	0.666 J	0.662 J	0.161
Sulfate	mg/L		1060	797	807	689	867	834	592 J	595 J	895
Total coliform bacteria	cfu/100mL		2	30	300	200	4200	50	0 J	0 J	1
Total dissolved solids (TDS)	mg/L		2180	1880	1880	1910	2040	1940	1430 J	1410 J	1660
Total Kjeldahl nitrogen (TKN)	mg/L		11.4	13.5	9.62	14.3	23.0	31.8	28.1 J	26.0 J	21.7
Total suspended solids (TSS)	mg/L		163	386	10.0	226	5.8	3.6	15.2 J	10.4 J	230
Turbidity	NTU		380	22.0	0.71	65.3	13.6	0.85	21.7 J	16.3 J	43.0
Un-ionized ammonia	mg/L		0.00229	0.00241	0.00211	0.00858	0.0496	0.152	1.50 J	1.49 J	0.0664
Field Parameters											
Color	TCU		--	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm		2.89	2.62	2.37	2.67	3.09	2.82	2.46	--	1.4
Dissolved oxygen (DO), field	mg/L		3.22	2.93	3.73	9.16	3.7	0.61	0.35	--	4.14
Odor	none		--	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-73	--	38	--	59	-52	-96	--	-75
pH, field	s.u.		6.32	5.74	6.80	6.26	7	7.06	8.02	8.02	7.07
Temperature, field	Deg C		6.4	16.5	22.32	16.5	6.31	17.57	22.61	22.6	13.19
Turbidity, field	NTU		3.29	97.5	24	73.9	38.6	37.5	16.2	--	--
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	360	ND(250)	2130	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	350	ND(250)	2110	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	920	ND(250)	7080	ND(250)	ND(250)	ND(250) J	ND(250) J	290
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	--	5140	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	1280	ND(250)	9210	ND(360)	ND(360)	ND(360) J	ND(360) J	ND(360)

GHD 0462041(85)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-MB-010	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
Sample Type:										Duplicate	
Parameters	**Units**	**TLP2**									
Semi-Volatiles											
1-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acridine	µg/L		--	--	--	--	ND(4.0)	--	--	--	--
Anthracene	µg/L		0.048	0.69	ND(0.020)	0.67	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	0.106
Benzo(a)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(a)pyrene	µg/L		0.097	1.25	0.0179	1.74	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	0.0963
Benzo(b)fluoranthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	ND(0.040)	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	ND(0.030)	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	ND(0.060)	--	--	--	--
Chrysene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Fluorene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Naphthalene	µg/L		--	--	--	--	ND(0.050)	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Pyrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Misc											
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--

Notes

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011	GW-45804-021016-TS-006	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:											
Parameters	**Units**										
Metals											
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0130	0.0087	0.00467	--	--
Boron (dissolved)	mg/L	ND(0.10)	0.13	0.17	0.12	ND(0.10)	0.073	0.12	0.111	--	--
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000012	ND(0.00010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)	ND(0.0010)	0.00053	ND(0.0010)	0.00051	--	--
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00068	ND(0.0020)	ND(0.00235)	--	--
Iron (dissolved)	mg/L	11.6	ND(0.50)	1.29	ND(0.10)	ND(0.10)	1.60	7.07	6.55	0.344	0.157 J
Lead (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	0.000061	--	--
Manganese (dissolved)	mg/L	2.02	0.088	1.41	0.053J	ND(0.0114)	1.09	1.09	0.957	0.036	0.760 J
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	0.000014	ND(0.000010)	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.000010)	--	--
Molybdenum (dissolved)	mg/L	0.0090	0.0071	0.0135	0.0148	ND(0.00987)	0.0201	0.0160	0.0196	--	--
Nickel (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00282	ND(0.0050)	0.00225	--	--
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0049)	ND(0.010)	0.0016	--	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	434	307	451	387	ND(329)	417	533	619	429	511 J
Ammonia-N	mg/L	15.2	ND(0.460)	11.5	1.36	0.237	12.3	20.5	17.1	6.25	15.9 J
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	41	18	25	15	ND(14)	15	ND(35)	43	--	--
Chloride	mg/L	133	197	186	136	ND(126)	81.3	85.7	97.2	--	--
Color (apparent)	TCU	127	9.4	76.7	6.8	ND(6.3) J	19.0	237	216	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.1	4.3	6.3	5.0	ND(4.5)	5.5	9.3	10.4	5.3	11.2 J
Escherichia coli	cfu/100mL	ND(2)	0	0	0	0 J	0	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0	0	0 J	0	2	0	--	--
Nitrate (as N)	mg/L	2.20	11.8	0.17	3.93	1.05	ND(0.10)	ND(0.10)	4.61	0.929	ND(0.030) J
Nitrite (as N)	mg/L	0.111	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.162	--	--
pH, lab	s.u.	7.64	7.47	7.77	7.28	7.72	7.86	7.54	7.05	--	--
Phenol	mg/L	ND(0.0034)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	0.0027	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0024)	0.0044	ND(0.0024)	--	--
Phosphorus	mg/L	1.37	ND(0.030)	0.048	ND(0.030)	ND(0.030)	0.0115	0.0369	0.0440	0.0157	0.0365 J
Sulfate	mg/L	1000	1010	759	705	ND(752)	710	528	432	--	--
Total coliform bacteria	cfu/100mL	4	20	20	15	ND(10) J	ND(10)	200	20	--	--
Total dissolved solids (TDS)	mg/L	1960	1920	1690	1520	ND(1490)	1460	1370	1340	--	--
Total kjeldahl nitrogen (TKN)	mg/L	17.2	0.39	9.89	1.88	0.61	12.6	32.3	20.7	--	--
Total suspended solids (TSS)	mg/L	2630	6.8	28.3	6.4	ND(9.8)	ND(9.2)	18.0	21.0	--	--
Turbidity	NTU	40.1	ND(1.34)	3.99	4.34	ND(2.39) J	11.8	94.5	58.3	--	--
Un-ionized ammonia	mg/L	0.0881	0.00165	0.184	0.0147	0.000644	0.321	0.0606	0.0727	--	--
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.681	2.51	2.85	2.13	1.1	1.76	1.91	0.604	1.91	1.32
Dissolved oxygen (DO), field	mg/L	--	2.12	1.36	0	0	0	1.36	1.44	0	0.09
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	247	-90	14	-18	-31	-89	-125	-51	-33
pH, field	s.u.	7.45	6.83	7.55	7.5	7.09	7.88	6.72	7.23	7.09	6.98
Temperature, field	Deg C	9.94	16.06	19.46	15.26	7.87	15.91	22.7	11.39	17.76	23.51
Turbidity, field	NTU	--	0	16.4	4.4	0	3.1	0	38	3	0
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	1330	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	1310	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	449J	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	583J	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--	--

GHD 04620-(85)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011	GW-45804-021016-TS-006	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:											
Parameters	**Units**										
Semi-Volatiles											
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	0.83	ND(1.020)	0.820	ND(1.020)	ND(1.020)	ND(1.020)	0.852	ND(1.020)	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	2.26	0.0072	0.0284	0.0117	ND(0.0050)	0.0144	0.0451	ND(0.0050)	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--

Notes

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

BEST COPIES AVAILABLE

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-051618-TS-005	GW-45804-051618-TS-005	GW-45804-081518-TS-003	GW-45804-110818-TS-005	GW-45804-061719-TS-014	GW-045804-090519-JC-007	GW-045804-090519-JC-008	GW-045804-112619-JC-002	GW-045804-112619-JC-003
Sample Date:		5/15/2018	5/16/2018	8/15/2018	11/8/2018	6/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	--	--	--	--	--	0.00083	0.00090	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	0.094	0.093	--	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	ND(0.000010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	0.00136	0.00168	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	0.00022	0.00024	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	0.00057	ND(0.00020)	--	--
Iron (dissolved)	mg/L	--	0.58	0.109	0.148	0.69	2.84	2.97	0.069	0.071
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--
Manganese (dissolved)	mg/L	--	0.864	0.869	0.892	0.800	0.895	0.971	1.42	1.36
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	0.00114	0.00113	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	0.0052	0.0010	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	--	574	485	363	406	--	--	603	604
Ammonia-N	mg/L	--	22.3	23.0	17.5	19.1	--	--	19.3	14.6
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	9.5	9.6	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	27	29	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	--	9.5	8.86	14.6	5.62	--	--	6.76	7.29
Escherichia coli	cfu/100mL	--	1	5	78.1	0	3	3	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	--	ND(0.02U)	ND(0.02U)	ND(0.02U)	ND(0.1U)	--	--	0.10	0.11
Nitrite (as N)	mg/L	--	--	--	--	--	ND(0.05U)	ND(0.05U)	--	--
pH, lab	s.u.	--	--	--	--	--	7.45	7.47	7.40	7.38
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	ND(0.0010)	0.0030	--	--
Phosphorus	mg/L	--	0.0471	0.0294	0.140	0.121	--	--	0.0099	0.0073
Sulfate	mg/L	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	19.6	19.9	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	16.0	14.6	--	--
Turbidity	NTU	--	--	--	--	--	--	--	1.26	1.42
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00669	0.00573
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.74	--	1.6	1.48	1.67	1.540	1.540	2.05	2.05
Dissolved oxygen (DO), field	mg/L	1.64	--	4.25	0.41	5.66	0.4	--	0.01	--
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	33	--	-41	-13	-118	-65	--	25	--
pH, field	s.u.	7.01	--	6.77	7.28	7.03	6.95	6.95	6.41	6.41
Temperature, field	Deg C	13.2	--	23.79	13.69	20.14	23.02	23.02	10.95	10.95
Turbidity, field	NTU	26.1	--	0.8	19.6	1.6	16.6	--	0.4	--
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-051618-TS-005	GW-45804-051618-TS-005	GW-45804-081518-TS-003	GW-45804-110818-TS-005	GW-45804-061719-TS-014	GW-045804-090519-JC-007	GW-045804-090519-JC-008	GW-045804-112619-JC-002	GW-045804-112619-JC-003
Sample Date:		5/15/2018	5/16/2018	8/15/2018	11/8/2018	6/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc										
Oil and grease	mg/L	--	--	--	--	--	ND(5.0)	ND(5.0)	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002	GW-45804-081611-TS-003	
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011	8/16/2011	
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**	**TLP2**										
Metals												
Aluminum (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Antimony (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Arsenic (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054	ND(0.010)	
Barium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Beryllium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Bismuth (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Boron (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	
Calcium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Chromium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Copper (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Iron (dissolved)	mg/L	10.5	10.0	8.20	12.0	15.0	24.0	24.7	10.5	10.4	8.84	
Lead (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Magnesium (dissolved)	mg/L		77.4	--	--	--	--	--	--	--	--	
Manganese (dissolved)	mg/L	2.1	2.61	1.95	2.06	2.11	2.30	2.30	4.01	4.02	2.37	
Mercury (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Molybdenum (dissolved)	mg/L		0.037	0.059	0.058	0.055	0.026	0.024	0.0248	0.0252	0.051	
Nickel (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Phosphorus (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Potassium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Selenium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Silicon (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Silver (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Sodium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Strontium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Thallium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Tin (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Titanium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Tungsten (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Uranium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Vanadium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
Zinc (dissolved)	mg/L		ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)	ND(0.030)	
Zirconium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	
General Chemistry												
Alkalinity, bicarbonate	mg/L		--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate	mg/L		--	--	--	--	--	--	--	--	--	
Alkalinity, hydroxide	mg/L		--	--	--	--	--	--	--	--	--	
Alkalinity, total (as CaCO3)	mg/L	996	530	220	444	426	598	716	277	261	380	
Ammonia-N	mg/L	0.2	7.480	1.02	1.03	0.873	0.331	0.872	0.0038	0.68	3.77	
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L		3.0	ND(2.0)	ND(2.0)	ND(2.0)	2.5	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	--	--	--	
Chloride	mg/L		58.1	106	58.1	71.6	78.7	78.5	107	105	141	
Color (apparent)	TCU		36.6	51.3	312	36.2	87.4	56.9	39.3	19.1	44.4	
Conductivity	umhos/cm		1800	--	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	10.4	7.7	13.0	10.6	14.9	15.2	10.5	10.6	9.9	
Escherichia coli	cfu/100mL	5	0	0	0	ND(2)	0	0	0	0	0	
Fecal coliform bacteria	cfu/100mL		1	0	0	ND(2)	0	0	0	0	0	
Nitrate (as N)	mg/L	0.5	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)	
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)	
Nitrite/Nitrate	mg/L		--	--	--	--	--	--	--	--	--	
pH, lab	s.u.		7.77	--	--	--	--	--	--	--	--	
Phenol	mg/L		--	--	--	--	--	--	--	--	--	
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--	
Phosphorus	mg/L	0.5	1.95	4.30	1.84	2.61	0.528	0.708	1.88	0.400	0.501	
Sulfate	mg/L		--	--	--	--	--	--	--	--	--	
Total coliform bacteria	cfu/100mL		2	0	30	10	0	0	1	1	1	
Total dissolved solids (TDS)	mg/L		1340	1280	1350	1280	1190	1200	1820	1860	1580	
Total Kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	--	--	--	
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	--	--	--	
Turbidity	NTU		4.90	--	--	--	--	--	--	--	--	
Un-ionized ammonia	mg/L		0.000225	0.00324	0.00162	0.000267	0.000218	0.000195	0.0000910	0.000103	0.0329	

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MS-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002	GW-45804-081611-TS-003	
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011	8/16/2011	
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**	**TLP2**										
Field Parameters												
Color	TCU		--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		2.3	1.67	1.54	2.07	2.35	2.35	2.79	2.79	2.28	
Dissolved oxygen (DO), field	mg/L		--	--	--	3	--	--	--	--	--	
Odor	none		--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts		--	--	--	-125	-130	-130	--	--	--	
pH, field	s.u.		6.22	7.11	6.09	5.99	6.20	6.20	5.73	5.73	7.34	
Temperature, field	Deg C		8.8	9.9	19.3	15.0	4.7	4.7	7.21	7.21	19.9	
Turbidity, field	NTU		-5	--	--	--	--	--	427	427	--	
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L		3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	
Petroleum hydrocarbons F3 minus PAH	µg/L		3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	
Petroleum hydrocarbons F4 (C34-C50)	µg/L		14300	13900	3120	1860	530	1800	4200	ND(2500)	520	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		45900	52900	8800	5960	--	5800	12200	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(1000)	ND(1000)	ND(100)	ND(100)	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L		17600	16800	3870	2340	530	2270	4200	ND(2500)	520	
Semi Volatiles												
1+2-Methylnaphthalene	µg/L		--	ND(0.28)	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
Acenaphthene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
Acenaphthylene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
Acridine	µg/L		--	--	--	--	--	--	--	--	--	
Anthracene	µg/L		--	ND(0.20)	ND(0.20)	0.098	0.031	0.059	ND(0.020)	ND(0.020)	0.033	
Benzo(a)anthracene	µg/L		--	0.44	--	--	--	--	--	--	--	
Benzo(a)pyrene	µg/L		--	0.508	0.082	0.292	0.113	0.232	0.0141	0.0021	0.135	
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--	--	
Benzo(j)fluoranthene/Benzo(j)fluoranthene	µg/L		--	0.39	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/L		--	0.48	--	--	--	--	--	--	--	
Benzo(k)fluoranthene	µg/L		--	0.42	--	--	--	--	--	--	--	
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--	--	
Chrysene	µg/L		--	0.58	--	--	--	--	--	--	--	
Dibenz(a,h)anthracene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
Fluoranthene	µg/L		--	1.41	--	--	--	--	--	--	--	
Fluorene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	
Indeno(1,2,3-cd)pyrene	µg/L		--	0.36	--	--	--	--	--	--	--	
Naphthalene	µg/L		--	0.22	--	--	--	--	--	--	--	
Phenanthrene	µg/L		--	0.91	--	--	--	--	--	--	--	
Pyrene	µg/L		--	1.32	--	--	--	--	--	--	--	
Misc.												
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003	GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	
Sample Date:		11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012	8/8/2012	8/8/2012	11/12/2012	
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.10)	ND(0.10)	--	
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.050)	ND(0.050)	--	
Arsenic (dissolved)	mg/L	0.0067	0.0042	--	--	0.0047	--	--	ND(0.010)	ND(0.010)	0.0044	
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	0.13	0.13	--	
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Boron (dissolved)	mg/L	--	ND(0.050)	--	--	0.056	--	--	ND(0.50)	ND(0.50)	0.068	
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	--	--	ND(0.00010)	--	--	ND(0.00090)	ND(0.00090)	ND(0.00010)	
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	262	273	--	
Chromium (dissolved)	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.0050)	ND(0.0050)	ND(0.0010)	
Cobalt (dissolved)	mg/L	--	ND(0.00050)	--	--	ND(0.00050)	--	--	ND(0.0050)	ND(0.0050)	0.00067	
Copper (dissolved)	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.010)	ND(0.010)	ND(0.0010)	
Iron (dissolved)	mg/L	7.95	10.3	--	--	9.87	--	--	8.93	8.05	5.48	
Lead (dissolved)	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.010)	ND(0.010)	ND(0.0010)	
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	70.1	69.5	--	
Manganese (dissolved)	mg/L	1.09	3.24	--	--	3.47	--	--	2.83	2.75	1.99	
Mercury (dissolved)	mg/L	--	ND(0.00010)	--	--	ND(0.00010)	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	
Molybdenum (dissolved)	mg/L	0.0250	0.0119	--	--	0.0168	--	--	0.024	0.024	0.0115	
Nickel (dissolved)	mg/L	--	ND(0.0020)	--	--	ND(0.0020)	--	--	ND(0.020)	ND(0.020)	ND(0.0020)	
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.50)	ND(0.50)	--	
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	23	23	--	
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0040)	ND(0.0040)	--	
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	15	15	--	
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	79.1	78.8	--	
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	2.74	2.60	--	
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0030)	ND(0.0030)	--	
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.10)	ND(0.10)	--	
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.050)	ND(0.050)	--	
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	--	--	ND(0.0030)	--	--	ND(0.030)	ND(0.030)	0.0044	
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.040)	ND(0.040)	--	
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	562	555	--	
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	ND(10)	ND(10)	--	
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	ND(10)	ND(10)	--	
Alkalinity, total (as CaCO3)	mg/L	483	511	426	--	364	--	--	567	560	555	
Ammonia-N	mg/L	3.12	3.38	2.59	3.03	3.74	--	--	3.62	3.52	3.25	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L	5.5	5.2	ND(3.0)	--	3.2	--	--	ND(2.0)	ND(2.0)	3.9 J	
Chemical oxygen demand (COD)	mg/L	--	49	--	--	36	--	--	53	51	42 J	
Chloride	mg/L	112	--	173	--	182	--	--	119	119	120	
Color (apparent)	TCU	30.2	13.2	23.3	--	--	158	112	184	88.5	65.6 J	
Conductivity	umhos/cm	--	--	1950	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.82	13.1	11.3	--	11.0	--	--	10.9	10.2	11.7	
Escherichia coli	cfu/100mL	ND(2)	0	0	0	--	0	0	0	0	ND(2)	
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0 J	0 J	--	0	0	0	0	ND(2)	
Nitrate (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.5)	--	ND(0.10)	--	--	ND(0.10)	ND(0.10)	ND(0.10)	
Nitrite (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.5)	--	ND(0.10)	--	--	ND(0.10)	ND(0.10)	ND(0.10)	
Nitrite/Nitrate	mg/L	--	ND(1.0)	--	--	--	--	--	--	--	--	
pH, lab	s.u.	--	7.61	7.09	--	7.59	--	--	7.96	8.00	7.83	
Phenol	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	
Phosphorus	mg/L	0.710	0.475	0.583	--	0.321	--	--	0.755	0.821	0.555	
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	425	
Total coliform bacteria	cfu/100mL	2	0	0	0	--	2	4	0	0	20 J	
Total dissolved solids (TDS)	mg/L	1580	1560	1510	--	1620	--	--	1430	1410	1370	
Total kjeldahl nitrogen (TKN)	mg/L	--	5.66	--	--	5.33	--	--	6.61	6.74	6.21	
Total suspended solids (TSS)	mg/L	--	466	--	--	567	--	--	484	584	466	
Turbidity	NTU	--	182	27.0	--	--	56.0 J	23.0 J	54.0	30.0	9.20 J	
Un-ionized ammonia	mg/L	0.0194	--	0.0000556	0.0000590	--	--	--	--	--	0.0917	

O:\HD\145804 (86)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003	GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004
Sample Date:		11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012	8/8/2012	8/8/2012	11/12/2012
Sample Type:								Duplicate		Duplicate	
Parameters	**Units**										
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.39	2.36	2.48	2.46	2.34	2.3	--	1.82	--	2.29
Dissolved oxygen (DO), field	mg/L	--	--	--	--	--	--	--	8.1	--	8.24
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	--	--	--	--	--	--	--	-132
pH, field	s.u.	7.29	5.9	5.09	5.09	9.46	8.29	--	7.7	--	7.75
Temperature, field	Deg C	13.7	4.66	6.8	6.8	10.77	11.09	--	18.24	--	15.1
Turbidity, field	NTU	981	-5	-5	-5	--	--	--	6.92	--	840
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(25)	ND(100)	--	ND(100)	--	--	ND(25)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	--	ND(100)	--	--	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	290	ND(250)	ND(250)	--	ND(250)	--	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	290	ND(250)	--	--	ND(250)	--	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1130	450	590	--	ND(250)	--	--	480	520	530 J
Petroleum hydrocarbons F4 gravimetric - silica gel (SHR)	µg/L	3400	--	--	--	--	--	--	2500	ND(2500)	3000
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	ND(100)	--	--	--	--	--	ND(100)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	1420	450	590	--	ND(250)	--	--	480	520	530 J
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.28)	ND(0.28)	ND(0.028)
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Acenaphthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Acenaphthylene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	0.021	ND(0.020)	--	--	ND(0.020)	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.036
Benzo(a)pyrene	µg/L	0.0923	0.014	--	--	0.0289	--	--	ND(0.10)	ND(0.10)	0.040
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.040
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.051
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.033
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.046
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	0.34	0.129
Fluorene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.026
Naphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.034
Phenanthrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.072 J
Pyrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	0.36	0.154
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-015	GW-45804-052213-TS-014	GW-45804-080713-TS-005	GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007
Sample Date:		11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014
Sample Type:		Duplicate			Duplicate		Duplicate				
Parameters	**Units**										
Metals											
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	0.0044	0.0020	0.0034	0.0035	0.0071	0.0068	0.0029	0.0012	0.0024	0.0040
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.065	ND(0.050)	0.067	0.069	0.076	0.075	0.067	ND(0.050)	0.075	0.092
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	4.85	8.39	8.75	8.87	5.93	5.90	6.07	9.19	8.92	5.21
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.10	4.86	4.80	4.77	2.70	2.70	2.75	4.69	5.06	2.17
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0127	0.0069	0.0130	0.0130	0.0191	0.0199	0.0107	0.0049	0.0084	0.0151
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
General Chemistry											
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	529	476	461	399	447	446	511	474	475 J	524 J
Ammonia-N	mg/L	3.77	3.66	4.38	4.48	5.02	5.02	5.13	5.47	7.40 J	6.43 J
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	6.8 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0) J
Chemical oxygen demand (COD)	mg/L	56 J	63	44	49	36 J	148 J	51	ND(58)	102 J	43 J
Chloride	mg/L	115	184	186	190	148	147	143	178	179 J	166 J
Color (apparent)	TCU	79.5 J	23.6	33.7	34.0	126	60.0	176	191 J	230 J	92.2 J
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	12.0	17.6	16.5	15.8	13.9	14.7	11.6	9.6	8.2 J	7.7 J
Escherichia coli	cfu/100mL	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.62	7.81	7.67	7.70	7.49	7.50	7.61	7.30	7.68 J	7.51 J
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0030	0.0030	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J	0.0018 J
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.218	0.692	0.208	0.228	0.093	0.118	0.032	0.046	0.127 J	0.079 J
Sulfate	mg/L	430	597	669	683	682	675	646	477	504 J	497 J
Total coliform bacteria	cfu/100mL	ND(2) J	ND(2)	ND(100)	ND(100)	10	10	ND(2)	0	ND(2) J	0 J
Total dissolved solids (TDS)	mg/L	1380	1650	1640	1650	1760	1770	1580	1450	1510 J	1450 J
Total Kjeldahl nitrogen (TKN)	mg/L	5.74	5.28	5.98	5.52	6.88	7.01	7.39	6.21	7.43 J	9.80 J
Total suspended solids (TSS)	mg/L	773	2650	748	646	26.9	23.6	905	24.5	38.0 J	12.0 J
Turbidity	NTU	5.70 J	22.0	40.0 J	20.5 J	34.0	32.0	53.8	117	96.0 J	52.2 J
Un-ionized ammonia	mg/L	0.0882	0.0388	0.00151	0.00156	0.0151	0.0148	0.00316	0.0215	0.0364 J	1.90 J

O:\HD\145804\ (86)

001500

BEST COPIES AVAILABLE

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-015	GW-45804-052213-TS-014	GW-45804-080713-TS-005	GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	
Sample Date:		11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	
Sample Type:		Duplicate			Duplicate		Duplicate					
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	ND()	--	--	--	
Conductivity, field	mS/cm	--	2.47	2.38	--	2.32	--	2.24	2.38	2.39	2.34	
Dissolved oxygen (DO), field	mg/L	--	6.86	5.54	--	5.46	--	9.06	5.69	0	2.02	
Odor	none	--	--	--	--	--	--	ND()	--	--	--	
Oxidation reduction potential (ORP), field	millivolts	--	--	-131	--	-119	--	--	-148	-176	-154	
pH, field	s.u.	7.75	7.78	8.11	8.11	8.63	8.63	8.21	7.34	7.32	8.64	
Temperature, field	Deg C	15.1	8.9	12.3	12.3	20.7	20.7	12.5	7.17	10.58	20.31	
Turbidity, field	NTU	--	-5	-5	--	0	--	641	33.8	30.1	45.1	
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J	
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(630)	420	490	ND(250)	ND(250)	1240	ND(250)	ND(250) J	ND(250) J	
Petroleum hydrocarbons F4 gravimetric - silica gel (SHH)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250) J	ND(630)	420	490	ND(250)	ND(250)	1530	ND(380)	ND(380) J	ND(380) J	
Semi Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--	
Acenaphthene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--	
Acenaphthylene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--	
Acridine	µg/L	--	--	ND(4.0)	ND(4.0)	--	--	--	ND(4.0)	--	--	
Anthracene	µg/L	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	
Benzo(a)anthracene	µg/L	0.037	--	0.022	0.033	--	--	--	ND(0.020)	--	--	
Benzo(a)pyrene	µg/L	0.042	ND(0.10)	0.0252	0.0342	ND(0.0050)	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	
Benzo(b)fluoranthene	µg/L	0.040	--	0.035	0.047	--	--	--	ND(0.020)	--	--	
Benzo(j)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L	--	--	ND(0.040)	ND(0.040)	--	--	--	ND(0.040)	--	--	
Benzo(g,h,i)perylene	µg/L	0.071	--	0.044	0.054	--	--	--	ND(0.020)	--	--	
Benzo(k)fluoranthene	µg/L	0.034	--	0.024	0.036	--	--	--	ND(0.020)	--	--	
Carcinogenic potency equivalent	µg/L	--	--	ND(0.060)	ND(0.060)	--	--	--	ND(0.060)	--	--	
Chrysene	µg/L	0.053	--	0.031	0.041	--	--	--	ND(0.020)	--	--	
Dibenz(a,h)anthracene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--	
Fluoranthene	µg/L	0.145	--	0.089 J	0.104 J	--	--	--	ND(0.020)	--	--	
Fluorene	µg/L	0.021	--	ND(0.097)	ND(0.13)	--	--	--	ND(0.020)	--	--	
Indeno(1,2,3-cd)pyrene	µg/L	0.032	--	0.024	0.029	--	--	--	ND(0.020)	--	--	
Naphthalene	µg/L	0.034	--	0.033 J	0.036 J	--	--	--	ND(0.050)	--	--	
Phenanthrene	µg/L	0.094 J	--	0.056	0.062	--	--	--	ND(0.020)	--	--	
Pyrene	µg/L	0.178	--	0.101	0.131	--	--	--	ND(0.020)	--	--	
Misc.												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	
Sample ID:		GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004	GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006	GW-45805-111516-TS-006	
Sample Date:		11/25/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016	11/15/2016	
Sample Type:			Field Blank									
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	0.0017	ND(0.0010)	0.0018	ND(0.00010)	0.0015	ND(0.0010)	0.00116	0.0016	0.00108	--	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.086	ND(0.050)	0.079	ND(0.010)	ND(0.10)	ND(0.10)	0.065	0.11	0.078	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.000010)	--	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)	ND(0.0010)	0.00018	ND(0.0010)	0.00027	--	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.0020)	0.00058	--	--
Iron (dissolved)	mg/L	5.12	10.7	9.11	ND(0.010)	5.82	6.02	7.89	4.96	4.06	--	--
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	3.31	3.57	4.37	ND(0.00050)	4.17	3.10	4.73	3.37	2.50	--	--
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.0000010)	--	--
Molybdenum (dissolved)	mg/L	0.0063	0.0022	0.0056	ND(0.000050)	0.00940	ND(0.00500)	0.00709	0.0107	0.00579	--	--
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	ND(0.0050)	ND(0.0050)	0.00161	ND(0.0050)	0.00105	--	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0070	ND(0.0030)	ND(0.0030)	0.0019	ND(0.010)	ND(0.010)	ND(0.0012)	ND(0.010)	ND(0.0010)	--	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	545	672	469	ND(10)	459	ND(439)	398	518	558	--	--
Ammonia-N	mg/L	8.27	8.57	10.5	ND(0.050)	9.08	2.80	6.21	7.19	8.35	--	--
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	2.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	39	45	41	ND(10)	36	ND(33)	33	ND(44)	45	--	--
Chloride	mg/L	126	149	356	ND(0.50)	199	ND(157)	155	148	128	--	--
Color (apparent)	TCU	159	54.2	79.0	ND(1.0)	222	211	200	216	196	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	7.8	10.7	ND(1.0)	10.5	ND(8.3)	9.8	11.0	10.9	--	--
Escherichia coli	cfu/100mL	0	ND(2)	0	0	0	0	0	1	0	--	--
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0	0	0	0	60	0	--	--
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)	--	--
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	--	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.84	7.71	7.69	7.18	7.79	7.89	7.91	7.74	7.34	--	--
Phenol	mg/L	ND(0.0010)	ND(0.0029)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	0.0027	0.0021	0.0029	ND(0.0010)	ND(0.0021)	0.0060	0.0022	--	--
Phosphorus	mg/L	0.088	0.338	0.073	ND(0.030)	0.101	0.056	0.0653	0.0820	0.0943	--	--
Sulfate	mg/L	425	405	579	ND(0.30)	660	ND(520)	726	560	511	--	--
Total coliform bacteria	cfu/100mL	0	12	10	1	0	0	10	3600	0	--	--
Total dissolved solids (TDS)	mg/L	1340	1410	1600	ND(10)	1590	ND(1540)	1690	1650	1580	--	--
Total kjeldahl nitrogen (TKN)	mg/L	9.06	8.99	11.6	ND(0.15)	8.47	6.70	7.50	7.70	5.62	--	--
Total suspended solids (TSS)	mg/L	16.4	1450	21.4	ND(2.0)	16.2	ND(16.0)	27.6	5.2	2.6	--	--
Turbidity	NTU	52.6	27.4	96.0	ND(0.10)	86.2	97.3 J	101	50.3	50.6	--	--
Un-ionized ammonia	mg/L	0.0287	0.0261	0.0477	--	0.355	0.0172	0.244	0.0285	0.0264	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004	GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006	GW-45805-111516-TS-006
Sample Date:		11/25/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016	11/15/2016
Sample Type:			Field Blank								
Parameters	**Units**										
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.579	--	2.47	--	2.29	1.25	1.87	1.8	--	1.86
Dissolved oxygen (DO), field	mg/L	3.09	--	1.04	--	0.57	0	0	0	--	3.14
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-103	--	-86	--	-167	-115	-94	-91	--	-129
pH, field	s.u.	7.14	7.44	7.19	--	8.11	7.22	8.16	6.97	--	7.1
Temperature, field	Deg C	11.26	4.4	13.32	--	13.66	4.95	11.99	19.33	--	13.5
Turbidity, field	NTU	--	--	0	--	2.3	0	1.6	0	--	0.2
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	260	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	260	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1290	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	1540	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.056	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(c)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(c)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-060117-TS-009	GW-45804-083017-TS-002	GW-45804-112917-TS-005	GW-45804-051618-TS-011	GW-45804-051618-TS-012	GW-45804-081518-TS-006	GW-45804-110818-TS-011	GW-45804-061819-JC-008	GW-045804-090419-JC-001	GW-045804-112619-JC-007
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018	8/15/2018	11/8/2018	6/18/2019	9/4/2019	11/26/2019
Sample Type:						Duplicate					
Parameters	**Units**										
Metals											
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00076	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.114	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.000010)	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00169	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00019	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	6.06	3.65 J	3.64	4.82	4.63	6.28	3.09	4.53	2.87	2.41
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.000050)	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	3.67	3.33 J	3.28	2.48	2.47	2.92	1.80	2.32	1.87	1.89
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00118	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.0010)	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
General Chemistry											
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	496	554 J	686	504	501	488	543	517	--	598
Ammonia-N	mg/L	8.61	9.86 J	7.54	9.80	10.2	13.2	10.2	11.2	--	9.61
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	36	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.2	13.6 J	10.9	9.7	9.8	12.5	12.0	9.47	--	10.7
Escherichia coli	cfu/100mL	0	0 J	0	ND(0)	ND(0)	ND(0)	ND(0) J	--	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	7.05	0.033	ND(0.10)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	ND(0.050)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	7.65	7.87
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	0.0089	--
Phosphorus	mg/L	0.0952	0.104 J	0.0818	0.128	0.123	ND(0.0123)	0.266	0.114	--	0.143
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	12.0	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	2.8	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	33.9
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	0.0181

001504

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-060117-TS-009	GW-45804-083017-TS-002	GW-45804-112917-TS-005	GW-45804-051618-TS-011	GW-45804-051618-TS-012	GW-45804-081518-TS-006	GW-45804-110818-TS-011	GW-45804-061819-JC-008	GW-045804-090419-JC-001	GW-045804-112619-JC-007
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018 Duplicate	8/15/2018	11/8/2018	6/18/2019	9/4/2019	11/26/2019
Sample Type:											
Parameters	**Units**										
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.03	1.68	1.53	1.73	--	1.82	1.63	1.86	1.810	1.77
Dissolved oxygen (DO), field	mg/L	0	0.77	0	0	--	0	0.39	0.03	0.82	0
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-109	-123	-92	-128	--	-153	-125	-181	-96	-140
pH, field	s.u.	7.04	7.24	7.31	7.25	--	7.28	7.49	7.22	7.01	6.86
Temperature, field	Deg C	11.71	19.79	11.22	10.73	--	20.15	10.73	15.51	20.31	11.86
Turbidity, field	NTU	0	0	59	4.3	--	2.4	0	0.7	0	27.4
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	--
Semi-volatiles											
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(c)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(h)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	ND(5.0)	--

Notes:

ND Not detected at the associated reporting limit
J Estimated concentration.

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021611-MB-003	GW-45804-051611-MMD-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/16/2011	5/16/2011	8/16/2011
Sample Type:				Duplicate		Duplicate				
Parameters	**Units**	TLP2								
Metals										
Arsenic (dissolved)	mg/L		0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L		--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L		--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L		--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	10.6	22.2	23.8	10.9	11.1	7.64	7.87	6.33	6.79
Lead (dissolved)	mg/L		--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	8.78	7.08	7.77	7.76	6.83	6.44	4.06	4.36
Mercury (dissolved)	mg/L		--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0062	ND(0.010)
Nickel (dissolved)	mg/L		--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	996	264	266	186	192	152	188	202	190
Ammonia-N	mg/L	0.2	2.36	2.25	1.68	1.71	0.955	0.905	0.952	0.856
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	--	--
Chloride	mg/L		107	106	78.7	78.4	40.1	44.3	58.9	50.8
Color (apparent)	TCU		83.8	87.8	520	498	367	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	9.0	8.9	8.7	10.2	8.6	10.0	9.0	11.2
Escherichia coli	cfu/100mL	5	0	0	0	0	0	0	0	1
Fecal coliform bacteria	cfu/100mL		0	0	0	0	0	0	0	10
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L		--	--	--	--	--	--	--	--
pH, lab	s.u.		--	--	--	--	--	--	--	--
Phenol	mg/L		--	--	--	--	--	--	--	--
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L		--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	0	0	0	1	0	10	20
Total dissolved solids (TDS)	mg/L		970	990	926	892	670	680	778	568
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	--	--
Turbidity	NTU		--	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L		0.00799	0.00769	0.00108	0.000871	0.000396	0.000182	0.000262	0.00404
Field Parameters										
Color	TCU		--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		1.423	1.423	0.99	0.99	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L		1.89	1.89	0	0	0	--	--	0
Odor	none		--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-123	-123	-152	-152	-143	-129	--	-165
pH, field	s.u.		7.05	7.05	6.20	6.20	6.17	6.17	6.48	7.17
Temperature, field	Deg C		13.82	13.82	19.2	19.2	14.3	4.7	6.88	18.1
Turbidity, field	NTU		--	--	--	--	--	--	14.3	89.1

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021611-MB-003	GW-45804-051611-MMD-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/16/2011	5/16/2011	8/16/2011
Sample Type:				Duplicate		Duplicate				
Parameters	**Units**	TLP2								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001507

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-05	MW103-09	MW103-05	MW103-09	MW103-09	MW103-09	MW103-09	MW103-05
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
Sample Type:		Duplicate		Duplicate					
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.011	0.0092	--	0.0071	0.0067	0.0087	0.0074	0.0061
Boron (dissolved)	mg/L	--	--	--	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	6.49	5.99	--	7.59	7.12	8.77	12.6	7.17
Lead (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.91	4.97	--	5.46	4.72	7.85	8.31	4.93
Mercury (dissolved)	mg/L	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0079	--	0.0049	0.0041	0.0063	0.0044	0.0060
Nickel (dissolved)	mg/L	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	--	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0080
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183	212	272	309	201
Ammonia-N	mg/L	0.886	0.998	0.917	0.630	0.914	0.953	1.08	1.01
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	28	30	46	44	36
Chloride	mg/L	51.0	38.9	37.7	--	61.5	62.4	111	92
Color (apparent)	TCU	269	103	75.3	14.2	277	322 J	75.9	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2	11.0	9.9	13.6	17.9
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite/Nitrate	mg/L	--	--	--	ND(1.0)	--	--	--	--
pH, lab	s.u.	--	--	--	7.61	7.87	7.74	7.60	7.52
Phenol	mg/L	--	--	--	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	ND(0.030)	0.046	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	--	--	--	--	--	328	278	317
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2	10
Total dissolved solids (TDS)	mg/L	564	546	546	612	748	860	900	734
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	1.47	1.61	1.66	2.08	1.65
Total suspended solids (TSS)	mg/L	--	--	--	13.0	7.0	15.0	32.0	14.0
Turbidity	NTU	--	--	--	77.0	81.0	8.50 J	106	59.0
Un-ionized ammonia	mg/L	0.00410	0.00168	0.00171	--	--	0.157	0.00558	0.000496
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	--	0.75	--	1.05	1.21	1	1.62	1.28
Dissolved oxygen (DO), field	mg/L	--	1.55	--	--	1.66	9.47	1.62	2.38
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-153	--	--	-139	-119	-109	--
pH, field	s.u.	--	7.10	7.10	5.78	6.84	8.84	7.48	6.15
Temperature, field	Deg C	--	12.0	12.0	6	12.98	16.3	6.6	14.3
Turbidity, field	NTU	--	13.4	--	484	94.3	129	74.4	117

001508

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-05	MW103-09	MW103-05	MW103-09	MW103-09	MW103-09	MW103-09	MW103-05
Sample ID:		GW-45804-061611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		6/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
Sample Type:		Duplicate		Duplicate					
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	ND(100)	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	0.030
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.028)	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	0.025
Acenaphthene	µg/L	--	--	--	--	--	ND(0.020)	--	0.070
Acenaphthylene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Acridine	µg/L	--	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Fluorene	µg/L	--	--	--	--	--	ND(0.020)	--	0.054
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Naphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Phenanthrene	µg/L	--	--	--	--	--	ND(0.020)	--	0.022
Pyrene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-05	MW103-09	MW103-09	MW103-05	MW103-09	MW103-05	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-005	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015
Sample Type:									Duplicate
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0103	0.0100	0.0031	0.0063	0.0101	0.0031	0.0063	0.0064
Boron (dissolved)	mg/L	0.056	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00096	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.03	5.22	2.69	5.16	3.91	4.80	7.30	7.22
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.78	2.79	1.78	2.93	1.96	2.41	4.09	4.03
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0061	0.0052	0.0060	0.0042	0.0049	0.0047	0.0029	0.0029
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.0147	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092	ND(0.0030)	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	179	169	341	224 J	202 J	209	396	398
Ammonia-N	mg/L	1.28	0.674	0.997	1.30 J	1.49 J	1.08	0.969	1.08
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.6	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	27	62	ND(34)	54 J	30 J	30	29	25
Chloride	mg/L	65	51.9	71.1	67.2 J	62.7 J	52	84.7	87.7
Color (apparent)	TCU	208	60.0	59.4 J	268 J	138 J	203	132	133
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	9.3	7.7	6.9 J	11.3 J	9.9	7.0	7.0
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0 J	0 J	0	ND(2)	2
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0 J	1 J	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.44	7.11	7.26	7.89 J	7.54 J	7.92	7.71	7.72
Phenol	mg/L	ND(0.0010)	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)	ND(0.0027)	ND(0.0025)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	ND(0.030)	1.50	ND(0.030)	0.043 J	ND(0.030) J	0.039	0.363	0.357
Sulfate	mg/L	135	171	272	193 J	109 J	126	174	185
Total coliform bacteria	cfu/100mL	100	ND(10)	7	0 J	7 J	300	178	128
Total dissolved solids (TDS)	mg/L	630	524	628	650 J	458 J	479	655	676
Total kjeldahl nitrogen (TKN)	mg/L	2.31	0.81	ND(1.57)	2.15 J	2.10 J	1.32	1.49	1.53
Total suspended solids (TSS)	mg/L	3.2	2750	53.5	4 G J	ND(2.0) J	3.6	448	390
Turbidity	NTU	18.7	136	47.0	34.0 J	7.03 J	19.6	52.0	53.0
Un-ionized ammonia	mg/L	0.00423	0.000291	0.00164	0.00786 J	0.317 J	0.00645	0.0113	0.0127
Field Parameters									
Color	TCU	--	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm	1.06	0.868	1.76	1.19	0.719	0.517	0.681	--
Dissolved oxygen (DO), field	mg/L	4.62	7.53	4.62	0	0.21	3.82	--	--
Odor	none	--	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	174	--	-101	-154	-147	-96	--	--
pH, field	s.u.	6.91	6.19	7.06	7.43	6.77	7.41	7.69	7.69
Temperature, field	Deg C	17.7	12.7	9.34	9.98	18.75	11.06	5.1	5.1
Turbidity, field	NTU	32.1	250	28.1	38.8	26.9	--	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-05	MW103-09	MW103-09	MW103-05	MW103-09	MW103-05	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-005	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015
Sample Type:									Duplicate
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)	960 J	370 J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)	1260 J	ND(380) J
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	ND(0.020)	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Acenaphthene	µg/L	--	--	0.037	--	--	--	--	--
Acenaphthylene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Acridine	µg/L	--	--	ND(4.0)	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.20)
Benzo(a)anthracene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.076	ND(0.050)
Benzo(b)fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	ND(0.040)	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	ND(0.060)	--	--	--	--	--
Chrysene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Fluorene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Naphthalene	µg/L	--	--	ND(0.050)	--	--	--	--	--
Phenanthrene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Pyrene	µg/L	--	--	ND(0.020)	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007
Sample Date:		5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016	6/1/2017
Sample Type:						Duplicate				
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	0.0067	0.00896	0.00851	0.00519	0.00527	0.00631	0.00817	0.0101	--
Boron (dissolved)	mg/L	ND(0.050)	0.045	0.042	ND(0.029)	ND(0.027)	0.030	0.046	0.044	--
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.00050)	0.00088	ND(0.00086)	ND(0.00080)	0.00063	ND(0.00050)	ND(0.00050)	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00011	0.00013	0.00071	0.00067	0.00069	0.00194	0.00022	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.00020)	ND(0.00020)	ND(0.00067) J	ND(0.00020) J	ND(0.00020)	ND(0.00020)	0.0403	--
Iron (dissolved)	mg/L	4.77	4.92	4.74	3.73	3.81	5.32	5.93	8.40	3.76
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000107	--
Manganese (dissolved)	mg/L	3.48	2.92	2.71	2.58	2.59	2.95	2.79	4.25	2.11
Mercury (dissolved)	mg/L	ND(0.000010)	0.000013	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L	0.0041	0.00467	0.00376	ND(0.00388)	ND(0.00379)	0.00372	0.00383	0.00371	--
Nickel (dissolved)	mg/L	ND(0.0020)	0.00056	0.00052	ND(0.00178)	ND(0.00158)	0.00142	0.00436	0.00078	--
Zinc (dissolved)	mg/L	ND(0.0030)	0.0023	0.0016	0.0069 J	ND(0.0022) J	0.0015	0.0124	0.0024	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	228	262	254	ND(349)	ND(253)	292	322	329	347
Ammonia-N	mg/L	1.01	1.35	1.09	0.867	0.908	1.19	1.32	1.43	1.61
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	32	32	32	ND(29)	ND(28)	32	ND(35)	44	--
Chloride	mg/L	76.5	96.8	56.9	ND(43.4)	ND(44.2)	80.4	101	83.5	--
Color (apparent)	TCU	225	247	207	189 J	191 J	293	260	343	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.6	9.9	10.1	ND(6.5)	ND(6.5)	9.6	11.5	10.3	7.8
Escherichia coli	cfu/100mL	0	12	0	0	0	0	8	0	0
Fecal coliform bacteria	cfu/100mL	2	40	0	0	0	0	60	0	--
Nitrate (as N)	mg/L	ND(0.10)	0.022	ND(0.020)	ND(0.025)	ND(0.024)	ND(0.020)	ND(0.10)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)	ND(0.010)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.84	7.93	7.58	7.82	7.80	7.90	7.63	7.11	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0034	0.0021	0.0036	ND(0.0010)	ND(0.0010)	0.0021	0.0032	0.0011	--
Phosphorus	mg/L	ND(0.030)	ND(0.030)	0.048	ND(0.030)	ND(0.030)	0.0261	0.0156	0.0243	0.0256
Sulfate	mg/L	90.1	102	86.2	ND(197)	ND(176)	144	223	283	--
Total coliform bacteria	cfu/100mL	50	50	2	ND(100)	ND(100)	10	3200	100	--
Total dissolved solids (TDS)	mg/L	431	565	374	ND(489)	ND(488)	711	810	697	--
Total Kjeldahl nitrogen (TKN)	mg/L	1.72	1.87	1.59	1.35	1.36	1.83	2.07	2.62	--
Total suspended solids (TSS)	mg/L	8.8	ND(2.0)	ND(2.0)	ND(3.4)	ND(3.5)	20.1	9.0	10.3	--
Turbidity	NTU	24.6	18.6	16.3	ND(33.5) J	ND(31.4) J	61.1	66.0	111	--
Un-Ionized ammonia	mg/L	0.00653	0.0170	0.0265	0.00267	0.00301	0.0130	0.00369	0.00431	--
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.609	2.56	0.602	0.843	--	0.695	0.826	1.02	0.936
Dissolved oxygen (DO), field	mg/L	2.3	1.46	3.92	0	--	0.12	0	0	2.64
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-43	-179	-136	-73	--	-67	-72	-107	-79
pH, field	s.u.	7.04	7.62	7.96	7.3	--	7.7	6.81	7.06	6.94
Temperature, field	Deg C	13.59	17.26	13.49	6.17	--	9.63	18.38	11.96	11.14
Turbidity, field	NTU	0	0	1.9	17.6	--	6.7	0	4.9	11.14

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007
Sample Date:		5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016	6/1/2017
Sample Type:						Duplicate				
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

BEST COPIES AVAILABLE

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-112917-TS-002	GW-45804-112917-TS-003	GW-45804-051618-TS-007	GW-45804-051618-TS-008	GW-45804-110718-TS-001	GW-45804-110718-TS-002	GW-45804-061819-JC-010	GW-045804-112619-JC-004
Sample Date:		11/29/2017	11/29/2017	5/16/2018	5/16/2018	11/7/2018	11/7/2018	6/18/2019	11/26/2019
Sample Type:			Duplicate		Duplicate		Duplicate		
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	1.24	1.30	3.73	3.30	0.60	0.60	5.46	4.67
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.43	1.46	3.04	3.16	0.460	0.458	1.96	3.63
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	328	332	305	306	358	363	300	296
Ammonia-N	mg/L	0.809	0.821	1.65	1.74	0.217	ND(0.255)	1.7	0.93
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	10.5	8.0	8.0	16.9	15.1	8.80	11.6
Escherichia coli	cfu/100mL	0	0	ND(0)	ND(0)	ND(0) J	ND(0) J	--	0
Fecal coliform bactena	cfu/100mL	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.076	0.095	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	7.63
Phenol	mg/L	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.0121 J	0.0079 J	0.0065	0.0066	0.0149 J	0.0113 J	0.0207	0.0230
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bactena	cfu/100mL	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--
Turbidity	NTU	--	--	--	--	--	--	--	58.4
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.000602
Field Parameters									
Color	TCU	--	-	--	-	--	--	--	--
Conductivity, field	mS/cm	0.601	-	0.907	-	1.62	--	1.07	1.45
Dissolved oxygen (DO), field	mg/L	0	--	0	--	2.87	--	0.35	0.01
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	33	--	-50	--	49	--	-196	-96
pH, field	s.u.	7.13	--	7.12	--	7.26	--	7.31	6.42
Temperature, field	Deg C	10.06	--	12.53	--	11.48	--	13.66	10.9
Turbidity, field	NTU	30.9	-	8.9	-	2	--	8.3	14.2

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-112917-TS-002	GW-45804-112917-TS-003	GW-45804-051618-TS-007	GW-45804-051618-TS-008	GW-45804-110718-TS-001	GW-45804-110718-TS-002	GW-45804-061819-JC-010	GW-045804-112619-JC-004
Sample Date:		11/29/2017	11/29/2017	5/16/2018	5/16/2018	11/7/2018	11/7/2018	6/18/2019	11/26/2019
Sample Type:			Duplicate		Duplicate		Duplicate		
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	-	--	-	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	-	--	-	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	-	--	-	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(h)quinoline (Quinoline)	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	-	--	-	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	-	--	-	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015
Sample Type:											
Parameters	**Units**	**TLP2**									
Metals											
Arsenic (dissolved)	mg/L		0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)
Boron (dissolved)	mg/L		ND(0.050)	ND(0.10)	ND(0.050)	0.068	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	0.068
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00090)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L		0.00204	0.0086	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00129
Copper (dissolved)	mg/L		0.0043	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)	0.0020
Iron (dissolved)	mg/L	10.6	0.932	15.6	22.9	4.96	4.62	16.2	15.7	2.74	0.765
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	1.82	19.4	17.8	7.70	5.35	13.3	14.8	11.5	3.46
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.186	0.0164	0.0172	0.0614	0.0232	0.0191	0.0139	0.0177	0.0136
Nickel (dissolved)	mg/L		0.0073	ND(0.010)	0.0023	0.0102	0.0028	ND(0.010)	ND(0.010)	ND(0.010)	0.0027
Zinc (dissolved)	mg/L		0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)	ND(0.030)	ND(0.030)	0.0040
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	996	290	389	263	306	207	575	493 J	536	485
Ammonia-N	mg/L	0.2	7.98	9.68	6.87	14.3	4.88	19.2	17.2 J	7.89	7.36
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		16.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		99	72	68	95	ND(54)	74	76 J	55	56
Chloride	mg/L		170	219	162	147	195	199	128 J	129	193
Color (apparent)	TCU		82.9	173 J	362	76.7	120 J	153 J	95.9 J	210	198
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	25.3	51.2	73.5	21.9	10.3	11.1	14.3 J	13.9	8.6
Escherichia coli	cfu/100mL	5	0	4	ND(2)	ND(2)	0	0	0 J	0	ND(2)
Fecal coliform bacteria	cfu/100mL		ND(0) J	6	10	ND(2)	0	0	0 J	0	ND(2)
Nitrate (as N)	mg/L	0.5	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)	0.37
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)	ND(0.10)
pH, lab	s.u.		7.86	7.73	7.50	7.57	7.55	7.58	7.34 J	7.52	7.49
Phenol	mg/L		0.0016	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0117	ND(0.0010) J	ND(0.0010)	0.0032
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.060	0.082	0.070	0.030	0.086	0.111	0.823 J	0.069	0.392
Sulfate	mg/L		585	531	800	713	452	507	539 J	512	546
Total coliform bacteria	cfu/100mL		100	1700	10400	10	1	0	ND(10) J	2	30 J
Total dissolved solids (TDS)	mg/L		1770	1900	2030	1680	1170	1680	1270 J	1470	1620
Total kjeldahl nitrogen (TKN)	mg/L		9.95	6.85	8.80	14.8	5.67	13.6	15.0 J	9.81	8.06
Total suspended solids (TSS)	mg/L		72.0	78.0	106	584	32.0	202	647 J	61.0	1240
Turbidity	NTU		61.0	162	43.0	75.0	54.0	132	57.9 J	124	20.9
Un-ionized ammonia	mg/L		0.0198	0.0292	0.0214	0.0536	0.0281	0.101	0.856 J	0.0259	0.000644
Field Parameters											
Color	TCU		--	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm		2.15	2.17	2.53	2.5	2.41	2.65	2.53	0.628	--
Dissolved oxygen (DO), field	mg/L		3.51	3.67	7.86	7.24	5.62	2	6.28	6.19	--
Odor	none		--	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-176	--	-122	--	-118	-145	-134	-90	--
pH, field	s.u		7.14	7.20	6.85	7.12	7.03	7.3	8.13	7.15	5.98
Temperature, field	Deg C		8.0	17.3	21.59	13.1	9.32	17.06	22.61	11.56	7.4
Turbidity, field	NTU		76.4	150	150	104	148	444	684	--	--

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015
Sample Type:											
Parameters	**Units**	**TLP2**									
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	420	560	ND(250)	ND(250)	610 J	ND(250)	300
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	420	560	ND(250)	ND(250)	600 J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)	1110
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	--	--	--	--	12500 J	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3040 J	ND(380)	1410
Semi-Volatiles											
1-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acridine	µg/L		--	--	--	--	ND(4.0)	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)	ND(0.20)
Benzo(a)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(a)pyrene	µg/L		0.024	ND(0.0050)	0.0079	0.391	0.0212	0.0436	0.426 J	0.0183	0.311
Benzo(b)fluoranthene	µg/L		--	--	--	--	0.029	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	ND(0.040)	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	ND(0.060)	--	--	--	--
Chrysene	µg/L		--	--	--	--	0.023	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	0.041	--	--	--	--
Fluorene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Naphthalene	µg/L		--	--	--	--	ND(0.050)	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Pyrene	µg/L		--	--	--	--	0.035	--	--	--	--
Misc											
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-016	GW-45804-060117-TS-004	GW-45804-083017-TS-001
Sample Date:		5/28/2015	8/13/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:										
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0013	0.0019	0.0014	0.0035	0.00226	--	--
Boron (dissolved)	mg/L	0.199	0.11	0.13	ND(0.10)	0.11	0.10	0.126	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.0040	0.0032	0.0022	0.0020	0.0020	0.00090	--	--
Copper (dissolved)	mg/L	0.0024	0.0107	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00304	--	--
Iron (dissolved)	mg/L	0.071	9.28	7.79	7.75	5.27	11.5	6.05	3.43	2.24 J
Lead (dissolved)	mg/L	ND(0.0010)	0.00056	ND(0.00050)	0.00086	ND(0.00050)	ND(0.00050)	ND(0.000050)	--	--
Manganese (dissolved)	mg/L	0.548	12.5	9.30	7.30	5.07	8.15	4.01	1.73	1.99 J
Mercury (dissolved)	mg/L	ND(0.000010)	0.000023	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--
Molybdenum (dissolved)	mg/L	0.0174	0.0172	0.0152	ND(0.0101)	0.0146	0.0130	0.0132	--	--
Nickel (dissolved)	mg/L	0.0045	0.0060	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00183	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.012	ND(0.0010)	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	381	400	341	ND(373)	380	415	364	444	543 J
Ammonia N	mg/L	1.93	2.3	6.15	1.72	3.32	3.43	1.29	0.62	3.69 J
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	23	47	41	ND(25)	27	ND(48)	25	--	--
Chloride	mg/L	197	114	66.1	ND(87.8)	134	61.3	54.3	--	--
Color (apparent)	TCU	66.9	130	142	163	102	141	103	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.5	9.4	9.5	ND(5.9)	6.7	9.2	7.3	5.5	7.8 J
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0	--	--
Nitrate (as N)	mg/L	23.6	1.42	0.83	2.26	ND(0.10)	2.8	2.39	0.81	0.109 J
Nitrite (as N)	mg/L	0.361	0.090	ND(0.050)	0.011	ND(0.050)	ND(0.050)	0.037	--	--
pH, lab	s.u.	7.71	7.90	7.78	7.75	7.86	7.98	7.18	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0020	0.0020	0.0032	0.0010	ND(0.0012)	0.0042	ND(0.0023)	--	--
Phosphorus	mg/L	0.042	0.041	0.066	ND(0.030)	0.0291	0.0449	0.0066	0.0193	0.0141 J
Sulfate	mg/L	693	621	385	ND(652)	968	519	454	--	--
Total coliform bacteria	cfu/100mL	0	40	5	ND(10)	ND(10)	100	0	--	--
Total dissolved solids (TDS)	mg/L	1470	1180	1130	ND(1370)	1760	1300	1120	--	--
Total kjeldahl nitrogen (TKN)	mg/L	2.12	10.9	6.99	2.18	4.56	5.97	2.30	--	--
Total suspended solids (TSS)	mg/L	92.4	35.1	52.8	28.5	40.3	104	23.5	--	--
Turbidity	NTU	36.0	9.07	68.1	80.9 J	77.5	91.5	57.3	--	--
Un-ionized ammonia	mg/L	0.0170	0.256	0.190	0.00835	0.0906	0.0766	0.0196	--	--
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.12	1.46	1.82	0.888	1.94	1.87	1.21	1.95	1.56
Dissolved oxygen (DO), field	mg/L	10.14	0.17	3.54	2.75	0	0.79	1.21	1.44	1.39
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-24	-120	-136	91	-73	-124	93	-84	-106
pH, field	s.u.	7.38	7.65	8.15	6.77	7.8	7.42	7.89	7.13	7.16
Temperature, field	Deg C	15.43	17.49	9.95	14.93	16.4	21.58	9.26	16.72	22.16
Turbidity, field	NTU	132	260	89	28.5	20.1	0	129	15.1	0

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewt Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005	GW-45804-050816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-016	GW-45804-060117-TS-004	GW-45804-083017-TS-001
Sample Date:		5/28/2015	8/13/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:										
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C5-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330	ND(250)	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0510	0.0199	0.0165	0.0051	0.0127	0.0554	ND(0.0050)	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc										
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renew Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-045804-113017-TS-009	GW-045804-051618-TS-006	GW-045804-081518-TS-005	GW-045804-110818-TS-004	GW-045804-061819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:		11/30/2017	5/16/2018	8/15/2018	11/8/2018	6/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	--	--	--	--	--	0.00417	0.00438	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	0.077	0.073	--	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	ND(0.000010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	0.00193	0.00131	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	0.00118	0.00120	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	0.00068	0.00093	--	--
Iron (dissolved)	mg/L	0.573	9.80	0.151	0.128	6.83	9.96	10.6	0.051	0.052
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--
Manganese (dissolved)	mg/L	2.26	5.51	0.946	1.69	4.85	5.33	5.36	1.93	1.95
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	0.00241	0.00231	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	0.0020	0.0010	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	536	588	495	456	491	--	--	413	415
Ammonia-N	mg/L	2.09	17.8	40.0	0.72	15.6	--	--	7.3	6.30
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	ND(3.0)	ND(3.0)	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	33	35	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.7	11.4	10.3	10.2	9.23	--	--	7.70	8.19
Escherichia coli	cfu/100mL	0	ND(0)	2	ND(0) J	0	3	1	4	3
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	3.07	0.090	ND(0.020)	5.85	0.15	--	--	5.44	10.1
Nitrite (as N)	mg/L	--	--	--	--	--	ND(0.050)	0.053	--	--
pH, lab	s.u.	--	--	--	--	--	7.45	7.44	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--
Phosphorus	mg/L	0.0089	0.0197	0.197	ND(0.0030)	0.0106	--	--	0.0186	0.0198
Sulfate	mg/L	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	12.9	13.9	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	67	41	--	--
Turbidity	NTU	--	--	--	--	--	--	--	17.1	15.2
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00567	0.00490
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.969	1.9	1.8	1.71	1.44	1.640	1.640	1.63	1.63
Dissolved oxygen (DO), field	mg/L	0.44	0	0.64	2.13	1.03	0.29	--	1.8	--
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-95	-146	-17	-137	-89	--	15	--
pH, field	s.u.	7.33	7.33	7.23	7.5	7.14	6.87	6.87	6.46	6.46
Temperature, field	Deg C	11.42	13.25	21.78	11.45	19.79	20.97	20.97	12.3	12.3
Turbidity, field	NTU	73.3	22.1	4.4	17.3	35.2	660	--	58.4	--

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewt Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-045804-113017-TS-009	GW-045804-051618-TS-006	GW-045804-081518-TS-005	GW-045804-110818-TS-004	GW-045804-061819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:		11/30/2017	5/16/2018	8/15/2018	11/8/2018	6/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc										
Oil and grease	mg/L	--	--	--	--	--	ND(5.0)	ND(5.0)	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001521

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-030952013-TS-006	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
Sample Type:							Duplicate		Duplicate		Duplicate	
Parameters	**Units**	**TLP2**										
Metals												
Arsenic (dissolved)	mg/L		0.0059	0.0142	0.0078	0.0029	0.0028	0.0092	0.0078	0.0040	0.0049	ND(0.0010)
Boron (dissolved)	mg/L		0.073	0.052	0.063	0.078	0.074	0.062	0.061	0.065	0.067	0.068
Cadmium (dissolved)	mg/L		ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.8	2.09	5.31	4.58	2.07	2.11	0.215	0.212	0.080	0.095	0.296
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.487	0.650	0.630	0.512	0.518	0.443	0.413	0.443	0.532	0.568
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0090	0.0141	0.0105	0.0087	0.0086	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Nickel (dissolved)	mg/L		ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L		ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0058	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	996	482	365	362	429	427	911	986	600	508	438 J
Ammonia-N	mg/L	0.2	34.7	32.9	30.7	25.5	27.2	36.6	37.6	27.8	30.8	19.7 J
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1	8.1	6.6	3.0 J
Chemical oxygen demand (COD)	mg/L		46	15	13	32	30	ND(54)	65	34	30	19 J
Chloride	mg/L		173	128	199	164	164	246	245	218	217	114 J
Color (apparent)	TCU		27.1	58.9 J	52.9	83.5	73.7	46.9 J	53.9 J	56.5 J	70.7 J	12.4 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	16.4	7.5	ND(5.2)	5.1	4.5	4.1	9.3	9.4	5.2	5.2	4.4 J
Escherichia coli	cfu/100mL	5	7	ND(2)	ND(2)	0	0	300	300	0	0	0 J
Fecal coliform bacteria	cfu/100mL		50 J	ND(2)	ND(2)	0	0	450	430	0	0	0 J
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
pH, lab	s.u.		7.92	7.75	7.41	7.54	7.51	7.25	7.26	7.55	7.99	7.41 J
Phenol	mg/L		ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0083	0.0103	0.0074	0.0090	0.0023 J
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.048	0.045	0.035	0.051	ND(0.030)	0.067	0.067	0.134	0.107	0.072 J
Sulfate	mg/L		970	963	1050	674	678	429	427	649	649	509 J
Total coliform bacteria	cfu/100mL		180	110	2	2	ND(10)	4400	4600	2	1	ND(10) J
Total dissolved solids (TDS)	mg/L		2100	1880	2140	1510	1660	1610	1600	1740	1730	1290 J
Total kjeldahl nitrogen (TKN)	mg/L		38.2	34.5	30.0	25.8	27.2	74.3	75.0	48.4	51.2	19.3 J
Total suspended solids (TSS)	mg/L		15.0	31.0	44.4	6.4	6.4	20.0 J	4.4 J	11.6 J	4.0 J	15.6 J
Turbidity	NTU		19.0	22.0	36.0	16.2	22.7	51.0	59.0	19.2	28.6	2.47 J
un-ionized ammonia	mg/L		0.141	0.0793	0.0695	0.0296	0.0316	0.174	0.173	0.396	0.396	17.0 J
Field Parameters												
Color	TCU		--	--	--	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm		3.01	2.69	2.75	2.43	--	2.12	--	3.02	--	2.02
Dissolved oxygen (DO), field	mg/L		2.68	1.21	4.33	6.79	--	4.53	--	5.33	--	0.26
Odor	none		--	--	--	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-215	--	-101	--	--	-73	--	-318	--	-276
pH, field	s.u.		7.11	6.93	6.63	6.47	6.47	7.4	7.03	7.19	--	9.87
Temperature, field	Deg C		14.5	19.1	22.55	17.3	17.3	10.47	9.3	19.92	--	21.66
Turbidity, field	NTU		175	119	34.2	11.2	--	31.9	--	24.6	--	108
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	560	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	560	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330 J
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	560	ND(250)	560	ND(380)	ND(380)	ND(380)	ND(380)	ND(380) J

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
Sample Type:							Duplicate		Duplicate		Duplicate	
Parameters	**Units**	**TLP2**										
Semi-Volatiles												
1-Methylnaphthalene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acridine	µg/L		--	--	--	--	--	ND(4.0)	ND(4.0)	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(a)pyrene	µg/L		ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	ND(0.040)	ND(0.040)	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	ND(0.060)	ND(0.060)	--	--	--
Chrysene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluorene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Naphthalene	µg/L		--	--	--	--	--	ND(0.050)	ND(0.050)	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Pyrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Misc												
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006	GW-45804-021016-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001	GW-45804-060117-TS-001
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015	2/10/2016	5/18/2016	8/16/2016	8/16/2016 Duplicate	11/15/2016	6/1/2017
Sample Type:												
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	0.0011	ND(0.0010)	ND(0.010)	0.0011	ND(0.0010)	ND(0.0014)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Boron (dissolved)	mg/L	0.073	0.060	ND(0.10)	ND(0.10)	0.11	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00078	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0020)	ND(0.0020)	0.0045	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0303	--
Iron (dissolved)	mg/L	2.75	1.39	7.40	4.59	7.61	5.77	4.45	4.09	4.13	2.20	2.18
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00010)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	--
Manganese (dissolved)	mg/L	0.580	0.899	1.06	0.699	0.909	0.567	0.637	0.536	0.534	0.852	0.362
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L	0.0070	0.0181	0.0150	0.0146	0.0181	ND(0.0187)	0.0101	0.00807	0.00831	0.00710	--
Nickel (dissolved)	mg/L	ND(0.0020)	0.0035	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Zinc (dissolved)	mg/L	0.0211	ND(0.0030)	ND(0.030)	ND(0.010)	ND(0.010)	0.011	ND(0.010)	ND(0.010)	0.412	ND(0.010)	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	406	270	268	323	379	ND(371)	376	449	451	406	500
Ammonia-N	mg/L	15.8	15.6	10.7	16.2	5.71	5.86	4.86	10.7	15.0	11.6	7.56
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	11	27	16	14	14	ND(15)	16	ND(18)	ND(18)	20	--
Chloride	mg/L	111	135	175	225	155	ND(120)	141	81.3	87.7	94.1	--
Color (apparent)	TCU	57.7	21.4	40.9	133	94.0	100	79.3	107	98.0	56.9	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.2	2.5	3.6	4.4	4.6	ND(5.5)	4.2	5.4	5.5	3.6	4.2
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0	4	3	0	--
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--
pH, lab	s.u.	7.76	7.75	7.53	7.85	7.46	7.72	7.88	7.60	7.60	6.94	--
Phenol	mg/L	ND(0.0010)	ND(0.0053)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	0.0057	ND(0.0010)	0.0026	0.0011	ND(0.0016)	ND(0.0016) J	0.0034 J	0.0016	--
Phosphorus	mg/L	0.089	0.253	0.156	0.088	0.073	ND(0.030)	0.0234	0.0391	0.0393	0.0306	0.0542 J
Sulfate	mg/L	738	1360	1360	1240	799	ND(822)	965	671	722	947	--
Total coliform bacteria	cfu/100mL	10	1730	2	100	1	ND(10)	ND(10)	100	100	200	--
Total dissolved solids (TDS)	mg/L	1480	2460	2200	2250	1530	ND(1720)	1840	1530	1520	1790	--
Total Kjeldahl nitrogen (TKN)	mg/L	20.7	16.5	14.9	13.8	5.81	6.70	5.35	16.4	16.4	12.9	--
Total suspended solids (TSS)	mg/L	21.3	402	283	16.0	15.0	ND(10.5)	22.7	15.5	6.1	8.3	--
Turbidity	NTU	20.9	9.71	21.6	17.0	110	88.1 J	50.0	52.6	49.6	28.9	--
Un-ionized ammonia	mg/L	0.0553	0.131	0.135	0.376	0.135	0.0226	0.321	0.0475	0.0475	0.0258	--
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.695	2.212	3.15	3.26	2.39	2.13	2.25	1.93	--	2.1	1.7
Dissolved oxygen (DO), field	mg/L	2.72	--	4.34	0.44	0.91	0	3.07	0	--	0	3.93
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-71	--	-6	-142	-150	-103	-115	-93	--	-107	-122
pH, field	s.u.	6.93	7.47	7.29	7.5	7.73	7.07	8.22	6.72	--	6.7	7.09
Temperature, field	Deg C	16.4	12.92	20.2	22.91	10	14.71	19.12	21.89	--	12.57	19.97
Turbidity, field	NTU	-	--	41.2	41.8	11.9	30.5	0.4	0	-	41.3	4.1
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	--	ND(250)	--	--	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--

001524

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006	GW-45804-021016-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001	GW-45804-060117-TS-001
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015	2/10/2016	5/18/2016	8/16/2016	8/16/2016	11/15/2016	6/1/2017
Sample Type:										Duplicate		
Parameters	**Units**											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001525

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-060117-TS-002	GW-45804-083017-TS-006	GW-45804-112917-TS-001	GW-45804-051518-TS-001	GW-45804-051518-TS-002	GW-45804-081518-TS-001	GW-45804-081518-TS-002	GW-45804-110618-TS-006	GW-45804-061719-JC-001	GW-045804-090419-JC-003	GW-045804-112719-JC-008
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/15/2018	5/15/2018	8/15/2018	8/15/2018	11/8/2018	6/17/2019	9/4/2019	11/27/2019
Sample Type:		Duplicate				Duplicate		Duplicate				
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00041	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.075	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000010)	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00126	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00010)	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	2.28	1.41 J	4.46	3.62 J	3.62 J	4.91	4.98	2.96	2.80	3.95	2.10
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000050)	--
Manganese (dissolved)	mg/L	0.385	0.145 J	0.256	0.254 J	0.253 J	0.676	0.655	0.717	0.722	0.726	0.990
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00085	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.0017	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	442	791 J	657	642 J	672 J	457	469	422	296	--	489
Ammonia-N	mg/L	5.42	34.5 J	47.8	35.6 J	33.2 J	18.6	19.5	12.2	7.8	--	15.7
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	--	99	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.3	15.0 J	11.2	10.1 J	10.7 J	7.01	7.20	ND(5.64)	3.02	--	5.75
Escherichia coli	cfu/100mL	0	0 J	0	ND(0) J	ND(0) J	ND(0)	ND(0)	ND(0) J	--	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.020)	0.030	ND(0.020)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.050)	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	7.28	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	0.0020	--
Phosphorus	mg/L	0.0211 J	0.0481 J	0.0570	0.144 J	0.145 J	0.0730	0.0752	0.0295	0.0422	--	0.0519
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	--	11.5	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	--	10.4	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	--	19.2
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	--	0.0213
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	--	1.84	2.12	2.05	--	1.99	--	1.94	1.4	1.690	2.28
Dissolved oxygen (DO), field	mg/L	--	1.7	0.91	0.64	--	0.11	--	0.16	0.77	1.26	0.21
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-106	-83	-120	--	-129	--	-73	-112	-51	-116
pH, field	s.u.	--	6.58	6.77	7.08	--	6.76	--	6.95	6.53	6.88	6.46
Temperature, field	Deg C	--	22.17	15.47	16.84	--	22	--	18.21	21.06	20.83	16.92
Turbidity, field	NTU	--	8.7	81	15.9	--	2.2	--	0	5	0	0.5
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C15-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13	MW18S-13
Sample ID:		GW-45804-060117-TS-002	GW-45804-083017-TS-006	GW-45804-112917-TS-001	GW-45804-051518-TS-001	GW-45804-051518-TS-002	GW-45804-081518-TS-001	GW-45804-081518-TS-002	GW-45804-110618-TS-006	GW-45804-061719-JC-001	GW-045804-090419-JC-003	GW-045804-112719-JC-008
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/15/2018	5/15/2018	8/15/2018	8/15/2018	11/8/2018	6/17/2019	9/4/2019	11/27/2019
Sample Type:		Duplicate				Duplicate		Duplicate				
Parameters	**Units**											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	11.1	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-014	GW-45804-111015-TS-901	GW-45804-021016-TS-009	GW-45804-051816-TS-011	GW-45804-081616-TS-009	GW-45804-111615-TS-013	GW-45804-050217-TS-013
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	5/2/2017
Sample Type:						Duplicate					
Parameters	**Units**	**TLP2**									
Metals											
Arsenic (dissolved)	mg/L		0.0011	0.00190	0.0011	0.0012	ND(0.0010)	0.00107	0.00074	0.00082	--
Boron (dissolved)	mg/L		0.095	0.165	0.16	0.18	ND(0.13)	0.129	0.180	0.198	--
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	0.000018	--
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00068)	ND(0.00050)	ND(0.00050)	--
Cobalt (dissolved)	mg/L		ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025	0.00039	0.00099	--
Copper (dissolved)	mg/L		ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.00055)	ND(0.00089)	--
Iron (dissolved)	mg/L	10.8	2.54	1.50	3.20	3.09	3.60	4.66	0.838	2.19	8.05
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	--
Manganese (dissolved)	mg/L	2.1	2.44	1.35	1.62	1.59	1.94	1.96	1.06	2.52	1.52
Mercury (dissolved)	mg/L		ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L		0.0102	0.0164	0.0127	0.0125	ND(0.0121)	0.0108	0.0170	0.0180	--
Nickel (dissolved)	mg/L		NO(0.0020)	0.00205	NO(0.0050)	ND(0.0050)	NO(0.0050)	0.00124	0.00222	0.00174	--
Zinc (dissolved)	mg/L		ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0013)	0.0037	0.0023	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	396	423	448	469	461	ND(474)	443	467	497	477
Ammonia-N	mg/L	0.2	10.0	2.83	3.95	2.99	4.79	5.16	3.32	1.31	1.30
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L		27	34	41	38	ND(35)	36	ND(39)	48	--
Chloride	mg/L		153	112	119	114	ND(105)	101	107	112	--
Color (apparent)	TCU		95.7	71.8	143	189	150 J	132	63.1	114	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	8.0	9.9	10.7	12.7	ND(10.1)	9.9	12.7	13.0	11.3
Escherichia coli	cfu/100mL	5	0	0	0	0	0	0	0	0	ND(0)
Fecal coliform bacteria	cfu/100mL		0	0	0	0	0	0	15	0	--
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.24	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L		ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	--
pH, lab	s.u.		7.82	7.94	7.68	7.66	7.66	7.86	7.89	7.26	--
Phenolics (total)	mg/L		0.0060	ND(0.0017)	0.0033	0.0024	ND(0.0010)	ND(0.0010)	0.0039	ND(0.0050)	--
Phosphorus	mg/L	0.5	0.068	0.057	0.074	0.060	0.055	0.101	0.068a	0.03a1	0.055
Sulfate	mg/L		709	423	479	444	ND(495)	542	503	387	--
Total coliform bacteria	cfu/100mL		0	ND(1)	0	0	0	0	200	0	--
Total dissolved solids (TDS)	mg/L		1370	1100	1180	1170	ND(1350)	1390	1370	1230	--
Total kjeldahl nitrogen (TKN)	mg/L		11.9	3.30	3.91	3.39	4.48	4.12	3.43	2.27	--
Total suspended solids (TSS)	mg/L		6.8	11.5	7.9	7.3	21.0	30.0	22.3	4.6	--
Turbidity	NTU		25.0	14.1	47.7	60.2	89.0 J	84.5	30.5	34.5	--
Un-ionized ammonia	mg/L		0.171	0.0516	0.109	0.0923	0.0176	0.159	0.0190	0.00827	--
Field Parameters											
Conductivity, field	mS/cm		2.07	3.92	1.32	--	1.04	1.52	1.57	1.63	1.89
Dissolved oxygen (DO), field	mg/L		1.56	0.51	3.12	--	0	1.42	0	0.33	0
Oxidation reduction potential (ORP), field	millivolts		43	-122	-134	--	-114	-97	-69	-13	-103
pH, field	s.u.		7.76	7.35	8.01	8.01	7.25	8.22	7.26	7.14	7.06
Temperature, field	Deg C		13.75	18.08	12.59	12.9	8.88	10.65	14.5	14.3	11.41
Turbidity, field	NTU		0	14S	13.8	--	212	41.2	0	8.7	676
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	420	540	400	290	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	420	540	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	ND(250)	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(360)	ND(380)	420	540	400	ND(380)	ND(360)	ND(360)	--
Semi-Volatiles											
Anthracene	µg/L		ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Misc											
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

OHD 045804 (8%)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:		GW-045804-083017-TS-003	GW-045804-112917-TS-007	GW-045804-051618-TS-004	GW-045804-081518-TS-008	GW-045804-110818-TS-013	GW-045804-061819-JC-016	GW-045804-090419-JC-002	GW-045804-112719-JC-013
Sample Date:		8/30/2017	11/29/2017	5/16/2018	8/15/2018	11/8/2018	6/18/2019	9/4/2019	11/27/2019
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	0.00155	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	0.152	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	ND(0.0000010)	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	0.00110	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	0.00017	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	4.24 J	3.57	1.83	3.98	2.06	4.03	2.36	1.08
Lead (dissolved)	mg/L	--	--	--	--	--	--	ND(0.000050)	--
Manganese (dissolved)	mg/L	1.19 J	1.48	1.62	1.82	1.34	1.33	1.07	1.63
Mercury (dissolved)	mg/L	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	0.00080	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	ND(0.0010)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	536 J	511	486	593	458	493	--	503
Ammonia-N	mg/L	2.27 J	3.52	3.44	18.0	5.02	3.9	--	1.03
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	3.0	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	36	--
Chloride	mg/L	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.7 J	11.4	9.4	9.99	10.3	10.2	--	12.0
Escherichia coli	cfu/100mL	0 J	0	ND(0)	ND(0)	ND(0) J	0	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	0.026	ND(0.10)	--	0.24
Nitrite (as N)	mg/L	--	--	--	--	--	--	ND(0.050)	--
pH, lab	s.u.	--	--	--	--	--	--	7.57	--
Phenolics (total)	mg/L	--	--	--	--	--	--	0.0018	--
Phosphorus	mg/L	0.100 J	0.0671	0.0493	0.155	0.0611	0.0639	--	0.0158
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	4.64	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	2.8	--
Turbidity	NTU	--	--	--	--	--	--	--	18.6
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00241
Field Parameters									
Conductivity, field	mS/cm	1.66	1.78	1.75	2	1.98	1.51	1.729	1.35
Dissolved oxygen (DO), field	mg/L	0.74	0	0	0	1.88	0.23	0.33	0
Oxidation reduction potential (ORP), field	millivolts	-119	-72	-82	-116	-82	-147	-91	-54
pH, field	s.u.	7.19	7.36	7.13	7.51	7.47	7.28	6.98	6.8
Temperature, field	Deg C	17.48	12.02	9.55	16.27	14.33	17.53	16.85	10.12
Turbidity, field	NTU	0	22.1	21.8	68.4	0	24.4	0	7.5
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C15)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C15-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--
Semi-Volatiles									
Anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--
Misc									
Oil and grease	mg/L	--	--	--	--	--	--	6.2	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

OHD045804 (6)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012
Sample Type:				Duplicate					
Parameters	**Units**	**TLP2**							
Metals									
Arsenic (dissolved)	mg/L		ND(0.010)	ND(0.010)	--	0.0056	0.0061	0.0052	--
Boron (dissolved)	mg/L		--	--	--	--	--	ND(0.050)	--
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	--
Chromium (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Cobalt (dissolved)	mg/L		--	--	--	--	--	0.00146	--
Copper (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Iron (dissolved)	mg/L	10.8	35.5	17.2	3.56	1.50	0.897	1.92	--
Lead (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Magnesium (dissolved)	mg/L		82.9	79.6	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	21.0	19.3	1.14	0.640	0.539	0.956	--
Mercury (dissolved)	mg/L		--	--	--	--	--	ND(0.00010)	--
Molybdenum (dissolved)	mg/L		0.0124	0.0118	0.0530	0.0344	0.0056	0.0037	--
Nickel (dissolved)	mg/L		--	--	--	--	--	ND(0.0020)	--
Silver (dissolved)	mg/L		--	--	ND(0.00010)	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	996	490	490	207	197	177	254	--
Ammonia-N	mg/L	0.2	0.883	0.622	0.338	0.335	0.410	1.06	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	--
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	51	--
Chloride	mg/L		66.1	66.6	109	47.5	37.9	99.8	--
Color (apparent)	TCU		220	249	69.2	151	29.5	--	107
Conductivity	umhos/cm		1750	1760	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	9.7	9.9	6.4	7.0	6.6	9.5	--
Escherichia coli	cfu/100mL	5	0	0	3	5	ND(2)	--	13
Fecal coliform bacteria	cfu/100mL		0	0	11	14	2	--	6
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	--
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	--
pH, lab	s.u.		7.65	7.59	--	--	--	7.78	--
Phenol	mg/L		--	--	--	--	--	ND(0.0010)	--
Phenolics (total)	mg/L		--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.127	0.067	1.69	5.40	3.13	2.68	--
Sulfate	mg/L		--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	0	700	50	70	--	470
Total dissolved solids (TDS)	mg/L		1310	1320	1010	896	462	700	--
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	2.29	--
Total suspended solids (TSS)	mg/L		--	--	--	--	--	3970	--
Turbidity	NTU		63.0	64.0	--	--	--	--	24.0
Un-Ionized ammonia	mg/L		0.000415	0.000382	0.00645	0.000111	0.00367	--	--
Field Parameters									
Color	TCU		--	--	--	--	--	--	--
Conductivity, field	mS/cm		1.09	1.09	0.5	1.62	0.701	1.16	1.24
Dissolved oxygen (DO), field	mg/L		2.29	2.29	--	6.87	--	--	--
Odor	none		--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-85	-85	--	-143	--	--	--
pH, field	s.u.		6.53	6.53	7.47	6.13	7.62	6.66	6.24
Temperature, field	Deg C		3.7	3.7	16.5	11.1	9.5	12.98	12.73
Turbidity, field	NTU		207	207	--	--	-5	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012
Sample Type:				Duplicate					
Parameters	**Units**	**TLP2**							
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	690	440	930	700	--
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	690	440	930	700	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	2840	1520	3410	2650	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	8000	4100	10900	9000	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	3530	1960	4340	3350	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	0.0160	0.0397	0.0276	0.0086	--
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001531

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111212-MB-003	GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016
Sample Date:		11/12/2012	5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/10/2015
Sample Type:							Duplicate		
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0054	0.0048	0.0031	0.0041	0.0016	0.0015	0.0034	0.00149
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.017
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00061
Cobalt (dissolved)	mg/L	0.00228	0.00077	0.00079	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	6.78	3.03	1.86	2.78	2.54	2.54	3.42	3.00
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.17	1.43	1.09	1.23	0.916	0.901	1.07	0.988
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0058	0.0109	0.0042	0.0045	0.0026	0.0027	0.0017	0.00160
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0036	0.0045	ND(0.0030)	0.0058	ND(0.0030)	0.0024
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	396	206	185	234 J	234	236	299	222
Ammonia-N	mg/L	1.56	1.12	0.448	2.06 J	1.22	1.32	0.664	0.482
Biochemical oxygen demand (carbonaceous)	mg/L	7.5	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	55	49	53	45 J	24	15	36	21
Chloride	mg/L	70.7	90	59.2	65.2 J	50	50	75.5	52.2
Color (apparent)	TCU	43.1 J	27.8	34.9	146 J	146	136	49.5	103
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.2	6.2	7.6	6.4 J	7.4	7.3	10.7	7.6
Escherichia coli	cfu/100mL	5	20	11	0 J	0	2	1	0
Fecal coliform bacteria	cfu/100mL	10	40	15	0 J	0 J	4 J	1	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.78	7.74	7.31	7.77 J	7.90	7.88	7.74	7.72
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	0.0101	0.0022
Phosphorus	mg/L	1.67	3.27	1.72	0.174 J	0.206	0.208	1.67	0.162
Sulfate	mg/L	397	337	231	194 J	141	137	88.7	60.8
Total coliform bacteria	cfu/100mL	100	20	900	5 J	290	320	800	150
Total dissolved solids (TDS)	mg/L	1110	812	537	644 J	513	511	468	441
Total Kjeldahl nitrogen (TKN)	mg/L	2.95	2.53	1.37	2.68 J	1.44	1.54	1.95	0.99
Total suspended solids (TSS)	mg/L	4820	2690	3220	5.6 J	7.6	6.4	2800	23.1
Turbidity	NTU	7.50 J	58.0	48.8	15.7 J	29.4	26.2	40.0	40.4
Un-ionized ammonia	mg/L	0.194	0.000445	0.000151	0.0173 J	0.00696	0.00753	0.00483	0.0287
Field Parameters									
Color	TCU	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm	1.32	1.3	0.857	1.17	0.807	--	0.607	0.594
Dissolved oxygen (DO), field	mg/L	3.01	4.46	7.02	0	3.32	--	8.32	0
Odor	none	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-113	--	--	-175	-53	--	-92	-113
pH, field	s.u.	9.68	6.05	6.18	7.38	7.47	7.47	7.24	8.39
Temperature, field	Deg C	12.3	15.9	10.9	15.65	8.11	8.1	14.97	11.3
Turbidity, field	NTU	-5	-5	857	3.1	--	--	0	39.8

GHD 045804(85)

BEST COPIES AVAILABLE

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111212-MB-003	GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016
Sample Date:		11/12/2012	5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/10/2015
Sample Type:							Duplicate		
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)	530	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1710	1920	3160	ND(250) J	ND(250)	ND(250)	2470	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	8300	13600	20000	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2170	2450	3940	ND(380) J	ND(380)	ND(380)	3000	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	0.034	0.040	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	0.068	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	0.034	0.028	--	--	--	--	--	--
Acenaphthene	µg/L	0.024	ND(0.020)	--	--	--	--	--	--
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Acridine	µg/L	--	ND(4.0)	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.029	ND(0.020)	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.034	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.041	0.033	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	0.056	0.027	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	--	--	--	--	--	--
Chrysene	µg/L	0.113	0.070	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Fluoranthene	µg/L	0.034	0.030	--	--	--	--	--	--
Fluorene	µg/L	0.040	ND(0.30)	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Naphthalene	µg/L	0.047	0.049	--	--	--	--	--	--
Phenanthrene	µg/L	0.056	0.061	--	--	--	--	--	--
Pyrene	µg/L	0.056	0.040	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008	GW-45804-051618-TS-010	GW-45804-110818-TS-009	GW-45804-061819-TS-012	GW-045804-112719-JC-011
Sample Date:		5/17/2016	11/15/2016	6/1/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.00186	0.00161	--	--	--	--	--
Boron (dissolved)	mg/L	0.032	0.026	--	--	--	--	--
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	--	--	--	--	--
Chromium (dissolved)	mg/L	0.00066	ND(0.00050)	--	--	--	--	--
Cobalt (dissolved)	mg/L	0.00011	ND(0.00010)	--	--	--	--	--
Copper (dissolved)	mg/L	ND(0.00020)	0.00058	--	--	--	--	--
Iron (dissolved)	mg/L	6.28	8.31	6.21	3.46	1.74	2.00	0.260
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.26	2.09	1.19	0.625	0.913	0.729	0.453
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.00113	0.00180	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00084	0.00065	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0010	ND(0.0010)	--	--	--	--	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	322	273	416	408	367	352	269
Ammonia-N	mg/L	0.883	0.817	1.14	0.67	2.39	2.6	3.16
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	35	33	--	--	--	--	--
Chloride	mg/L	97.1	101	--	--	--	--	--
Color (apparent)	TCU	260	448	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.7	7.3	7.9	8.8	9.05	8.07	9.55
Escherichia coli	cfu/100mL	0	0	0	ND(0)	ND(0) J	0	0
Fecal coliform bacteria	cfu/100mL	0	0	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.10)	ND(0.020)	ND(0.020)	0.056	0.036	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.050)	--	--	--	--	--
pH, lab	s.u.	7.85	8.96	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0022	0.0024	--	--	--	--	--
Phosphorus	mg/L	0.118	0.147	0.167	0.202	0.427	0.220	0.282
Sulfate	mg/L	149	669	--	--	--	--	--
Total coliform bacteria	cfu/100mL	1	100	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	727	1360	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	1.62	0.79	--	--	--	--	--
Total suspended solids (TSS)	mg/L	11.3	12.1	--	--	--	--	--
Turbidity	NTU	78.1	107	--	--	--	--	6.34
Un-ionized ammonia	mg/L	0.00945	0.00227	--	--	--	--	0.0116
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.795	1.59	0.911	0.877	1.1	0.951	0.962
Dissolved oxygen (DO), field	mg/L	0	6.35	5.49	0	3.79	0	0
Odor	none	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-102	-96	-122	-119	-72	-175	-142
pH, field	s.u.	7.67	7	7.11	7.1	7.33	7.02	7.32
Temperature, field	Deg C	11.51	11.23	13.83	14.17	10.02	15.35	9.83
Turbidity, field	NTU	0.6	0	0	1.6	0	0	3.9

GHD 045804(85)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008	GW-45804-051618-TS-010	GW-45804-110818-TS-009	GW-45804-061819-TS-012	GW-045804-112719-JC-011
Sample Date:		5/17/2016	11/15/2016	6/1/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	--	--	--	--	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001535

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012
Sample Type:									
Parameters	**Units**	**TLP2**							
Metals									
Arsenic (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		--	--	--	--	--	--	ND(0.050)
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	0.00012	ND(0.00010)
Chromium (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	0.00122
Copper (dissolved)	mg/L		--	--	--	--	--	--	0.0028
Iron (dissolved)	mg/L	10.6	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L		--	--	--	-	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L		26.5	--	--	-	--	--	--
Manganese (dissolved)	mg/L	2.1	0.0070	0.0691	0.0077	0.0110	--	0.177	0.0352
Mercury (dissolved)	mg/L		--	--	--	-	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0064	0.0120	0.0077	0.0104	--	0.0122	0.0098
Nickel (dissolved)	mg/L		--	--	--	-	--	--	0.0052
Zinc (dissolved)	mg/L		0.103	0.0253	0.0127	0.0414	--	0.0126	0.0090
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	996	209	261	314	261	294	--	273
Ammonia-N	mg/L	0.2	ND(0.050)	0.071	0.090	ND(0.050)	ND(0.050)	--	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	ND(10)
Chloride	mg/L		ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	--	ND(2.0)
Color (apparent)	TCU		32.7	66.3	15.1	25.2	9.9	--	11.5
Conductivity	umhos/cm		465	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	3.5	1.5	3.2	4.6	10.0	--	3.9
Escherichia coli	cfu/100mL	5	0	0	0	0	ND(2)	--	ND(2)
Fecal coliform bacteria	cfu/100mL		0	0	0	0	ND(2)	--	ND(2)
Nitrate (as N)	mg/L	0.5	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	--	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	--	ND(0.10)
pH, lab	s u		8.00	--	--	--	--	--	8.00
Phenol	mg/L		--	--	--	--	--	--	ND(0.0010)
Phenolics (total)	mg/L		--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.110	0.039	0.033	0.033	0.036	--	ND(0.030)
Sulfate	mg/L		--	--	--	-	--	--	--
Total coliform bacteria	cfu/100mL		1	2	30	210	2	--	ND(2)
Total dissolved solids (TDS)	mg/L		258	456	576	518	554	--	518
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	-	--	--	0.43
Total suspended solids (TSS)	mg/L		--	--	--	-	--	--	24.4
Turbidity	NTU		6.10	--	--	-	--	--	4.60
Un-ionized ammonia	mg/L		ND(0.000057)	0.00045	0.0096	ND(0.000076)	ND(0.000058)	--	--
Field Parameters									
Color	TCU		--	--	--	--	--	--	--
Conductivity, field	mS/cm		0.801	0.678	0.971	0.95	0.77	--	--
Dissolved oxygen (DO), field	mg/L		--	5.69	4.3	9.19	--	--	--
Odor	none		--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		--	14	-77	213	--	--	--
pH, field	s u		6.78	7.38	8.68	6.96	7.68	--	--
Temperature, field	Deg C		7.8	12.12	10.9	6.14	10.9	--	--
Turbidity, field	NTU		255	--	--	3.5	94.4	--	--

001536

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012
Sample Type:									
Parameters	**Units**	**TLP2**							
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		390	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		390	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(100)	ND(100)	--	-	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		390	ND(250)	ND(250)	ND(250)	--	--	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--
Anthracene	µg/L		--	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		--	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	-	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001537

BEST COPIES AVAILABLE

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111212-MB-009	GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052814-MB-011	GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010
Sample Date:		11/12/2012	11/13/2012	5/23/2013	11/14/2013	5/28/2014	5/30/2014	11/25/2014	11/10/2015
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	ND(0.050)	--	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	0.018
Cadmium (dissolved)	mg/L	ND(0.00010)	--	0.00022	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	0.000035
Chromium (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	0.00102
Cobalt (dissolved)	mg/L	0.00058	--	0.00295	ND(0.00050)	ND(0.00050)	--	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	0.0036	--	0.0031	0.0036	0.0039	--	0.0027	0.00376
Iron (dissolved)	mg/L	ND(0.050)	--	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0074	--	0.0381	0.0035	0.0019	--	0.0047	0.00072
Mercury (dissolved)	mg/L	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0085	--	0.0179	0.0067	0.0123	--	0.0061	0.00906
Nickel (dissolved)	mg/L	0.0050	--	0.0064	0.0046	0.0048	--	0.0038	0.00453
Zinc (dissolved)	mg/L	0.0100	--	0.0153	0.0071	0.0105	--	0.0047	0.0094
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	329	--	263	310	282	--	325	324
Ammonia-N	mg/L	ND(0.050)	--	ND(0.050)	0.105	ND(0.050)	--	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	19	--	ND(10)	34	10	--	13	ND(10)
Chloride	mg/L	2.8	--	2.7	ND(2.0)	ND(2.0)	--	ND(10)	ND(2.5)
Color (apparent)	TCU	--	17.1	24.3 J	14.5	9.9	--	7.0	56.5
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	--	ND(3.8)	5.9	2.2	--	5.6	5.2
Escherichia coli	cfu/100mL	ND(2)	--	ND(2)	0	0	--	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	--	ND(2)	0	0	--	0	0
Nitrate (as N)	mg/L	0.31	--	ND(0.10)	ND(0.10)	ND(0.10)	--	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	--	ND(0.50)	ND(0.050)
pH, lab	s.u.	7.63	--	7.98	7.79	7.71	--	7.90	7.79
Phenol	mg/L	ND(0.0010)	--	ND(0.0010)	0.0019	0.0016	--	ND(0.0010)	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	0.0027
Phosphorus	mg/L	0.054	--	0.073	ND(0.030)	0.052	--	0.031	0.041
Sulfate	mg/L	216	--	147	119	108	--	106	228
Total coliform bacteria	cfu/100mL	10	--	ND(100)	1	6	--	270	30
Total dissolved solids (TDS)	mg/L	--	588	448	446	402	--	437	589
Total kjeldahl nitrogen (TKN)	mg/L	0.43	--	0.18	0.41	ND(0.43)	--	0.29	0.53
Total suspended solids (TSS)	mg/L	--	59.2	194	65.2	17.2	--	ND(2.9)	74.2
Turbidity	NTU	--	19.1	8.86	0.58	2.22	--	0.62	31.9
Un-ionized ammonia	mg/L	ND(0.000040)	--	ND(0.0000026)	0.000034	ND(0.00048)	--	--	ND(0.0070)
Field Parameters									
Color	TCU	--	--	--	ND()	--	--	--	--
Conductivity, field	mS/cm	1.21	--	1.96	0.832	--	0.686	0.681	0.678
Dissolved oxygen (DO), field	mg/L	6.66	--	6.41	8.16	--	6.91	6.02	3.1
Odor	none	--	--	--	ND()	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	246	--	--	--	--	94	67	55
pH, field	s.u.	6.50	--	5.30	6.16	--	7.53	7.51	8.74
Temperature, field	Deg C	11.6	--	13.0	10.1	--	13.12	9.16	13.08
Turbidity, field	NTU	953	--	325	280	--	35.6	--	44.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111212-MB-009	GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011	GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010
Sample Date:		11/12/2012	11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	ND(100)	ND(100)	ND(100)	--	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	ND(100)	ND(100)	--	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	ND(250)	ND(250)	ND(250)	--	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	ND(250)	ND(250)	--	ND(250) J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	ND(250)	ND(250)	ND(250)	--	ND(250) J	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	ND(250)	ND(250)	--	--	ND(380)	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Acenaphthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Acenaphthylene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	ND(0.020) J	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.010)	--	ND(0.0050)	ND(0.0050)	--	ND(0.0050) J	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	0.027	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Chrysene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Fluorene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Naphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Phenanthrene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Pyrene	µg/L	ND(0.020)	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-051716-TS-003	GW-45804-111816-TS-011	GW-45804-060217-TS-010	GW-45804-113017-TS-010	GW-45804-051618-TS-015	GW-45804-110818-TS-007	GW-45804-061719-JC-015	GW-045804-112619-JC-001
Sample Date:		5/17/2016	11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/17/2019	11/26/2019
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.00024	0.00050	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.011	ND(0.010)	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	0.000035	0.000019	--	--	--	--	--	--
Chromium (dissolved)	mg/L	0.00063	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	ND(0.00010)	0.00023	--	--	--	--	--	--
Copper (dissolved)	mg/L	0.00369	0.0705	--	--	--	--	--	--
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	0.000129	0.000149	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.00171	0.00270	0.207	0.00058	0.00112	0.00107	0.00566	0.00068
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.00905	0.0218	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00434	0.00526	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0139	0.0094	--	--	--	--	--	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	264	188	242	219	236	181	250	197
Ammonia-N	mg/L	0.054	ND(0.020)	ND(0.038)	ND(0.161)	ND(0.182)	ND(0.171)	ND(1.0)	ND(0.010)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	18	36	--	--	--	--	--	--
Chloride	mg/L	0.88	2.81	--	--	--	--	--	--
Color (apparent)	TCU	86.6	143	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.1	10.0	6.4	ND(6.4)	4.6	7.67	5.28	5.21
Escherichia coli	cfu/100mL	0	ND(2)	0	0	ND(0)	ND(0) J	0	ND(2)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	0.226	ND(0.020)	ND(0.020)	ND(0.020)	0.028	0.038	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.010)	--	--	--	--	--	--
pH, lab	s.u.	7.99	7.66	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0024	ND(0.0013)	--	--	--	--	--	--
Phosphorus	mg/L	0.0991	0.0617	0.0276	0.0388	0.0353	0.0162	0.0111	0.106
Sulfate	mg/L	118	136	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	20	300	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	502	413	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	0.27	1.00	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	567	61.7	--	--	--	--	--	--
Turbidity	NTU	94.5	26.6	--	--	--	--	--	72.1
Un-ionized ammonia	mg/L	0.0064	ND(0.000080)	--	--	--	--	--	ND(0.000018)
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.527	--	0.528	0.247	0.331	0.616	1.05	0.385
Dissolved oxygen (DO), field	mg/L	4.96	--	1.57	2.15	2.7	4.24	5.09	3.39
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	110	--	125	107	5	-74	-93	161
pH, field	s.u.	8.74	--	7.45	7.79	7.64	7.44	7.16	6.94
Temperature, field	Deg C	10.58	--	11.2	8.08	11.42	11.98	15.97	8.7
Turbidity, field	NTU	177	--	90.4	37.3	544	36.6	220	32.7

GHD 045804(85)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-051716-TS-003	GW-45804-111616-TS-011	GW-45804-060217-TS-010	GW-45804-113017-TS-010	GW-45804-051618-TS-015	GW-45804-110818-TS-007	GW-45804-061719-JC-015	GW-045804-112619-JC-001
Sample Date:		5/17/2016	11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/17/2019	11/26/2019
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	--	--	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051811-MWD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-006	GW-45804-051412-MB-003
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/18/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012	5/14/2012
Sample Type:								Duplicate		Duplicate			
Parameters	**Units**	**TLP2**											
Metals													
Aluminum (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0010	ND(0.0010)	--	--	ND(0.0010)
Barium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L		--	--	--	--	--	--	0.054	0.056	--	--	0.067
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	--	ND(0.00010)
Calcium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	ND(0.00050)	ND(0.00050)	--	--	ND(0.00050)
Copper (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	ND(0.0010)
Iron (dissolved)	mg/L	19.6	4.99	4.88	4.18	5.18	3.92	3.83	6.27	6.24	--	--	5.88
Lead (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L		118	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	2.55	2.26	2.30	3.29	2.42	2.47	4.73	4.76	--	--	3.99
Mercury (dissolved)	mg/L		--	--	--	--	--	--	ND(0.00010)	ND(0.00010)	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.024	0.018	0.022	0.0095	0.0133	0.0125	0.0088	0.0088	--	--	0.0093
Nickel (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0020)	ND(0.0020)	--	--	ND(0.0020)
Phosphorus (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		0.139	ND(0.020)	ND(0.020)	0.0093	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0087	--	--	0.0030
Zirconium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--
General Chemistry													
Alkalinity, bicarbonate	mg/L		--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L		--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L		--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	998	369	408	487	485	541	534	527	517	477	--	442
Ammonia-N	mg/L	9.2	0.066	0.063	0.030	3.90	4.77	4.78	7.85	7.85	8.09	10.2	10.1
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NO(2.0)	NO(2.0)	NO(2.9)	--	NO(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	45	35	--	--	30
Chloride	mg/L		94.4	147	98.5	103	108	109	--	--	104	--	116
Color (apparent)	TCU		23.1	25.9	128	102	29.2	23.8	10.9	13.0	26.8	--	--
Conductivity	umhos/cm		2150	--	--	--	--	--	--	--	2170	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	7.6	5.5	6.6	10.0	10.0	10.0	11.0	9.4	8.0	--	9.4
Escherichia coli	ctu/100mL	5	0	0	0	0	ND(2)	ND(2)	0	0	0	0	--
Fecal coliform bacteria	ctu/100mL		0	0	0	0	ND(2)	ND(2)	0	0	0 J	0 J	--
Nitrate (as N)	mg/L	0.5	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	--	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	--	ND(0.10)
Nitrite+Nitrate	mg/L		--	--	--	--	--	--	NO(1.0)	NO(1.0)	--	--	--
pH, lab	s.u.		7.68	--	--	--	--	--	7.56	7.53	7.06	--	7.56
Phenol	mg/L		--	--	--	--	--	--	0.0010	0.0010	--	--	ND(0.0010)
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.11	1.30	0.736	0.167	0.462	0.512	0.632	0.621	0.705	--	0.555
Sulfate	mg/L		--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	ctu/100mL		3	0	6	10	4	ND(2)	0	0	1	0	--
Total dissolved solids (TDS)	mg/L		1750	1620	1350	1740	1610	1610	1800	1780	1790	--	1720
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	10.8	9.87	--	--	11.8
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	2010 J	770 J	--	--	380
Turbidity	NTU		4.10	--	--	--	--	--	116	156	10.6	--	--
Un-ionized ammonia	mg/L		0.0000536	0.00144	0.0000553	0.00225	0.0202	0.0202	--	--	0.000337	0.000348	--

OHD 0458a (5)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Resolute Forest Products Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051811-MWD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-006	GW-45804-051412-MB-003
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/18/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012	5/14/2012
Sample Type:								Duplicate		Duplicate			
Parameters	**Units**	**TLP2**											
Field Parameters													
Color	TCU	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.96	0.957	2.15	2.87	2.48	--	2.51	2.51	2.56	2.56	2.45
Dissolved oxygen (DO), field	mg/L	--	--	4.82	--	--	--	--	--	--	--	--	--
Odor	none	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	-57	--	--	--	--	--	--	--	--	--
pH, field	s.u.	5.54	5.93	5.72	6.52	7.15	7.15	6.57	6.57	5.23	5.23	6.26
Temperature, field	Deg C	9.6	11.5	14.5	6.8	13.7	13.7	7.52	7.52	8.4	8.4	10.23
Turbidity, field	NTU	0	--	--	288	652	--	-5	-5	-5	-5	--
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)	--	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	--	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		12600	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	ND(2500)	--	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		12400	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	--	--	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		36800	4450	2010	550	1770	1640	2470 J	610 J	4700	--	690
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		104000	13800	4500	--	4500	4100	6300	--	10300	--	ND(2500)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(1000)	ND(1000)	ND(100)	--	--	--	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		49300	4400	2830	550	2370	2200	3190 J	610 J	4700	--	690
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L		--	ND(0.28)	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		--	0.27	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	0.24	--	--	--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		--	0.25	0.141	0.023	0.100	0.151	0.074	0.060	--	--	ND(0.020)
Benzo(a)anthracene	µg/L		--	0.60	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		--	0.848	0.530	0.0435	0.244 J	0.470 J	0.234	0.218	--	--	0.0225 J
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--	--	--	--
Benzo(b,j)fluoranthene/Benzo(j)fluoranthene	µg/L		--	0.55	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	0.54	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	0.55	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		--	0.88	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		--	1.04	--	--	--	--	--	--	--	--	--
Fluorene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	0.51	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		--	0.79	--	--	--	--	--	--	--	--	--
Pyrene	µg/L		--	1.41	--	--	--	--	--	--	--	--	--
Misc													
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

OHD 045804 (5)

BEST COPIES AVAILABLE

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-662	GW-45804-022713-TS-664	GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-666	GW-45804-052914-MB-612
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
Sample Type:		Duplicate					Duplicate					
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	ND(0.10)	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	ND(0.050)	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	0.0019	0.0012	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	--	--	0.15	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.064	--	ND(0.50)	0.073	0.057	0.055	0.064	0.074	0.080	ND(0.050)	0.063
Cadmium (dissolved)	mg/L	ND(0.00010)	--	ND(0.00050)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	--	--	292	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	0.0015	--	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	--	ND(0.0050)	0.00033	0.00053	0.00056	0.00021	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.95	--	5.58	6.79	7.31	7.34	7.47	4.79	5.00	6.73	6.53
Lead (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	--	--	92.0	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	3.97	--	7.40	4.27	4.40	4.55	4.20	2.48	3.36	3.79	3.75
Mercury (dissolved)	mg/L	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0094	--	0.014	0.0158	0.0110	0.0108	0.0163	0.0103	0.0102	0.0061	0.0066
Nickel (dissolved)	mg/L	ND(0.0020)	--	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	--	--	ND(0.50)	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	19	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	ND(0.0040)	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	15	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	ND(0.0010)	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	161	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	3.31	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	ND(0.0030)	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	ND(0.020)	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	ND(0.10)	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	ND(0.050)	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	--	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	ND(0.040)	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	488	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	ND(10)	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	ND(10)	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	433	--	490	525	488	494	483	495	596	660	--
Ammonia-N	mg/L	10.2	--	8.90	7.08	7.21	7.22	10.0	15.2	12.4	25.7	30.2
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	25	--	36	44	59	57	38	30	55	ND(43)	41
Chloride	mg/L	118	--	176	143	148	149	320	144	149	209	--
Color (apparent)	TCU	--	166	57.4	52.1 J	55.0	46.4	28.0	86.5	130	153 J	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	--	8.1	8.3	12.1	11.1	8.3	9.5	8.8	7.5	7.1
Escherichia coli	cfu/100mL	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	--	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	--
Nitrite (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.58	--	7.75	7.57	7.54	7.66	7.58	7.41	7.51	7.31	--
Phenol	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0012	0.0076	0.0011
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.409	--	0.551	0.183	0.474	0.535	0.332	0.146	0.404	0.193	0.196
Sulfate	mg/L	--	--	--	424	872	872	581	773	630	297	--
Total coliform bacteria	cfu/100mL	--	ND(10)	0	2	ND(2)	2	160	10	ND(10)	0	0
Total dissolved solids (TDS)	mg/L	1710	--	1740	1430	2030	2020	1910	1920	1760	1480	--
Total kjeldahl nitrogen (TKN)	mg/L	12.2	--	10.8	9.99	13.5	14.1	10.8	16.8	20.3	26.9	28.0
Total suspended solids (TSS)	mg/L	246	--	304	88.0	709 J	1400 J	550	16.4	391	21.5	--
Turbidity	NTU	--	26.0	29.0	8.90 J	39.0 J	207 J	19.2	28.0	50.0	87.0	51.0
Un-ionized ammonia	mg/L	--	--	--	0.242	0.0467	0.0484	0.00147	0.0310	0.00928	0.0831	0.133

OHD 045804 xls

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99	MW5-99
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-008	GW-45804-022713-TS-002	GW-45804-022713-TS-004	GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-008	GW-45804-052914-MB-012
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
Sample Type:		Duplicate					Duplicate					
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	ND(0	--	--
Conductivity, field	mS/cm	--	3.06	2.21	1.94	2.85	--	2.84	2.54	2.55	2.57	2.86
Dissolved oxygen (DO), field	mg/L	--	--	5.69	3.34	5.71	--	5.71	5.69	7.15	4.95	0
Odor	none	--	--	--	--	--	--	--	--	ND(0	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	--	-87	--	--	-87	-101	--	-132	-168
pH, field	s.u.	--	6.17	7.87	8.37	7.31	7.31	6.75	6.65	6.24	7.15	7.31
Temperature, field	Deg C	--	10.17	16.54	14.8	7.8	7.8	11.5	17.4	13.2	9.85	9.44
Turbidity, field	NTU	--	--	463	139	939	--	81.8	2.2	243	22.9	5.7
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	120	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	--	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	--	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	540	--	1550	510	ND(420)	ND(250)	730	ND(250)	1010	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	2700	--	4400	ND(2500)	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	ND(100)	ND(100)	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	840	--	2140	510	ND(420)	ND(250)	990	ND(250)	1280	ND(380)	ND(380)
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	ND(0.20)	ND(0.020)	--	--	ND(0.027)	--	--	ND(0.020)	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	ND(0.28)	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	ND(0.20)	ND(0.020)	--	--	ND(0.020)	--	--	ND(0.020)	--
Acenaphthene	µg/L	--	--	0.26	0.098	--	--	0.142	--	--	0.184	--
Acenaphthylene	µg/L	--	--	0.23	0.093	--	--	0.162	--	--	ND(0.187)	--
Acridine	µg/L	--	--	--	--	--	--	ND(4.0)	--	--	ND(4.0)	--
Anthracene	µg/L	0.023	--	ND(0.20)	0.060	ND(0.20)	ND(0.20)	0.048	ND(0.020)	0.029	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	0.31	0.220	--	--	0.181	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L	0.0262 J	--	0.28	0.197	0.11 J	0.31 J	0.159	ND(0.0050)	0.0654	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	0.33	0.184	--	--	0.199	--	--	ND(0.020)	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	ND(0.040)	--	--	ND(0.040)	--
Benzo(g,h,i)perylene	µg/L	--	--	0.23	0.117	--	--	0.113	--	--	ND(0.020)	--
Benzo(j)fluoranthene	µg/L	--	--	0.20	0.162	--	--	0.167	--	--	ND(0.020)	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	0.257	--	--	ND(0.060)	--
Chrysene	µg/L	--	--	0.38	0.228	--	--	0.196	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L	--	--	ND(0.20)	0.038	--	--	0.029	--	--	ND(0.020)	--
Fluoranthene	µg/L	--	--	1.02	0.648	--	--	0.525	--	--	0.121	--
Fluorene	µg/L	--	--	ND(0.20)	0.034	--	--	ND(0.13)	--	--	0.043	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	ND(0.20)	0.120	--	--	0.117	--	--	ND(0.020)	--
Naphthalene	µg/L	--	--	ND(0.20)	ND(0.020)	--	--	0.024 J	--	--	ND(0.050)	--
Phenanthrene	µg/L	--	--	0.29	0.153	--	--	0.132	--	--	ND(0.020)	--
Pyrene	µg/L	--	--	0.85	0.480	--	--	0.458	--	--	0.079	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

001545

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-053014-MS-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040615-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007	GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-021616-TS-007	GW-45804-111616-TS-012	
Sample Date:		5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	
Sample Type:													
Parameters	**Units**												
Metals													
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027	ND(0.0010)	ND(0.0010)	0.00015	0.0020	0.00099	
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	0.096	0.086	ND(0.10)	ND(0.10)	0.10	0.12	ND(0.10)	0.089	0.12	0.087	
Cadmium (dissolved)	mg/L	--	ND(0.000010)	ND(0.000010)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015	ND(0.000010)	ND(0.000010)	
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00083)	ND(0.0050)	ND(0.00050)	
Cobalt (dissolved)	mg/L	--	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013	ND(0.0010)	ND(0.0010)	0.00014	ND(0.0010)	0.00024	
Copper (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00034	ND(0.0020)	ND(0.00075)	
Iron (dissolved)	mg/L	--	4.68	7.52	14.5	7.55	10.2	4.86	5.55	5.66	10.3	4.66	
Lead (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)	
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	--	2.59	2.45	8.33	3.60	3.86	2.04	2.07	3.06	3.28	3.67	
Mercury (dissolved)	mg/L	--	ND(0.000010)	ND(0.000010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	
Molybdenum (dissolved)	mg/L	--	0.0144	0.0339	0.0158	0.0071	0.0204	0.00960	ND(0.00771)	0.00825	0.0174	0.00993	
Nickel (dissolved)	mg/L	--	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00154	ND(0.0050)	0.00154	
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0040)	ND(0.010)	ND(0.0010)	
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry													
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	742 J	673 J	445	446	517	586	504	ND(459)	483	533	553	
Ammonia-N	mg/L	--	28.0 J	9.01	3.71	0.07 J	31.8	24.5	19.5	19.0	17.8	21.7	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	--	34 J	33	65	34	45	32	ND(26)	27	74	34	
Chloride	mg/L	231 J	207 J	244	1160	174	693	155	ND(135)	128	656	140	
Color (apparent)	TCU	260 J	102 J	101	74.4	34.2	161	151	245 J	115	243	184	
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	--	8.4 J	9.2	5.4	7.7	8.5	7.8	ND(6.8)	6.7	11.4	8.7	
Escherichia coli	cfu/100mL	--	0 J	0	ND(2)	0	0	0	0	0	1	0	
Fecal coliform bacteria	cfu/100mL	--	1 J	0	ND(2)	0	0	0	0	0	23	0	
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.026)	
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.52 J	7.43 J	7.48	7.37	7.75	7.61	7.62	7.76	7.66	7.54	7.13	
Phenol	mg/L	--	0.0011 J	0.0016	ND(0.0015)	--	--	--	--	--	--	--	
Phenolics (total)	mg/L	--	--	--	--	0.0035	ND(0.0022)	0.0016	ND(0.0010)	ND(0.0010)	0.0058	ND(0.0026)	
Phosphorus	mg/L	--	0.161 J	0.105	0.312	0.355	0.131	0.133	0.126	0.126	0.135	0.141	
Sulfate	mg/L	421 J	411 J	172	227	880	505	675	ND(635)	749	405	504	
Total coliform bacteria	cfu/100mL	--	2 J	0	96	ND(100)	100	0	0	0	600	0	
Total dissolved solids (TDS)	mg/L	1840 J	1420 J	1130	2470	1580	2300	1710	ND(1490)	1790	2350	1510	
Total kjeldahl nitrogen (TKN)	mg/L	--	25.9 J	9.31	9.19	37.9	26.3	28.3	18.6	16.2	18.4	15.1	
Total suspended solids (TSS)	mg/L	17.6 J	9.5 J	20.8	1020	530	25.3	10.6	ND(7.4)	20.4	20.2	9.0	
Turbidity	NTU	--	48.7 J	116	43.0	47.0	130	63.3	65.8 J	76.2	136	57.2	
Un-ionized ammonia	mg/L	--	3.50 J	0.0133	0.0307	0.203	0.292	0.923	0.0588	0.159	0.0869	0.0450	

OHD 0458a (5)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-053014-MS-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040615-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007	GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012	
Sample Date:		5/30/2014	8/21/2014	11/26/2014	4/6/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	
Sample Type:													
Parameters	**Units**												
Field Parameters													
Color	TCU	--	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.86	2.57	1.107	2.679	2.49	2.64	2.54	2.11	2.01	3.01	2.01	
Dissolved oxygen (DO), field	mg/L	0	1.06	3.53	--	--	5.44	0.1	0	0	0	0	
Odor	none	--	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-140	-139	-63	--	--	-125	-144	-115	-75	-82	-101	
pH, field	s.u.	7.4	8.53	6.92	7.36	7.39	7.56	8.06	7.25	7.64	6.95	7.06	
Temperature, field	Deg C	9.5	16.99	10.36	3.89	11.54	22.72	15.28	5.82	10.31	18.56	14.14	
Turbidity, field	NTU	32.2	44	--	--	294	175	4.3	65.4	0.6	0	29.9	
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus naphthalene	µg/L	--	ND(100) J	ND(100)	ND(100)	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	ND(250) J	ND(250)	510	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F3 minus PAH	µg/L	--	ND(250) J	ND(250)	500	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	ND(250) J	ND(250)	1500	530	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	ND(100)	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	ND(250)	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	ND(250)	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	ND(380) J	ND(380)	2010	530	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Anthracene	µg/L	--	ND(0.020) J	ND(0.020)	ND(0.20)	0.047	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(a)pyrene	µg/L	--	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Misc													
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--	

Notes:

ND Not detected at the associated reporting limit
J Estimated concentration

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Reneval Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-060217-TS-011	GW-45804-083017-TS-004	GW-45804-112917-TS-006	GW-45804-051618-TS-013	GW-45804-051818-TS-014	GW-45804-081518-TS-007	GW-45804-110818-TS-012	GW-45804-061819-TS-005	GW-45804-061819-JC-006	GW-045804-090519-JC-009	GW-045804-112719-JC-012
Sample Date:		6/2/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018	8/15/2018	11/8/2018	6/18/2019	6/18/2019	9/5/2019	11/27/2019
Sample Type:						Duplicate				Duplicate		
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00020	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.114	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000010)	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00103	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00010)	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	5.40	3.38 J	4.29	5.86	5.97	3.20	4.25	5.05	5.01	3.54	3.22
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000050)	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.80	1.80 J	1.69	1.80	1.97	1.84	1.87	1.86	1.85	1.58	1.45
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00085	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0010)	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	430	620 J	749	596	595	538	610	499	487	--	574
Ammonia-N	mg/L	15.0	9.60 J	8.01	16.1	17.5	10.7	15.2	15.1	14.1	--	12.6
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	--	21	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.5	13.0 J	11.2	7.5	8.4	12.4	9.70	6.33	6.74	--	8.53
Escherichia coli	cfu/100mL	ND(2)	0 J	0	ND(0)	ND(0)	ND(0)	ND(0) J	--	--	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.023	ND(0.10)	ND(0.020)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.050)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	7.44	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	0.0034	--
Phosphorus	mg/L	0.150	0.209 J	0.143	0.143	0.144	0.114	0.148	0.136	0.133	--	0.206
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	--	14.2	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	--	4.8	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	--	40.2
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	--	0.0132

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-060217-TS-011	GW-45804-083017-TS-004	GW-45804-112917-TS-006	GW-45804-051618-TS-013	GW-45804-051818-TS-014	GW-45804-081518-TS-007	GW-45804-110818-TS-012	GW-45804-061819-TS-005	GW-45804-061819-JC-006	GW-045804-090519-JC-009	GW-045804-112719-JC-012
Sample Date:		6/2/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018	8/15/2018	11/8/2018	6/18/2019	6/18/2019	9/5/2019	11/27/2019
Sample Type:						Duplicate				Duplicate		
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.94	1.59	1.03	1.72	--	1.86	1.91	1.83	1.83	1.680	1.87
Dissolved oxygen (DO), field	mg/L	3.87	0.04	0.34	0	--	0	0.43	0.45	--	2.45	0
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-87	-106	-71	-111	--	-124	-113	-132	--	--	-141
pH, field	s.u.	6.81	7.22	7.11	7.09	--	7.15	7.42	7.15	7.12	6.83	6.81
Temperature, field	Deg C	10.8	16.62	12.16	11.86	--	17.75	14.13	6.81	6.81	16.57	8.46
Turbidity, field	NTU	0	0	42.8	2.8	--	0.4	0	0	--	1.5	0.6
PetroleumProducts												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	-	--	--	--	--	--	--	--	-	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	-	--	--	--	--	--	--	--	-	--
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	-	--	--	--	--	-	--	--	-	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(j)fluoranthene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	-	--	--	--	--	--	--	--	-	--
Misc												
Oil and grease	mg/L	--	-	--	--	--	--	-	--	--	ND(5.0)	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

OHD 045804 (6)

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Reterwi Canada Ltd.
Ottawa, Ontario

Sample Location:					FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004	GW-45804-110611-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007	GW-45804-052313-TS-011
Sample Date:					1/18/2019	5/18/2018	11/2/2018	5/16/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/23/2013
Sample Type:													
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Metals													
Arsenic (dissolved)	mg/L		0.010	IMAC	--	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	--	0.111	0.078	0.108
Cadmium (dissolved)	mg/L		0.005	IMAC	--	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	--	0.0016	0.0026	0.0030
Iron (dissolved)	mg/L	10.6	0.30	AO	--	2.06[b]	4.02[b]	0.4358	2.28[b]	--	1.66[b]	1.12[b]	2.44[b]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	--	0.480[b]	1.47[b]	1.19[b]	1.01[b]	--	1.05[b]	1.62[b]	1.18[b]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		/	/	--	0.0438	0.0049	0.0059	0.0066	--	0.0030	0.0044	0.0043
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	--	0.0038	0.0023	0.0065
Zinc (dissolved)	mg/L		5.0	AO	--	0.0115	0.308	ND(0.0030)	0.0060	--	0.0285	0.0065	0.0064
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	995	30-500	OG	--	422	553[b]	566[b]	553[b]	--	565[b]	541[b]	557[b]
Ammonia-N	mg/L	0.2	/	/	--	0.160[b]	0.422[b]	0.218[b]	0.422[b]	--	1.20[b]	0.422[b]	0.808[b]
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	--	13	30	34
Chloride	mg/L		250	AO	--	73.6	356[b]	104	108	--	--	140	143
Color (apparent)	TCU		/	/	--	27.2	132	42.0	7.6	--	64.6	33.2 J	30.1 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	--	4.5	8.0[b]	7.3[b]	6.3[b]	--	5.0	8.3[b]	ND(5.2)
Escherichia coli	cfu/100mL	5	0	MAC	0	0	0	0	ND(2)	--	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	ND(10)	--	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	0.5	10.0	MAC	--	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	--	ND(0.10)	ND(0.10)	0.26
Nitrite (as N)	mg/L		1.0	MAC	--	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	--	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	--	7.74	7.86	7.82
Phenol	mg/L		/	/	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0030)
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	--	0.033	ND(0.030)	ND(0.030)	ND(0.030)	--	0.037	ND(0.030)	ND(0.030)
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	446	325
Total coliform bacteria	cfu/100mL		0	MAC	0	0	0	0	ND(2)	--	0	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L		500	AO	--	988[b]	1580[b]	1280[b]	1330[b]	--	1360[b]	1430[b]	1370[b]
Total Kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	--	0.85	0.69	0.96
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	--	5.6	2.0	4.8
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	--	16.5[b]	5.30[b]	8.7[b]
Un-ionized ammonia	mg/L		/	/	--	0.0057	0.00152	0.00303	0.00171	--	--	0.0217	0.000166
Field Parameters													
Color	TCU		5	AO	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.972	1.228	1.58	2.05	2.26	0.831	2.02	1.8	1.97
Dissolved oxygen (DO), field	mg/L		/	/	--	--	10.92	--	9.81	--	--	8.5	8.32
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	--	--	--	--	--	--	-55	--
pH, field	s.u.		6.5-8.5	OG	6.68	8.02	7.41	7.76	7.21	6.55	8.57	8.28	8.82[b]
Temperature, field	Deg C		15	AO	9.33	9.96	10.6	10.90	9.7	13.8	11.48	11.2	13.5
Turbidity, field	NTU		5.0	AO/MAC	12.9[b]	--	--	10.5[b]	40.7[b]	--	--	11.3[b]	11.2[b]
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	ND(100)	--	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)

001550

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004	GW-45804-110811-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007	GW-45804-052113-TS-011
Sample Date:					1/18/2019	5/18/2018	11/2/2018	5/16/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/23/2013
Sample Type:													
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Semi-Volatiles													
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Misc													
Oil and grease	mg/L		/	/	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4	FW-4
Sample ID:					GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016	GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016	GW-45804-060217-TS-016
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/28/2015	5/28/2015 Duplicate	11/10/2015	5/17/2016	11/16/2016	6/2/2017
Sample Type:													
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Metals													
Arsenic (dissolved)	mg/L		0.010	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00013	--
Boron (dissolved)	mg/L		5.0	MAC	0.111	0.079	0.080	0.105	0.103	0.14	0.12	0.132	--
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	--
Chromium (dissolved)	mg/L		0.05	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	--
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	ND(0.0010)	0.00019	--
Copper (dissolved)	mg/L		1.0	AO	0.0310	0.0134	0.0691	0.0154	0.0173	0.0112	0.0147	0.00971	--
Iron (dissolved)	mg/L	10.6	0.30	AO	0.745[a]	1.1[a]	ND(0.050)	0.411[a]	0.537[a]	0.29	0.52[a]	0.025	0.016
Lead (dissolved)	mg/L		0.01	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.00050)	0.000089	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.13[a]	1.12[a]	1.33[a]	1.327[a]	1.28[a]	1.42[a]	1.22[a]	1.27[a]	1.62[a]
Mercury (dissolved)	mg/L		0.001	MAC	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)	--
Molybdenum (dissolved)	mg/L		/	/	0.0045	0.0041	0.0048	0.0048	0.0051	0.00551	0.00438	0.00404	--
Nickel (dissolved)	mg/L		/	/	0.0031	0.0022	0.0026	0.0033	0.0031	ND(0.0050)	0.0075	0.00581	--
Zinc (dissolved)	mg/L		5.0	AO	0.0146	0.0044	0.0065	0.0113 J	0.0064 J	ND(0.010)	0.013	0.0043	--
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	593[a]	570[a]	592[a]	588[a]	574[a]	550[a]	520[a]	547[a]	561[a]
Ammonia-N	mg/L	0.2	/	/	1.04[a]	0.718[a]	1.13[a]	0.0504[a]	0.0554[a]	0.612[a]	0.706[a]	0.627[a]	0.991[a]
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L		/	/	34	23	19	25	25	28	26	26	--
Chloride	mg/L		250	AO	164	170	156	264[a]	247	83.7	256[a]	251[a]	--
Color (apparent)	TCU		/	/	85.4	45.7	7.5	36.6	37.9	45.1	34.2	25.1	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	6.1[a]	4.4	7.3[a]	5.2[a]	5.4[a]	4.4[a]	7.2[a]	4.8	5.4[a]
Escherichia coli	cfu/100mL	5	0	MAC	0	0	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	0	0	0	0	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	0.16	ND(0.10)	0.82[a]	0.34	0.31	0.051	ND(0.10)	0.14	0.18
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	--
pH, lab	s.u.		6.5-8.5	OG	7.43	7.48	7.37	7.57	7.52	7.50	7.71	6.99	--
Phenol	mg/L		/	/	ND(0.0010)	0.0023	ND(0.0010)	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0016 J	0.0037 J	0.0027	0.0025	ND(0.0034)	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0037	0.0041	0.00130
Sulfate	mg/L		500	AO	356	355	345	313	294	62.9	312	308	--
Total coliform bacteria	cfu/100mL		0	MAC	0	0	0	0	0	0	1[b]	0	--
Total dissolved solids (TDS)	mg/L		500	AO	1560[a]	1460[a]	1540[a]	1280[a]	1300[a]	1440[a]	1550[a]	1520[a]	--
Total Kjeldahl nitrogen (TKN)	mg/L		/	/	2.04	0.52	1.16	0.96	0.95	0.97	1.08	1.05	--
Total suspended solids (TSS)	mg/L		/	/	7.2	5.4	4.8	3.0	ND(2.0)	4.0	5.5	4.1	--
Turbidity	NTU		5.0	AO/MAC	13.5[a]	1.4[a]	ND(0.50)	0.92[a]	0.77[a]	14.1[a]	9.2[a]	10.3[a]	--
Un-ionized ammonia	mg/L		/	/	0.000746	0.0128	0.00423	0.00221	0.00326	0.0247	0.0107	0.00145	--
Field Parameters													
Color	TCU		5	AO	ND()	ND()	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	2.1	2.27	0.526	1.78	--	2.7	2.43	2.61	2.7
Dissolved oxygen (DO), field	mg/L		/	/	10.4	5.56	8.32	4.47	--	2.49	6.23	4.21	2.68
Odor	none		Inoffensive	AO	ND()	ND()	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-41	124	166	--	-2	51	149	129
pH, field	s.u.		6.5-8.5	OG	8.12[a]	7.13	7.86	7.23	7.23	7.99	7.7	6.98	6.77
Temperature, field	Deg C		15	AO	12.3	11.63	14.25	13.58	13.6	13.44	12.35	13.02	13.69
Turbidity, field	NTU		5.0	AO/MAC	1	4.3	--	0	--	0.9	1.4	7.6[a]	0.7
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4
Sample ID:					GW-45804-111413-TS-015	GW-45804-052614-MB-002	GW-45804-112614-TS-016	GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016	GW-45804-060217-TS-016
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/28/2015	5/28/2015 Duplicate	11/10/2015	5/17/2016	11/16/2016	6/2/2017
Sample Type:													
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Semi-Volatiles													
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.040)	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.060)	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	ND(0.050)	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Misc													
Oil and grease	mg/L		/	/	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4
Sample ID:					GW-45804-113017-TS-013	GW-45804-051618-TS-019	GW-45804-051618-TS-020	GW-45804-110918-TS-017	GW-45804-061819-TS-004	GW-045804-090519-JC-005	GW-045804-090519-JC-006	GW-045804-112619-JC-017	GW-045804-112619-JC-018	
Sample Date:					11/30/2017	5/16/2018	5/16/2018	11/9/2018	6/18/2019	9/5/2019	9/5/2019	11/28/2019	11/28/2019	
Sample Type:							Duplicate				Duplicate		Duplicate	
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**										
Metals														
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	0.13	0.12	--	--	
Cadmium (dissolved)	mg/L		0.005	IMAC	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--	
Chromium (dissolved)	mg/L		0.05	IMAC	--	--	--	--	--	ND(0.0050)	ND(0.0050)	--	--	
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	0.0738	0.0759	--	--	
Iron (dissolved)	mg/L	10.6	0.30	AO	ND(0.10)	0.66[c]	0.42[c]	2.36[c]	0.11	0.43[c]	0.43[c]	0.04[c]	0.64[c]	
Lead (dissolved)	mg/L		0.01	IMAC	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--	
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.31[c]	0.45[c]	0.61[c]	1.19[c]	0.17[c]	0.574[c]	0.568[c]	0.06[c]	1.06[c]	
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--	
Molybdenum (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	0.0052	0.0054	--	--	
Zinc (dissolved)	mg/L		5.0	AO	--	--	--	--	--	0.077	0.062	--	--	
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	528[c]	536[c]	540[c]	492	566[c]	--	--	508[c]	510[c]	
Ammonia-N	mg/L	0.2	/	/	0.634[c]	ND(0.012)	ND(0.571)	1.14[c]	0.19	--	--	0.144[c]	0.149[c]	
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	ND(3.0)	ND(3.0)	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	21	22	--	--	
Chloride	mg/L		250	AO	--	--	--	--	--	--	--	--	--	
Color (apparent)	TCU		/	/	--	--	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	ND(0.4)	5.6[c]	5.2[c]	10.4[c]	6.8[c]	--	--	5.2[c]	7.4[c]	
Escherichia coli	cfu/100mL	5	0	MAC	0	ND(0)	ND(0)	1[c]	--	0	0	0	0	
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--	--	--	--	--	--	--	
Nitrate (as N)	mg/L	0.5	10.0	MAC	0.20[c]	0.112	0.112	0.029	0.24	--	--	0.06[c]	0.07[c]	
Nitrite (as N)	mg/L		1.0	MAC	--	--	--	--	--	ND(0.050)	ND(0.050)	--	--	
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.06	7.03	--	--	
Phenol	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Phenolics (total)	mg/L		/	/	--	--	--	--	--	0.0013	0.0033	--	--	
Phosphorus	mg/L	0.5	/	/	ND(0.0030)	ND(0.0030)	0.0030	0.129	0.0038	--	--	ND(0.0030)	ND(0.0030)	
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	--	--	
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--	--	--	--	--	--	--	
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--	--	--	--	--	--	--	
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	0.75	0.78	--	--	
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	15.4	5.4	--	--	
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	--	--	20.1[c]	27.6[c]	
Un-ionized ammonia	mg/L		/	/	--	--	--	--	--	--	--	0.00122	0.00122	
Field Parameters														
Color	TCU		5	AO	--	--	--	--	--	--	--	--	--	
Conductivity, field	mS/cm		/	/	2.45	2.52	--	2.51	2.5	2.270	2.270	2.44	2.44	
Dissolved oxygen (DO), field	mg/L		/	/	3.32	3.8	--	4.45	6.76	6.7	--	3.13	--	
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts		/	/	209	--	--	-10	96	26	--	-41	--	
pH, field	s.u.		6.5-8.5	OG	7.39	7.05	--	7.35	8.88	/	/	6.75	6.75	
Temperature, field	Deg C		15	AO	14.79	13.15	--	12.73	15.69[c]	15.63[c]	15.63[c]	13.4	13.4	
Turbidity, field	NTU		5.0	AO/MAC	95.1[c]	5.9[c]	--	19.1[c]	1.1[c]	2.04	--	20.1[c]	--	
Petroleum Products														
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	

001554

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4	BW-4
Sample ID:				GW-45804-113017-TS-013	GW-45804-051618-TS-019	GW-45804-051618-TS-020	GW-45804-110918-TS-017	GW-45804-061819-TS-004	GW-045804-090519-JC-005	GW-045804-090519-JC-006	GW-045804-112619-JC-017	GW-045804-112619-JC-018
Sample Date:				11/30/2017	5/16/2018	5/16/2018	11/9/2018	6/18/2019	9/5/2019	9/5/2019	11/28/2019	11/28/2019
Sample Type:						Duplicate				Duplicate		Duplicate
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L		/	/	--	--	--	--	ND(5.0)	ND(5.0)	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

OHD 045804 (8)

001555

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:				GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011	GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:				5/27/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/12/2012	5/22/2013
Sample Type:											
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**							
Metals											
Arsenic (dissolved)	mg/L		0.010	IMAC	--	0.0032	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.5	0.30	AO	8.6[a]	8.3[a]	--	6.8[a]	7.1[a]	6.9[a]	7.1[a]	7.4[a]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.2[a]	1.0[a]	--	1.1[a]	1.2[a]	1.2[a]	1.1[a]	1.2[a]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		/	/	0.0059	0.0042	--	0.0049	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L		/	/	ND(0.00010)	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.110	ND(0.0030)	--	0.0078	ND(0.0030)	0.0033	ND(0.0030)	0.0057
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	396	30-500	OG	311[a]	309	--	321[a]	327[a]	342[a]	366[a]	343[a]
Ammonia-N	mg/L	0.2	/	/	0.157	0.104	--	0.117	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	27	34	30
Chloride	mg/L		250	AO	54.0	53.0	--	58.1	56.7	76.7	62.1	94
Color (apparent)	TCU		/	/	137	--	109	232	59.1	258	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	9.4[a]	9.6[a]	--	11.0[a]	11.2[a]	12.6[a]	9.2[a]	10.4[a]
Escherichia coli	cfu/100mL	5	0	MAC	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bactena	cfu/100mL		/	/	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.10)	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.10)	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.91	7.67	7.45
Phenol	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	0.0020
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	0.462	--	0.031	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L		500	AO	--	--	--	--	--	--	198	213
Total coliform bacteria	cfu/100mL		0	MAC	0	--	0[c]	0	ND(2)	42[c]	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L		500	AO	1080[a]	960[a]	--	1020[a]	1060[a]	1040[a]	1080[a]	1030[a]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	0.53	0.66	0.59
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	15.0	16.0	42.0
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	50.0[a]	2.80[a]	30.0[a]
Un-ionized ammonia	mg/L		/	/	0.00083	0.00022	--	0.000126	0.00026	--	0.00079	0.000032
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.6	1.32	1.36	1.98	1.82	1.83	2	1.87
Dissolved oxygen (DO), field	mg/L		/	/	--	2.94	0.5	--	2.95	1.27	0.87	1.71
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-98	-88	--	-98	-77	-156	--
pH, field	s.u.		6.5-8.5	OG	7.2	6.96	6.28[c]	6.69	6.97	6.4[c]	7.32	6.84[c]
Temperature, field	Deg C		15	AO	15.3[a]	12.2	12	9.74	12.8	11.55	12.6	14.9
Turbidity, field	NTU		5.0	AO/MAC	--	--	--	28.7[a]	73.1[a]	84.3[a]	15.7[a]	53[a]
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	ND(100)	ND(100)	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

001556

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renew Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011	GW-45804-111011-TS-010	GW-45804-051512-MD-009	GW-45804-111212-MD-002	GW-45804-052213-TS-005
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/12/2012	5/22/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acridine	µg/L		/	/	--	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluorene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Naphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Pyrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renew Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001	GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015	11/9/2015	5/17/2016	11/15/2016
Sample Type:											
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**							
Metals											
Arsenic (dissolved)	mg/L		0.010	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	0.00017
Boron (dissolved)	mg/L		5.0	MAC	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.023	0.022	0.023
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L		0.05	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00053	0.00058	ND(0.00050)
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Copper (dissolved)	mg/L		1.0	AO	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)	0.00047	0.0539
Iron (dissolved)	mg/L	10.6	0.30	AO	0.082	11.1[b]	14.3[b]	5.05[b]	0.133	1.68[b]	0.199
Lead (dissolved)	mg/L		0.01	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.000050)	0.000078
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.0838[b]	1.02[b]	0.1092[b]	0.251[b]	0.0470	0.215[b]	0.0465
Mercury (dissolved)	mg/L		0.001	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L		/	/	0.0042	0.0027	0.0010	ND(0.0010)	0.00124	0.000422	0.00131
Nickel (dissolved)	mg/L		/	/	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	ND(0.0030)	ND(0.0030)	0.0034	0.0035	0.0013	0.0031	0.0021
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	986	30-500	OG	74	309	84	156	105	173	102
Ammonia-N	mg/L	0.2	/	/	0.091	0.055	ND(0.050)	ND(0.050)	ND(0.050)	0.080	0.033
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	5.2
Chemical oxygen demand (COD)	mg/L		/	/	76	34	ND(10)	12	12	13	21
Chloride	mg/L		250	AO	86.8	78.5	80	308[b]	87.0	75.6	86.5
Color (apparent)	TCU		/	/	23.7	25.3	31.7	28.2	48.2	48.2	31.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	6.8[b]	3.0	3.5	2.6	3.2	3.6	4.5
Escherichia coli	cfu/100mL	5	0	MAC	0	ND(2)	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	ND(2)	0	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.		6.5-8.5	OG	9.52[b]	7.67	8.30	9.09	8.05[b]	9.33	8.82[b]
Phenol	mg/L		/	/	0.0133	0.0032	0.0015	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0030	0.0027	0.0035	0.0025
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.054[b]	0.0096	0.0060
Sulfate	mg/L		500	AO	61.4	191	62	393	17.4	42.1	0.34
Total coliform bacteria	cfu/100mL		0	MAC	ND(10)	>200[b]	0	ND(10)	2[b]	2[b]	160[b]
Total dissolved solids (TDS)	mg/L		500	AO	284	772[b]	259	346	245	349	241
Total kjeldahl nitrogen (TKN)	mg/L		/	/	0.40	0.60	ND(0.15)	0.21	0.26	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L		/	/	177	252	9.6	ND(2.0)	2.7	45.2	5.1
Turbidity	NTU		5.0	AO/MAC	9.50[b]	145[b]	5.03[b]	2.83[b]	10.9[b]	161[b]	12.3[b]
Un-ionized ammonia	mg/L		/	/	0.000036	0.00016	ND(0.0012)	0.0018	ND(0.045)	0.0018	0.0029
Field Parameters											
Color	TCU		5	AO	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	1.98	--	0.329	0.474	0.404	0.422	0.379
Dissolved oxygen (DO), field	mg/L		/	/	11.04	--	4.3	0.56	9	1.85	0
Odor	none		Inoffensive	AO	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	--	-154	-186	-187	-260	-148
pH, field	s.u.		6.5-8.5	OG	9.22[b]	--	7.98	7.94	10.05[b]	9.36[b]	8.65[b]
Temperature, field	Deg C		15	AO	11.3	--	11.5	14.57	14.06	10.47	11.96
Turbidity, field	NTU		5.0	AO/MAC	13[b]	--	--	0	2	51[b]	12.5[b]
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)

BEST COPIES AVAILABLE

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewt Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:				GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001	GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:				11/14/2013	5/28/2014	11/25/2014	5/28/2015	11/9/2015	5/17/2016	11/15/2016
Sample Type:										
Parameters	Units	TLP2 a	ODWS Limit b	CriteriaName						
Semi-Volatiles										
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.046)	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.060)	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Naphthalene	µg/L		/	/	ND(0.020)	ND(0.050)	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-060117-TS-006	GW-45804-112917-TS-004	GW-45804-051618-TS-009
Sample Date:					6/1/2017	11/29/2017	5/16/2018
Sample Type:							
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**			
Metals							
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--
Iron (dissolved)	mg/L	10.6	0.30	AO	1.45[5]	ND(0.010)	0.251[5]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.109[5]	0.0352	0.176[5]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	160	86	152
Ammonia-N	mg/L	0.2	/	/	0.065	0.225[5]	ND(0.262)
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--
Chloride	mg/L		250	AO	--	--	--
Color (apparent)	TCU		/	/	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	2.1	3.2	2.7
Escherichia coli	cfu/100mL	5	0	MAC	0	0	ND(0)
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	--
Phenol	mg/L		/	/	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0031	0.0061	0.0094
Sulfate	mg/L		500	AO	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--
Turbidity	NTU		5.0	AO/MAC	--	--	--
Un-ionized ammonia	mg/L		/	/	--	--	--
Field Parameters							
Color	TCU		5	AO	--	--	--
Conductivity, field	mS/cm		/	/	0.433	0.25	0.469
Dissolved oxygen (DO), field	mg/L		/	/	4.61	0	1.14
Odor	none		Inoffensive	AO	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-265	83	-209
pH, field	s.u.		6.5-8.5	OG	7.96	8.11	8.21
Temperature, field	Deg C		15	AO	10.12	12.08	12.62
Turbidity, field	NTU		5.0	AO/MAC	75.7[5]	75.7[5]	25[5]
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--

001560

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-7	TW-7	TW-7
Sample ID:				GW-45804-060117-TS-006	GW-45804-112917-TS-004	GW-45804-051618-TS-009
Sample Date:				6/1/2017	11/29/2017	5/16/2018
Sample Type:						
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**		
Semi-Volatiles						
1-Methylnaphthalene	µg/L		/	/	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--
Acenaphthene	µg/L		/	/	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--
Acridine	µg/L		/	/	--	--	--
Anthracene	µg/L		/	/	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--
Chrysene	µg/L		/	/	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--
Fluoranthene	µg/L		/	/	--	--	--
Fluorene	µg/L		/	/	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--
Naphthalene	µg/L		/	/	--	--	--
Phenanthrene	µg/L		/	/	--	--	--
Pyrene	µg/L		/	/	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-110718-TS-003	GW-45804-061819-JC-011	GW-045804-112619-JC-006
Sample Date:					11/7/2018	6/18/2019	11/26/2019
Sample Type:							
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**			
Metals							
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--
Iron (dissolved)	mg/L	10.6	0.30	AO	ND(0.010)	0.222	ND(0.010)
Lead (dissolved)	mg/L		0.01	MAC	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.0428	0.164[b]	0.0322
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	100	159	94
Ammonia-N	mg/L	0.2	/	/	ND(0.120)	ND(1.0)	0.019
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--
Chloride	mg/L		250	AO	--	--	--
Color (apparent)	TCU		/	/	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	6.14[b]	3.02	4.37
Escherichia coli	cfu/100mL	5	0	MAC	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	8.07[b]
Phenol	mg/L		/	/	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0035	0.0030	0.0282
Sulfate	mg/L		500	AO	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--
Turbidity	NTU		5.0	AO/MAC	--	--	41.1[b]
Un-ionized ammonia	mg/L		/	/	--	--	0.00127
Field Parameters							
Color	TCU		5	AO	--	--	--
Conductivity, field	mS/cm		/	/	0.46	1.521	0.445
Dissolved oxygen (DO), field	mg/L		/	/	0.63	0.2	0
Odor	none		Inoffensive	AO	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-2	-245	-86
pH, field	s.u.		6.5-8.5	OG	8.06[b]	8.02[b]	8.42
Temperature, field	Deg C		15	AO	13.34	12.8	12.04
Turbidity, field	NTU		5.0	AO/MAC	6.8[b]	3.8	21.4[b]
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--

001562

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-7	TW-7	TW-7
Sample ID:				GW-45804-110718-TS-003	GW-45804-061819-JC-011	GW-045804-112619-JC-006
Sample Date:				11/7/2018	6/18/2019	11/26/2019
Sample Type:						
Parameters	Units	TLP2 a	ODWS Limit b	CriteriaName		
Semi-Volatiles						
1-Methylnaphthalene	µg/L		/	/	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--
Acenaphthene	µg/L		/	/	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--
Acridine	µg/L		/	/	--	--	--
Anthracene	µg/L		/	/	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--
Chrysene	µg/L		/	/	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--
Fluoranthene	µg/L		/	/	--	--	--
Fluorene	µg/L		/	/	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--
Naphthalene	µg/L		/	/	--	--	--
Phenanthrene	µg/L		/	/	--	--	--
Pyrene	µg/L		/	/	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010	GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/13/2012	5/23/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Metals												
Arsenic (dissolved)	mg/L		0.010	IMAC	--	0.0023	--	0.0018	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	0.058	0.078	0.074
Cadmium (dissolved)	mg/L		0.005	MAC	0.00022	0.00020	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.00050)	0.00076	ND(0.00050)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.6	0.30	AO	3.59[b]	2.89[b]	--	5.3[b]	ND(0.050)	5.27[b]	8.0[b]	5.03[b]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.53[b]	1.53[b]	--	2.74[b]	0.32[b]	2.05[b]	2.3[b]	2.04[b]
Mercury (dissolved)	mg/L		0.001	IMAC	--	--	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		/	/	0.0695	0.0527	--	0.0188	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L		/	/	ND(0.00010)	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.0743	ND(0.0030)	--	0.0123	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	427	490	--	519[b]	291	519[b]	548[b]	507[b]
Ammonia-N	mg/L	0.2	/	/	0.327[b]	0.311[b]	--	0.475[b]	ND(0.050)	1.55[b]	2.33[b]	2.45[b]
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	23	51	36
Chloride	mg/L		250	AO	83.5	78.6	--	106	42.8	116	140	94.2
Color (apparent)	TCU		/	/	143	--	90.6	203	5.0	112	73.0	35.0 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	6.5[b]	3.5[b]	--	10.3[b]	3.1	10.5[b]	7.5[b]	ND(5.0)
Escherichia coli	cfu/100mL	5	0	MAC	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL		/	/	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.30)	0.44	ND(0.10)	ND(0.10)	0.25
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.96	7.50	7.82
Phenol	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	--	0.072	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L		500	AO	--	--	--	--	--	--	546[b]	373
Total coliform bacteria	cfu/100mL		0	MAC	0	--	10[b]	2[b]	340[b]	2[b]	10[b]	140[b]
Total dissolved solids (TDS)	mg/L		500	AO	1080[b]	1080[b]	--	1360[b]	837[b]	1560[b]	2000[b]	1510[b]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	2.16	2.43	2.95
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	12.5	14.0	38.7
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	14.9[b]	7.6[b]	23.9[b]
Un-ionized ammonia	mg/L		/	/	0.000407	0.00152	--	0.0145	ND(0.00031)	--	0.605	0.00202
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.52	1.53	1.65	2.31	0.981	2.37	1.95	2.17
Dissolved oxygen (DO), field	mg/L		/	/	--	2.91	2.12	0.02	--	1.7	0	5.62
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-124	-31	-60	--	-73	-104	--
pH, field	s.u.		6.5-8.5	OG	6.62	7.24	8.19[b]	8.12	7.48	8.39[b]	8.17[b]	8.49[b]
Temperature, field	Deg C		15	AO	11.9	12.9	7.72	10.59	9.0	9.92	9.0	14.9
Turbidity, field	NTU		5.0	AO/MAC	--	--	--	4.2	62.5	15.5[b]	25.1[b]	32[b]
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C15)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	ND(100)	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

O HD 5458U4 (86)

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:				GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010	GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:				5/26/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/13/2012	5/23/2013
Sample Type:											
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**							
Semi-Volatiles											
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

BEST COPIES AVAILABLE

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011	GW-45804-052815-TS-011	GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-110516-TS-002
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015	5/17/2016	5/17/2016	11/15/2016
Sample Type:												Duplicate	
Parameters	**Units**	**ToP2 a**	**ODWS Limit b**	**CriteriaName**									
Metals													
Arsenic (dissolved)	mg/L		0.010	IMAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	0.081	0.099	0.204	0.188	--	0.29	0.13	0.14	0.27
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L		1.0	AO	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	--	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0067
Iron (dissolved)	mg/L	10.6	0.30	AO	6.2[a]	7.0[a]	ND(0.050)	0.178	--	ND(0.10)	1.6[a]	1.5[a]	ND(0.10)
Lead (dissolved)	mg/L		0.01	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	2.1	0.05	AO	2.3[a]	1.3[a]	0.548[a]	0.0875[a]	-	0.0439	0.425[a]	0.438[a]	0.0256
Mercury (dissolved)	mg/L		0.001	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L		/	/	0.0211	0.0133	0.0301	0.0351	--	0.0015	0.242	0.247	0.0847
Nickel (dissolved)	mg/L		/	/	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.0034	0.0075	0.0075	ND(0.0030)	--	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	345[a]	466	489	305	--	261	259	257	301
Ammonia-N	mg/L	0.2	/	/	4.6[a]	2.2[a]	0.273[a]	0.099	--	0.355[a]	0.581[a]	0.581[a]	0.057
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	46	19	ND(10)	ND(10)	--	14	69 J	19 J	13
Chloride	mg/L		250	AO	157	103	127	48.9	--	52.5	92.7	91.6	81.2
Color (apparent)	TCU		/	/	35.7	34.6 J	61.9	15.4	--	59.8	47.7	66.3	38.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	13.5[a]	4.2	2.5	2.4	--	4.3	4.4	3.9	1.9
Escherichia coli	cfu/100mL	5	0	MAC	0	0	0	0	-	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	--	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	0.15	0.46	0.058[a]	--	0.47	ND(0.020)	ND(0.020)	0.487
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)	--	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.		6.5-8.5	OG	7.53	7.76	7.54	8.02	--	7.72	7.89	7.90	7.39
Phenol	mg/L		/	/	ND(0.0010)	0.0030	0.0015	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0014	--	0.0019	0.0023 J	0.0034 J	0.0048
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	ND(0.030)	0.030	--	ND(0.030)	0.0408	0.0396	0.0190
Sulfate	mg/L		500	AO	830[a]	279	333	172	--	256	213	211	271
Total coliform bacteria	cfu/100mL		0	MAC	0	10[a]	0	1[a]	--	0	40[a]	30[a]	100[a]
Total dissolved solids (TDS)	mg/L		500	AO	1760[a]	1080[a]	1120[a]	525[a]	--	691[a]	722[a]	717[a]	777[a]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	5.09	2.65	0.42	0.43	--	1.04	0.70	0.68	0.30
Total suspended solids (TSS)	mg/L		/	/	26.4	10.0	24.4	28.1	--	5.0	23.3 J	86.0 J	8.7
Turbidity	NTU		5.0	AO/MAC	52.5[a]	22.9[a]	11.4[a]	3.44	-	4.96	23.4[a]	35.0[a]	15.0[a]
Un-ionized ammonia	mg/L		/	/	0.00197	0.0104	0.00386	0.0020	--	0.177	0.0571	0.0543	0.00035
Field Parameters													
Color	TCU		5	AO	ND()	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	2.32	1.69	0.557	--	0.661	0.331	0.802	--	0.926
Dissolved oxygen (DO), field	mg/L		/	/	7.89	8.74	10.48	--	6.5	2.36	1.56	--	0
Odor	none		Inoffensive	AO	ND()	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-54	24	--	144	136	-49	--	-29
pH, field	s.u.		6.5-8.5	OG	7.26[a]	7.22	7.9	7.73	7.73	6.98[a]	6.55[a]	--	7.43
Temperature, field	Deg C		15	AO	11.1	10.44	7.15	17.7[a]	12.05[a]	11.35	13.8	--	10.39
Turbidity, field	NTU		5.0	AO/MAC	0	5.5[a]	--	--	0	2.6	3.7	--	10.5[a]
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(380)	ND(380)	ND(380)	--	ND(380)	ND(380)	ND(380)	ND(380)

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:				GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011	GW-45804-052815-TS-011	GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:				11/14/2013	5/28/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015	5/17/2016	5/17/2016	11/15/2016
Sample Type:											Duplicate	
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.040)	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.060)	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	ND(0.050)	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-060117-TS-005	GW-45804-113017-TS-011	GW-45804-051618-TS-017	GW-45804-051618-TS-018	GW-45804-051618-TS-017	GW-45804-110818-TS-006	GW-45804-061719-TS-002	GW-045804-112719-JC-014
Sample Date:					6/1/2017	11/30/2017	5/16/2018	5/16/2018	5/16/2018	11/8/2018	6/17/2019	11/27/2019
Sample Type:								Duplicate				
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Metals												
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	10.6	0.30	AO	1.06[c]	0.163	0.341[c]	0.601[c]	--	0.024	0.011	1.58[c]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.313[c]	0.315[c]	0.167[c]	0.182[c]	--	0.00640	0.00252	0.558[c]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	340	259	267	291	--	232	308	361
Ammonia-N	mg/L	0.2	/	/	0.340[c]	ND(0.550)	ND(0.395)	ND(0.385)	--	ND(0.083)	1.7[c]	0.473[c]
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	--	--	--
Chloride	mg/L		250	AO	--	--	--	--	--	--	--	--
Color (apparent)	TCU		/	/	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	2.2	ND(2.6)	3.7 J	2.1 J	--	ND(2.95)	2.77	3.81
Escherichia coli	cfu/100mL	5	0	MAC	0	0	ND(0)	ND(0)	--	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	0.071	0.018[c]	0.048	0.059	--	0.500[c]	1.03[c]	0.527[c]
Nitrite (as N)	mg/L		1.0	MAC	--	--	--	--	--	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	--	--	--
Phenol	mg/L		/	/	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0195	0.0190	0.0190	0.0263	--	0.0075	0.0458	0.0180
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	--	--	--
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	--	--	21.7[c]
Un-ionized ammonia	mg/L		/	/	--	--	--	--	--	--	--	0.00263
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.844	0.53	--	--	0.661	0.937	0.842	1.08
Dissolved oxygen (DO), field	mg/L		/	/	4.18	0	--	--	3.68	6.72	5.86	7.78
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-49	33	--	--	-36	6	84	68
pH, field	s.u.		6.5-8.5	OG	7.55	7.31	--	--	7.31	7.59	7	7.45
Temperature, field	Deg C		15	AO	13.87	8.53	--	--	13.29	10.51	17.39[c]	9.19
Turbidity, field	NTU		5.0	AO/MAC	1.87	9.0[c]	--	--	5.0[c]	5.6[c]	6.8[c]	26.5[c]
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--	--	--	--	--	--

001568

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:				GW-45804-060117-TS-005	GW-45804-113017-TS-011	GW-45804-051618-TS-017	GW-45804-051618-TS-018	GW-45804-051618-TS-017	GW-45804-110818-TS-008	GW-45804-061719-TS-002	GW-045804-112719-JC-014
Sample Date:				6/1/2017	11/30/2017	5/16/2018	5/16/2018	5/16/2018	11/8/2018	6/17/2019	11/27/2019
Sample Type:							Duplicate				
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**							
Semi-Volatiles											
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration

001569

Pages 1570 to / à 1579

are not relevant

sont non pertinentes

From: Michael Rooke
To: Straberger, Kyle (ENE)
Cc: Tanya Minarik
Subject: Action Required for Stormwater Inspection Report
Date: December 27, 2013 11:43:51 AM
Attachments: Image.1388162614350.gif
Response to Action Required in Inspection Report 2012.pdf

Hello Kyle:

Please find attached the procedure going forward to address the "temperature" parameter from not being analysed during the monthly pond sampling at the Orgaworld Ottawa facility. I believe it to be fairly straight-forward. If you have any questions or concerns, please let me know.

Kind regards,

Mike Rooke
Compliance Officer



mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

May 29, 2025

TO: Jordan Hook
Environmental Officer
Ottawa District Office
Eastern Region

FROM: Kyle Stephenson
Hydrogeologist
Technical Support Section
Eastern Region

RE: Convertus Processing Facility
5123 Hawthorne Road, Ottawa
- 2024 Groundwater and Surface Water Monitoring Report
- Groundwater Work Plan

I have reviewed the hydrogeology aspects of the following documents for the Convertus Processing Facility at 5123 Hawthorne Road in Ottawa (the "site"):

- "2024 Groundwater and Surface Water Monitoring Report" dated March 28, 2025 and completed by GHD consultants.

- "Convertus Ottawa Groundwater Workplan" dated July 5, 2024 and completed by Convertus.

2024 Monitoring Report

GHD provided the following (groundwater) conclusions in their 2024 annual report:

- Based on the groundwater elevations gathered in April/May, August and December of 2024, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.

- Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site has been historically affected by Facility operations. The distribution of concentrations of ammonia, DOC, iron, and manganese are consistent with an area of impact related to an organic contaminant source in the vicinity of the Facility. Significant improvements in water quality were observed during 2023 and 2024.

- In 2021 and 2022, there were increases in ammonia and DOC in proximity to the Facility (EW107-15 and MW105-13). A damaged knee wall was discovered within the Facility in 2021, which likely contributed to leakage of affected water

into the shallow groundwater. The damage was repaired in 2022 and significant improvements in shallow groundwater quality were observed in the vicinity of the Facility in 2023 and 2024.

- Repair of a failed gasket in a leachate management system manhole in February 2024 eliminated a potential historical source of leakage of leachate to shallow groundwater. Shallow groundwater quality results from 2024 suggest that this repair contributed to improvements in shallow groundwater quality in the vicinity of the Facility.

- Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. This observation is consistent with investigations of deep bedrock groundwater quality prior to Facility construction and operation.

Based on these conclusions, GHD recommends the following for 2025:

- The groundwater extraction system at EW107-15 should be operated in such a manner that as much impacted groundwater from the shallow flow system is removed as is feasible.

- The SCADA monitoring system should continue to be used to accurately record the volume of water pumped from EW107-15.

- Groundwater samples should continue to be collected from EW107-15 on a monthly basis during 2025.

- Well condition of bedrock monitoring well TW-4 should be assessed by a licenced well contractor to determine if the well has been compromised. The well should be repaired or replaced, based on the results of the assessment.

- Surveying should be completed in 2025 for monitoring wells MW106-15, MW108-20, MW109-21, MW110-21, and MW111-21. Surveying should also be completed at extraction well EW107-15.

- Wells MW101-13, MW102-09, MW104-13, MW106-15, and MW108-20 should be sampled in duplicate in 2025 as part of a Tier II TLP response.

GHD indicated that a leachate tank inspection was conducted in response to my previous recommendation and the integrity of the tanks was confirmed (no leaks). GHD further indicated that offsite wells MW109-21, MW110-21 and MW111-21 will be included as part of the ongoing monitoring program.

Groundwater Workplan

Convertus indicated the following in the Workplan document:

- Convertus also indicated that monitoring wells MW109-21, MW110-21 and MW111-21 will be included as part of the ongoing monitoring program.

- Convertus agrees that the groundwater extraction well (EW107-15) will be operated to remove as much impacted shallow groundwater as feasible.

- The plan to implement remedial measures at the site (the "Treewell" system) was put on hold in 2022 when concentrations of ammonia and other organic indicators were found to be increasing in wells near the facility. Convertus shifted their focus to identifying and stopping the potential sources of this impact. This led to repair of the receiving area knee wall (June 2022) and a leaking manhole connected to the leachate USTs (March 2024).

- Convertus is exploring transporting impacted water pumped from the extraction well to ROPEC for treatment.

- Convertus will continue to work with Geosyntec and Applied Natural Sciences to evaluate the Treewell system. Convertus will also reconsider the onsite pump and treat option previously proposed by Current Water Technologies.

- Convertus has indicated that they have taken significant steps to control groundwater impacts from the facility and has increased the extraction of impacted groundwater.

Conclusions and Recommendations

Based on my review I offer the following comments for your consideration:

- Repairs to the knee wall and failed manhole gasket have apparently resulted in significant improvements to shallow groundwater quality at the site.

- I am in general agreement with the recommendations presented by GHD in the 2024 annual report.

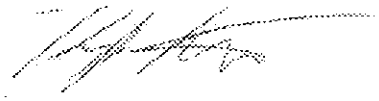
- Monitoring wells MW109-21, MW110-21 and MW111-21 should be included as part of the ongoing monitoring program as agreed to by Convertus and GHD.

- I support the commitment from Convertus to continue assessment of an appropriate remediation approach for the site based on ongoing monitoring results.

- Based on groundwater flow conditions at the site, shallow groundwater impacts extend onto the property north of Somme Street and potentially onto the property east of the site. Supply wells at these properties access water from a deeper aquifer unit that is interpreted to not be hydraulically connected to the shallow groundwater flow system where impacts reside. Groundwater quality at these supply wells is therefore not expected to be adversely impacted by impacts at the site. Despite this I recommend that these property owners should be notified of shallow contamination conditions at the Convertus property just hydraulically upgradient of their properties and likely extending onto their properties. The easiest way to do this may be for Convertus to provide the annual report to adjacent property owners.

- There is potential for impact to surface water resources at this site. As such, I recommend that the documents should be reviewed by the ministry's Surface Water Specialist.

Please contact me if you would like to further discuss these comments.



K. Stephenson, M.Sc., P.Eng.
KMS/FC

ec: J. Hook
B. Simmatis
P. Lalonde
V. Castro

c: KMS/ECHO #1-531728272

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: June-08-18 10:33 AM
To: 'David Veinot'
Cc: Michael Leopold; Andre Boucher
Subject: RE: Discharge - Industrial Sewage Works

Hello David,

Thank you for the submission of the response to my email of May 8, 2018. The submission will be reviewed and a response provided to Orgaworld once complete.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca


Please consider the environment before printing this email.

From: David Veinot [mailto:dveinot@orgaworld.ca]
Sent: May-29-18 10:41 AM
To: Straberger, Kyle (MOECC)
Cc: Michael Leopold; Andre Boucher
Subject: Re: Discharge - Industrial Sewage Works

Good Morning Kyle,

Attached is a reply to your email message of May 8th requesting Orgaworld to review the sampling data provided by Tomlinson, and to determine our compliance status with the conditions within the ECA associated with the operation of the stormwater management pond at our Ottawa facility.

If you have any further questions or comments, please do not hesitate to contact me.

Best regards,

David Veinot
Compliance Officer

dveinot@orgaworld.ca
C: (226) 268 6869 | P: (519) 663 4446 ext. 103 | F: (519) 6630830
Orgaworld Canada Ltd, P.O. Box 21070, London, ON N6K 0C7
* Head office - 2940 Dingman Drive, London ON N6N 1G4
* London ON Plant - 4675 Wellington Road South London, ON N6E 3W7
* Ottawa ON Plant - 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
* Surrey BC Plant - 9752 192 St, Surrey, BC V4N 4C7
www.orgaworld.ca

From: Straberger, Kyle (MOECC) <Kyle.Straberger@ontario.ca>
Sent: May 8, 2018 3:58 PM
To: David Veinot
Subject: Discharge - Industrial Sewage Works

Hello David,

As discussed this afternoon, Orgaworld was advised that Golder Associates, on behalf of Tomlinson, collected effluent samples from the discharge point of the stormwater management pond during the April 2018 discharge period. According to the sample analysis of the effluent samples collected, the effluent exceeded Table 2 Trigger Limits for E.coli and unionized ammonia. Based on Orgaworld's samples collected, as per Condition 5(5) of Environmental Compliance Approval No. 2844-9YNGZC (ECA), the water quality was in compliance with Table 2 Trigger Limits prior to the discharge; therefore, supporting the discharge of the stormwater management pond in April 2018.

The question being asked to the ministry is whether the samples collected by Golder Associates, on behalf of Tomlinson, is an exceedance of the ECA and a reportable spill.

Based on the review of the information above, Orgaworld is to review the sample results and QA/QC provided by Tomlinson to determine compliance with the conditions within the ECA associated with the operation of the stormwater management pond. If the review determines non-compliance, then Orgaworld is to notify the ministry and comply with the additional conditions of the ECA which speak to exceedances. If the review determines there was no violation of the ECA, then Orgaworld is to provide a response to the ministry outlining the outcome and rationale for this conclusion.

If you have any questions please contact me to discuss.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca


Please consider the environment before printing this email.

Ontario

Ministry of the Environment
Ministère de l'Environnement

eMail

Shawn Kinney Sent: March 31, 2014 02:54 PM	Send To:	Kyle Straberger
	Other Email Addresses:	
	Subject:	2012 AMR Orgaworld

Technical Support

Review Type - **Monitoring/Reporting - Industrial Sewage**

Reference Number
1466-96PPBC

Orgaworld Canada Ltd.
5123 Hawthorne Rd
Ottawa, Ontario
K1G 3Y3

Orgaworld Canada Ltd. Ottawa Composting Facility
5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan
Ottawa, NA
NA

Too old to review. Bob Holland will review 2013 AMR

Attachments:	

Pages 1589 to / à 1595

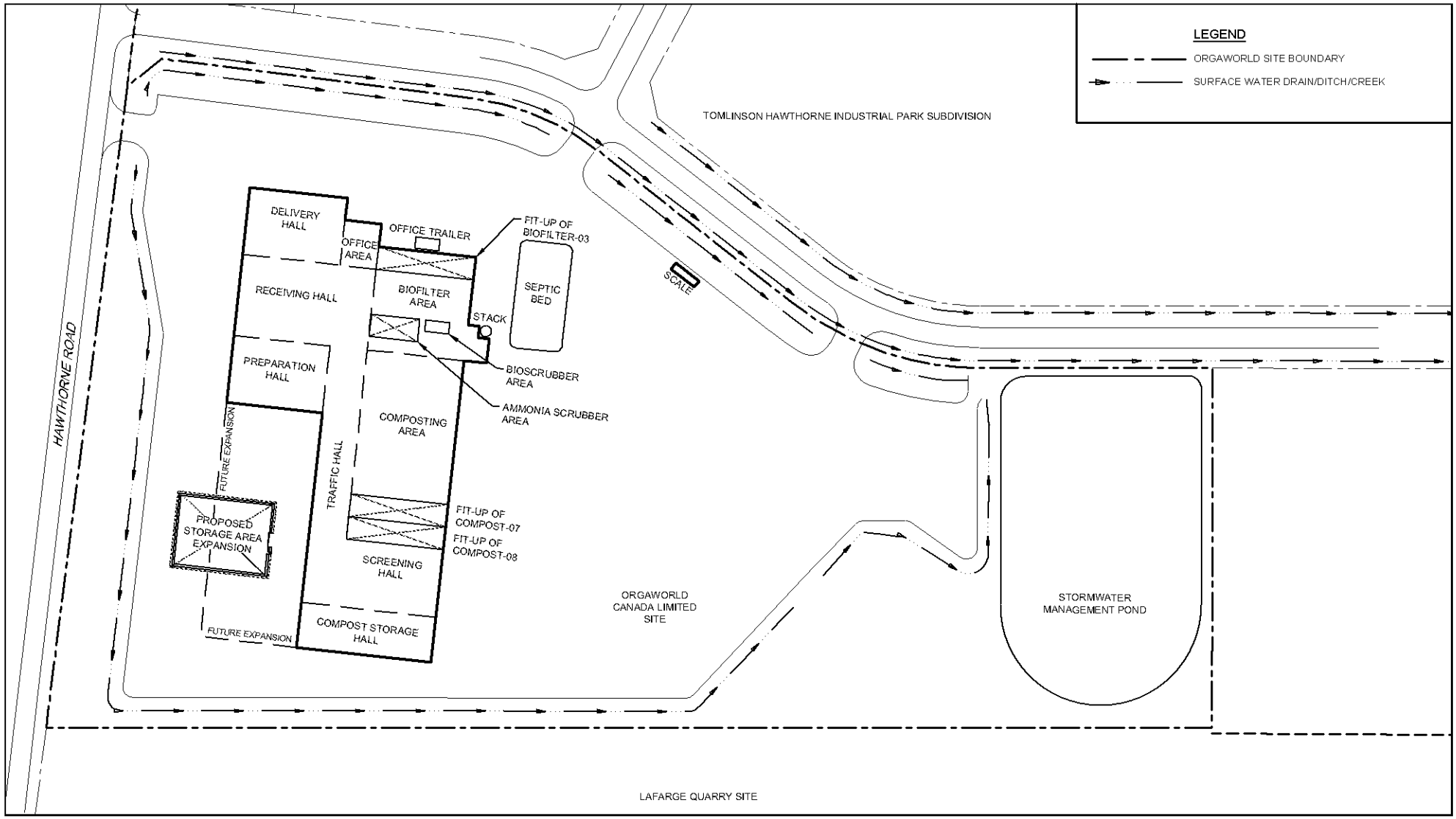
are withheld pursuant to section

sont retenues en vertu de l'article

N/R

of the Freedom of Information and Protection of Privacy Act

de la Freedom of Information and Protection of Privacy Act



0 15 30 45m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO

ORGAWORLD OTTAWA EXPANSION
SITE PLAN PRE-CONSULTATION

11148316-03
August 17, 2018

figure 1

CAD File: P:\drawings\11148000s\11148316\11148316-PRES\11148316-03(PRES001)\11148316-03(PRES001)GN\11148316-03(PRES001)GN-WA001.dwg

001596

EVALUATION OF CWTI'S PATENTED AMMEL AND ESD SYSTEMS FOR THE TREATMENT OF AMMONIA AND PHOSPHORUS IN GROUND WATER

LABORATORY STUDY SUMMARY REPORT

CONFIDENTIAL OVERVIEW FOR CONSIDERATION ONLY
NOT FOR DISTRIBUTION WITHOUT CONSENT OF CURRENT WATER TECHNOLOGIES INC.

Provided to:

DAVID VEINOT
Compliance Officer

On behalf of:
Renewi Canada, Ltd.
Ottawa ON Plant
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

May, 2018

Current Water Technologies, Inc. (CWTI)
4-70 Southgate Drive
Guelph, ON N1G 4P5 CANADA

CONFIDENTIAL

EXECUTIVE SUMMARY

Current Water Technologies, Inc. was engaged by Renewi to perform a laboratory-based study to determine the effectiveness of the AmmEL-LC system to remove ammonia and the ESD System to remove phosphorus from ground water provided from Renewi's Ottawa site.

The laboratory AmmEL-LC system consisted of one 10 cm diameter ion-exchange column with a bed volume of 6.36 L. The ion exchange column was designed to operate as a packed bed during ammonia loading and fluidized bed during column recharge. The IX system was coupled with an electrochemical reactor for column recharge between IX runs. The laboratory system was operated at a flow rate of approximately 1 L/min. The laboratory ESD system consisted of an ESD cell containing 0.76 m^2 of active electrode surface area. The laboratory unit was operated at a flow rate of 250 ml/minute.

The laboratory testing program demonstrated that CWTI's AmmEL-LC technology is capable of reducing inlet ammonia levels in groundwater water at Renewi's Ottawa site to effluent ammonia limits below 1 mg NH_3-N/L. CWTI's ESD System is capable of reducing inlet phosphorus levels in groundwater to below the required effluent limit of 0.03 mg/L.

The conclusions of the study are:

- Laboratory testing was very successful in demonstrating that the AmmEL-LC system is a viable option to treat ammonia levels characteristic of Renewi's ground waters and to meet the desired treated water requirements.

- At maximum removal efficiency, the AmmEL reduced inlet ammonia concentrations in the various totes provided by Renewi as follows:
    - Tote MW105-13 from 17 mg/L to less than 0.1 mg/L NH_3-N representing >99% removal
    - Tote EW107-15 from 122 mg/L to less than 0.2 mg/L NH_3-N representing >99% removal
    - Tote MW5-09 from 48 mg/L to less than 0.3 mg/L NH_3-N representing >99% removal

- Laboratory testing also demonstrated that in two of the waters, the ESD System is a viable option to treat phosphorus levels characteristic of Renewi's ground waters and to meet the desired treated water requirements. Due to the high phosphorus concentrations and complex nature of the water in Tote EW107-15, additional stages of ESD treatment will be required to achieve the target concentration of 0.03 mg/L.

- After two stages of ESD treatment, the phosphorus concentration in the AmmEL treated effluent was reduced as follows:
    - Tote MW105-13 from 0.115 mg/L to 0.0219 mg/L, representing 80.9% removal
    - Tote EW107-15 from 2.27 mg/L to 0.735 mg/L, representing 67.6% removal
    - Tote MW5-09 from 0.146 mg/L to 0.011 mg/L, representing 92.5% removal

CONFIDENTIAL

Recommendation:

- Should well EW107-15 be the source of the water for ammonia removal, CWTI would like to discuss alternatives to the ESD for removal of phosphate should phosphate concentration become the limiting factor to prevent off-site water discharge.

CONFIDENTIAL

Table of Contents

1 INTRODUCTION 5
1.1 AmmEL System – Basic Principles 5
1.2 ESD System – Basic Principles 6
2 MATERIALS AND METHODS 9
3 RESULTS 10
3.1 Ambient Water Testing - AmmEL 10
3.2 Ambient Water Testing - ESD 14
3.3 Treated Water Chemistry 16
4 NEXT STEPS – RECOMMENDATIONS 16
5 SUMMARY 17

List of Figures

Figure 1. Schematic of AmmEL-LC Process. 5
Figure 2. Mobile AmmEL Demonstration Unit 6
Figure 3. Principle of CDI (during active desalination) 7
Figure 4. Principle of CDI (During Regeneration) 7
Figure 5. 36-Cell ESD Unit in 20-Foot Shipping Container 8
Figure 6. Laboratory-Scale AmmEL-LC Unit 9
Figure 7. Laboratory-Scale ESD400 Unit 9
Figure 8. Ambient Temperature Ammonia Removal Data Tote MW105-13 11
Figure 9. Ambient Temperature Ammonia Removal Data Tote EW07-15 12
Figure 10. Ambient Temperature Ammonia Removal Data Tote MW5-09 13

List of Tables

Table 1. Ambient Temperature Run Tote MW105-13 Ammonia Removal Data 10
Table 2. Ambient Temperature Run Tote EW107-15 Ammonia Removal Data 12
Table 3. Ambient Temperature Run Tote MW5-09 Ammonia Removal Data 13
Table 4. ESD Phosphorus Removal Data – Tote MW105-13 14
Table 5. ESD Phosphorus Removal Data – Tote EW107-15 15
Table 6. ESD Phosphorus Removal Data – Tote MW5-09 16

List of Appendices

Appendix 1. Raw Water Chemistry 18
Appendix 2. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW105-13 19
Appendix 3. Third Party Analyses of AmmEL and ESD Treated Water – Tote EW107-15 20
Appendix 4. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW5-09 21

CONFIDENTIAL

1 INTRODUCTION

As an introduction to the AmmEL and ESD technology and to determine its efficacy in removing ammonia and phosphorus from ground water collected at Renewi's Ottawa site, CWTI conducted a preliminary laboratory-scale feasibility study.

The purpose of the project was to implement a laboratory-scale feasibility study with CWTI's AmmEL and ESD systems to treat ground waste water of the type found at Renewi's Ottawa site. The goal of the project was to reduce the ammonia-nitrogen concentration to less than 1 mg/L and phosphorus concentration to less than 0.02 mg/L. The feasibility test was performed at CWTI's facility in Guelph, Ontario using water supplied by Renewi.

The specific project goals were:

- Perform laboratory-scale feasibility testing on Renewi ground water
- Collect operational data for the duration of the test
- Provide a summary report following completion of the testing period

1.1 AmmEL System – Basic Principles

The AmmEL-LC treatment technology is a 2-stage process; the first stage (Phase 1) consists of removal of ammonia from the waste stream using an ion-exchange (IX) zeolite medium followed by the second stage (Phases 2&3), electrochemical oxidation of ammonium to nitrogen (N_2) gas in the IX regenerant solution. The Regeneration and Conversion phases occur simultaneously. The column regeneration circuit is a closed loop, i.e., the regenerant solution is reused once the ammonia is oxidized (Figure 1).

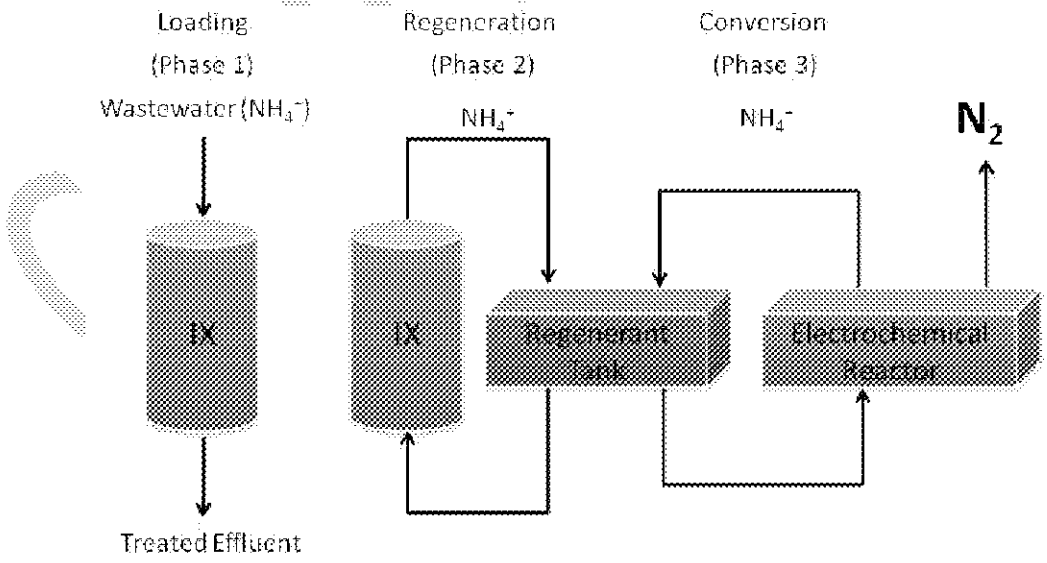


Figure 1. Schematic of AmmEL-LC Process.

Some of the advantages of the technology over conventional systems are:

- Converts ammonia to environmentally friendly nitrogen gas
- Operates independent of temperature and maintains efficiency when treating water at 0°C
- No production of nitrate
- No production of greenhouse gas nitrous oxide
- Relatively small footprint
- Rapid start-up and shut-down
- Lower capital cost than bio-based systems of similar capabilities
- Fully automated and remotely monitored



Figure 2. Mobile AmmEL Demonstration Unit

1.2 ESD System – Basic Principles

The ESD System is a state-of-the-art electrochemical technology designed to produce drinking water, gray water and/or select process waters from brackish and waste waters. The system has also proven extremely successful in producing high purity (< 1 μS/cm) water. The produced water is free of toxic levels of metals and other inorganic contaminants and is done more efficiently and economically than conventional methods. ESD has the potential to dramatically improve the treatment of municipal drinking water, industrial process water, makeup water, and municipal wastewater around the globe. For drinking water applications, the ESD system is predicted to have a lower capital cost than competitive membrane systems and lower operating costs (<$0.08/$m^3$ includes power and chemicals, excludes manpower).

CWTI's ESD system is based on the principles of Capacitive Deionization. The Capacitive deionization (CDI) process is a low-pressure on-membrane process that removes dissolved ions from a water stream in the presence of an electrical field. In general, inlet water is pumped through cells that contain the charged electrodes. The electrodes attract and retain ions on the electrode surfaces (Figure 3). As the ions build up on the surface of the electrodes the cells lose efficiency so that treated water produced at

the start of the cycle has lowest conductivity, and conductivity gradually increases until a pre-set maximum is reached. The treated water exits the system as a high volume with low total dissolved solids (TDS) content.

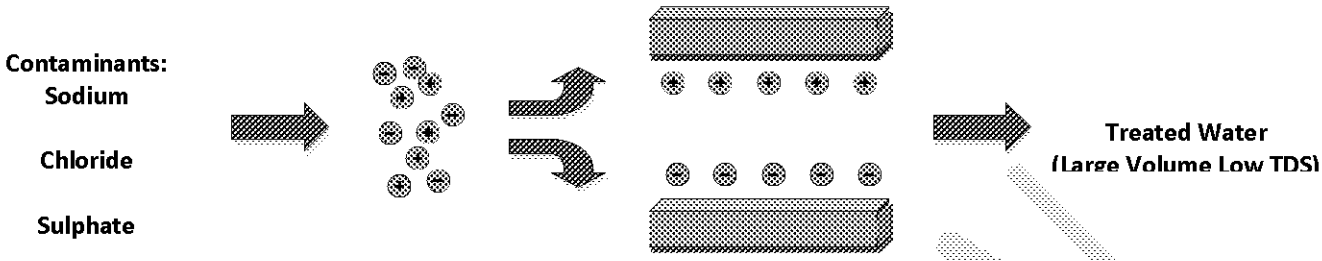


Figure 3. **Principle of CDI (during active desalination)**

The electrodes have a finite capacity for holding ions. When the maximum conductivity setting is reached the system switches to regeneration. To regenerate the electrodes, the applied potential is reversed and the ions are then repelled back into the gap between the electrodes. A small volume of rinse water then carries the ions from the cells producing a waste stream that has a much smaller volume with higher TDS concentration (Figure 4). Since the CDI process does not require high-pressure pumps, the energy consumption is expected to be low and is related mainly to the DC power consumption on the cells. Once flushing is complete the system resets and the treatment cycle begins again.

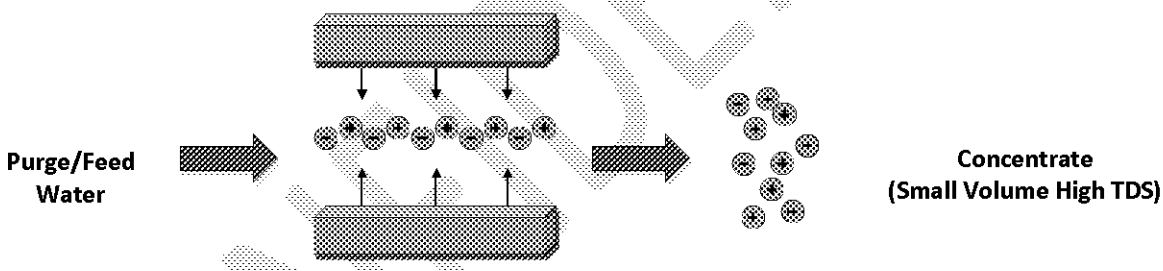


Figure 4. **Principle of CDI (During Regeneration)**

CWTI knows of no other direct, commercial competitor to the novel, electrochemical ESD System in the water treatment industry. The ESD System offers several advantages compared to conventional ion exchange, reverse osmosis and distillation systems. This patent-pending technology expends less electrical energy, produces minimal wastewater, and provides potable water more efficiently than conventional methods. ESD has proved to be capable of producing water free of toxic levels of metals and other inorganic contaminants more efficiently and economically than conventional methods and achieves water recovery rates as high as 98% combined with greater than 99% TDS removal.

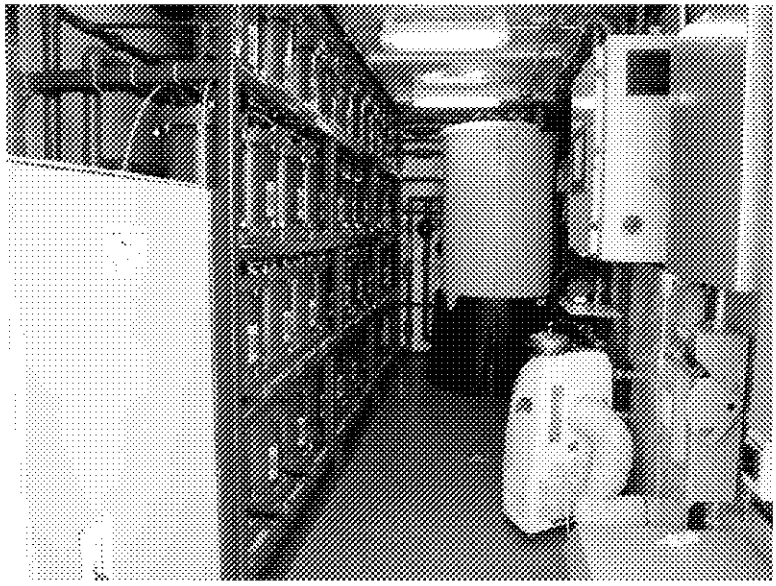


Figure 5. 36-Cell ESD Unit in 20-Foot Shipping Container

CONFIDENTIAL

2 MATERIALS AND METHODS

The AmmEL study was performed using a single 4 inch ID column containing 6.36 L of zeolite (Figure 6). The zeolite used was CWTI's proprietary modified zeolite - the same type used in the IX columns of the demonstration unit. Feed water for the laboratory study was supplied from Renewi's Ottawa site in three $1m^3$ totes. The water chemistry for the three totes is included in Appendix 1.

The zeolite column was loaded with ammonia to an outlet concentration of ~2 mg NH_3-N/L. Outlet ammonia concentrations were monitored during the loading cycle using an ammonium ion-selective electrode. Regeneration of the column was performed with 5% NaCl solution made using high purity water.

Capacitive deionization experiments were performed on CWTI's Model ESD400 Laboratory Scale Capacitive Deionization Unit (Figure 7). The unit is designed to operate at a flow rate range of 0-500 mL/min with a maximum operating pressure of 20 psi. Typical operating flow rates are in the range 250-400 mL/min. The unit is fitted with a CDI cell containing 0.76 m^2 of electrode surface area with an operating potential of 1.3 VDC and maximum peak current of 60 ADC. The unit is controlled through a combination of programmable logic controller (PLC) and a touch screen human-machine interface (HMI).

Electrical conductivity measurements were performed using an Oakton hand-held conductivity meter. Ammonia measurements were performed with a bench top Thermo Scientific millivolt meter and a Cole-Parmer ammonia ion selective electrode (ISE). The ISE was calibrated according to manufacturer's procedure prior to each experimental run, and millivolt data was collected four minutes after the ISE was inserted into the sample when a stable mV reading could be recorded from the meter.

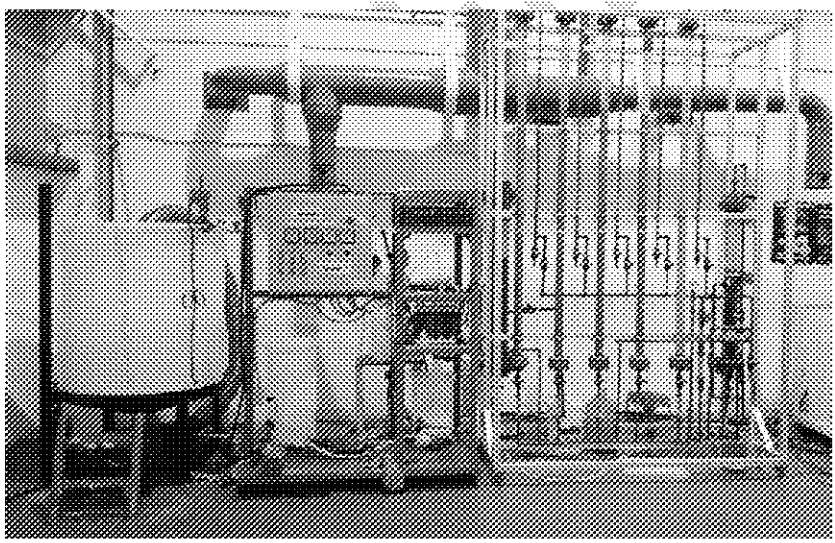


Figure 6. Laboratory-Scale AmmEL-LC Unit

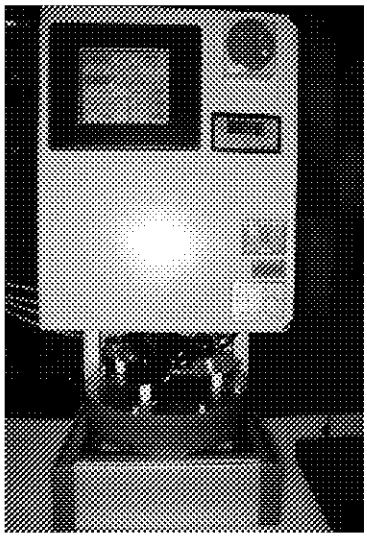


Figure 7. Laboratory-Scale ESD400 Unit

3 RESULTS

3.1 Ambient Water Testing - AmmEL

Tote MW105-13

Ammonia removal testing was done on Tote Number MW105-13. Ammonia removal data gathered from ambient temperature runs are included in Table 1 and Figure 8. Ammonia concentrations are plotted as a function of number of ion exchange bed volumes of water treated. One bed volume is

Table 1. **Ambient Temperature Run Tote MW105-13 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
	0	17.00	0.00	0.00
1	60	0.19	98.9	8.85
2	120	0.19	98.9	17.69
3	240	0.17	99.0	26.54
4	300	0.09	99.5	35.39
5	360	0.12	99.3	44.20
6	420	0.12	99.3	53.06
7	492	0.13	99.2	72.47
8	546	0.14	99.2	80.41
9	600	0.17	98.9	88.33
10	685	0.29	98.3	100.85
11	720	0.37	97.7	106.00
12	780	0.47	97.2	114.84
13	810	0.20	98.8	118.81
14	840	0.33	98.0	123.23
15	870	0.44	97.3	127.65
16	900	0.56	96.7	132.06
17	930	0.81	95.2	136.47
18	960	1.10	93.5	140.88
19	990	1.54	90.9	145.31
20	1020	2.23	86.8	149.73

CONFIDENTIAL

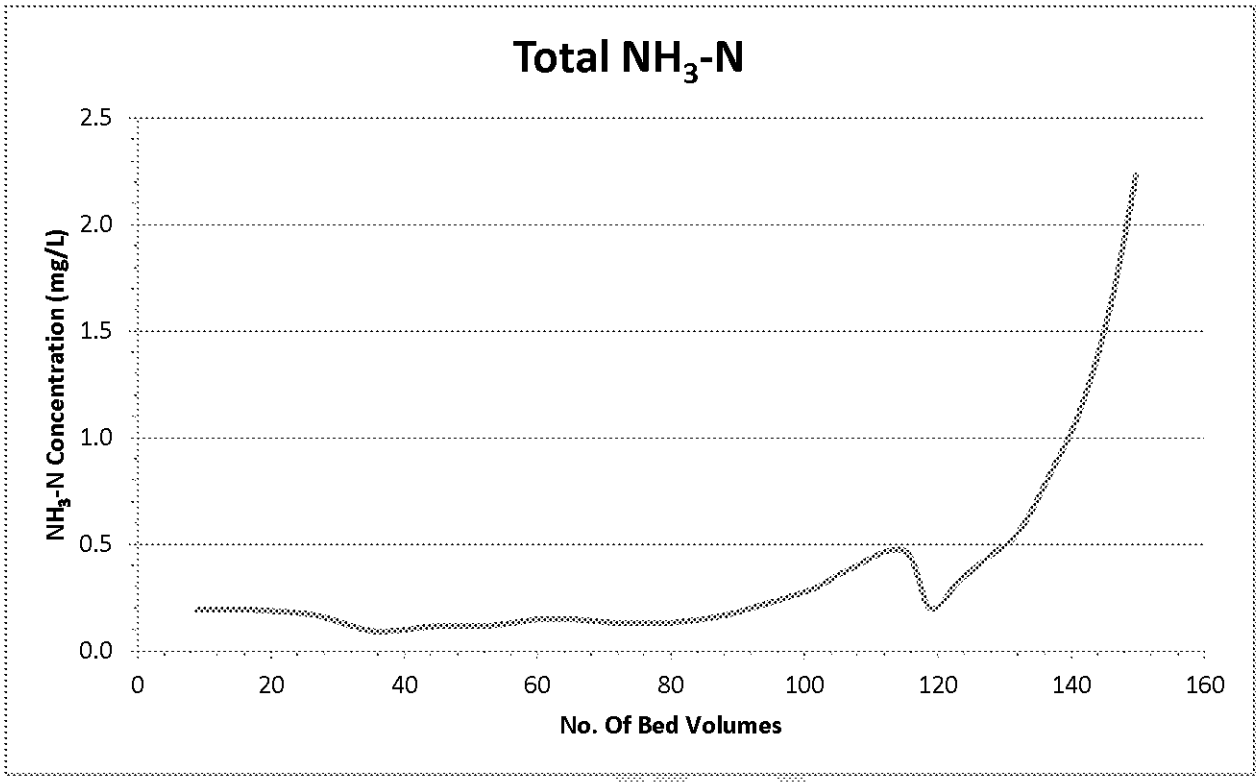


Figure 8. Ambient Temperature Ammonia Removal Data Tote MW105-13

equivalent to 6.36 L, the volume of zeolite contained in the IX column. The water provided to CWTI by Renewi was pumped through the ion exchange column without pH adjustment or pre-treatment. For Run 1 at ambient temperature, after treating 149 bed volumes of water (1015 L), the outlet ammonia-nitrogen concentration measured 2.2 mg/L.

Tote EW107-15

Ammonia removal data gathered from the ambient temperature run for Tote EW107-15 are included in Table 2 and Figure 9. The initial ammonium concentration in this tote was significantly higher (122 mg/L vs. 17 mg/L), and as a result, the zeolite became saturated with ammonia at a faster rate. As expected, this lead to a shorter loading cycle and fewer bed volumes of water treated. For Run 2 at ambient temperature, after treating 57 bed volumes of water (388 L), the outlet ammonia-nitrogen concentration measured 39 mg/L.

Table 2. **Ambient Temperature Run Tote EW107-15 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
1	0	122.40	0.00%	0.00
2	62.00	0.19	99.85%	9.10
3	120.00	0.20	99.84%	17.62
4	180.00	0.86	99.30%	26.43
5	250.00	9.57	92.18%	36.71
6	300.00	18.03	85.27%	44.06
7	360.00	33.30	72.79%	52.87
8	390.00	38.98	68.16%	57.27

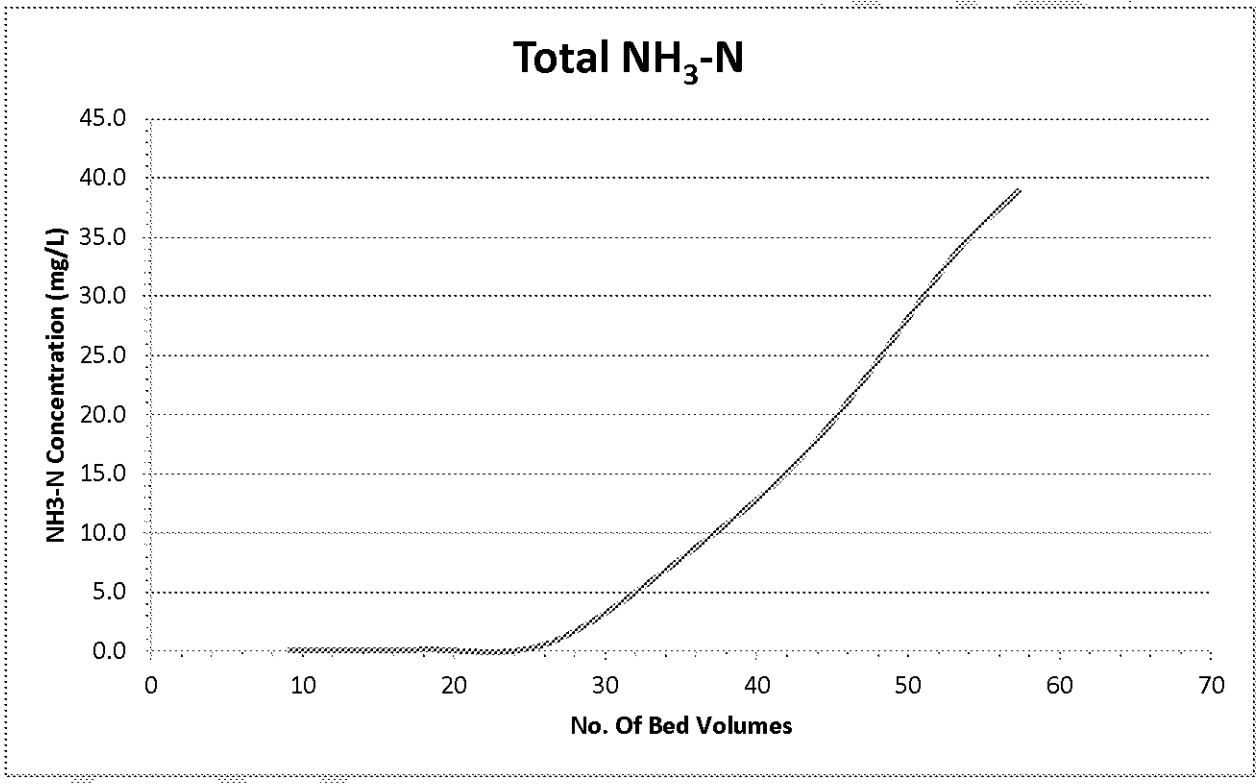


Figure 9. **Ambient Temperature Ammonia Removal Data Tote EW07-15**

Tote MW5-09

Ammonia removal data gathered from the ambient temperature run for Tote MW5-09 are included in Table 3 and Figure 10. The initial ammonium concentration in this tote was 48 mg/L, and as a result, as expected, the total number of bed volumes treated fell between totes MW105-13 and EW107-15. For Run 3 at ambient temperature, after treating 125 bed volumes of water (850 L), the outlet ammonia-nitrogen concentration measured 4.6 mg/L.

Table 3. **Ambient Temperature Run Tote MW5-09 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
1	0	48.39	0.00%	0.00
2	60.00	0.43	99.10%	8.14
3	120.00	0.42	99.12%	15.75
4	200.00	0.36	99.25%	26.83
5	240.00	0.31	99.36%	32.38
6	300.00	0.37	99.24%	41.05
7	360.00	0.46	99.05%	49.72
8	420.00	0.33	99.31%	57.68
9	480.00	0.41	99.15%	65.99
10	530.00	0.45	99.07%	72.78
11	590.00	0.48	99.01%	81.09
12	650.00	0.70	98.55%	89.76
13	710.00	1.11	97.70%	98.25
14	770.00	1.88	96.12%	107.28
15	830.00	3.22	93.34%	116.30
16	890.00	4.61	90.48%	125.32

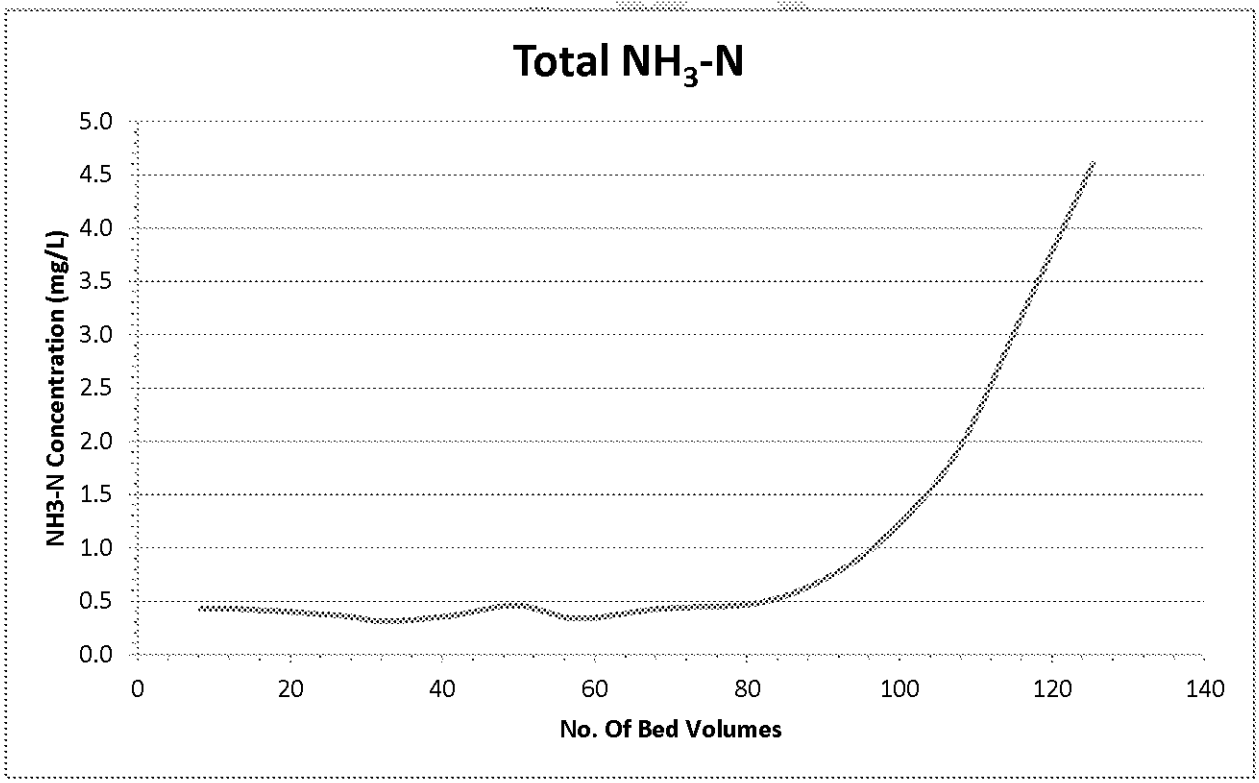


Figure 10. **Ambient Temperature Ammonia Removal Data Tote MW5-09**

3.2 Ambient Water Testing - ESD

Tote MW105-13

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 4. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 4. ESD Phosphorus Removal Data – Tote MW105-13

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	7.33	Feed water pH	7.14
Feed water Conductivity	2,053 µS/cm	Feed water Conductivity	542 µS/cm
Product water pH	7.14	Product water pH	6.93
Product water Conductivity	542 µS/cm	Product water Conductivity	315 µS/cm
Feed Phosphorus conc.	0.115 mg/L	Feed Phosphorus conc.	0.0347 mg/L
Product Phosphorus conc.	0.0347 mg/L	Product Phosphorus conc.	0.0219 mg/L
Phosphorus removal	69.8%	Phosphorus removal	36.9%
Ion removal	73.6%	Ion removal	41.9%

After two stages of ESD treatment, the phosphorus concentration in the product water is below the target concentration of 0.03 mg/L.

CONFIDENTIAL

Tote EW107-15

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 5. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 5. **ESD Phosphorus Removal Data – Tote EW107-15**

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	8.04	Feed water pH	7.96
Feed water Conductivity	2750 µS/cm	Feed water Conductivity	1200 µS/cm
Product water pH	7.96	Product water pH	7.51
Product water Conductivity	1200 µS/cm	Product water Conductivity	417 µS/cm
Feed Phosphorus conc.	1.8 mg/L	Feed Phosphorus conc.	1.18 mg/L
Product Phosphorus conc.	1.18 mg/L	Product Phosphorus conc.	0.735 mg/L
Phosphorus removal	34.4%	Phosphorus removal	37.7%
Ion removal	57.5%	Ion removal	63.0%

Due to the high initial phosphorus concentration (2.27 mg/L), after two stages of ESD treatment the phosphorus levels are still above the target phosphorus concentration of 0.03 mg/L. Additional stages of ESD treatment are required to achieve the target phosphorus concentration

CONFIDENTIAL

Tote MW5-09

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 6. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 6. **ESD Phosphorus Removal Data – Tote MW5-09**

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	8.08	Feed water pH	7.46
Feed water Conductivity	1980 µS/cm	Feed water Conductivity	564 µS/cm
Product water pH	7.46	Product water pH	6.36
Product water Conductivity	564 µS/cm	Product water Conductivity	92.8 µS/cm
Feed Phosphorus conc.	0.049 mg/L	Feed Phosphorus conc.	0.0156 mg/L
Product Phosphorus conc.	0.0156 mg/L	Product Phosphorus conc.	0.011 mg/L
Phosphorus removal	68.2%	Phosphorus removal	29.5%
Ion removal	73.7%	Ion removal	79.9%

After two stages of ESD treatment, the phosphorus concentration in the product water is below the target concentration of 0.03 mg/L.

3.3 Treated Water Chemistry

Samples of the treated water following AmmEL treatment and one and two stages of ESD treatment were collected by a representative of Renewi and submitted to a third party lab for analysis. The results of those analyses are presented in Appendix 2.

4 NEXT STEPS – RECOMMENDATIONS

The recommended next step is to use the data collected from the study to develop a plan of action to use CWTI's AmmEL and ESD Systems in an on-site groundwater remediation program.

5 SUMMARY

The laboratory testing program demonstrated that CWTI's AmmEL-LC technology is capable of reducing inlet ammonia levels in groundwater water at Renewi's Ottawa site to effluent ammonia limits below 1 mg NH_3-N/L. CWTI's ESD System is capable of reducing inlet phosphorus levels in groundwater to below the required effluent limit of 0.03 mg/L.

The conclusions of the study are:

- Laboratory testing was very successful in demonstrating that the AmmEL-LC system is a viable option to treat ammonia levels characteristic of Renewi's ground waters and to meet the desired treated water requirements.

- At maximum removal efficiency, the AmmEL reduced inlet ammonia concentrations in the various totes provided by Renewi as follows:
    - Tote MW105-13 from 17 mg/L to less than 0.1 mg/L NH_3-N representing >99% removal
    - Tote EW107-15 from 122 mg/L to less than 0.2 mg/L NH_3-N representing >99% removal
    - Tote MW5-09 from 48 mg/L to less than 0.3 mg/L NH_3-N representing >99% removal

- Laboratory testing also demonstrated that in two of the waters, the ESD System is a viable option to treat phosphorus levels characteristic of Renewi's ground waters and to meet the desired treated water requirements. Due to the high phosphorus concentrations and complex nature of the water in Tote EW107-15, additional stages of ESD treatment will be required to achieve the target concentration of 0.03 mg/L.

- After two stages of ESD treatment, the phosphorus concentration in the AmmEL treated effluent was reduced as follows:
    - Tote MW105-13 from 0.115 mg/L to 0.0219 mg/L, representing 80.9% removal
    - Tote EW107-15 from 2.27 mg/L to 0.735 mg/L, representing 67.6% removal
    - Tote MW5-09 from 0.146 mg/L to 0.011 mg/L, representing 92.5% removal

CONFIDENTIAL

Appendix 1. Raw Water Chemistry

Well #		EW107-15	MW105-13	MW5-09
Date Sampled		28-Mar-2019	28-Mar-2019	28-Mar-2019
Physical Tests (Water)				
Conductivity	umhos/cm	2930	2170	2020
pH	pH units	7.23	7.34	7.29
Total Dissolved Solids	mg/L	1780	1460	1350
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	970	583	538
Ammonia, Total (as N)	mg/L	68.7	14.1	16.4
Chloride (Cl)	mg/L	195	148	115
Fluoride (F)	mg/L	<0.20	0.18	0.23
Nitrate (as N)	mg/L	<0.20	<0.10	<0.10
Nitrite (as N)	mg/L	<0.10	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	66.1	15.3	18.7
Phosphorus, Total	mg/L	2.27	0.115	0.146
Sulfate (SO_4)	mg/L	175	491	578
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.50	<0.50	<0.50
Arsenic (As)-Dissolved	mg/L	<0.010	<0.010	<0.010
Barium (Ba)-Dissolved	mg/L	0.166	0.076	0.131
Boron (B)-Dissolved	mg/L	<1.0	<1.0	<1.0
Cadmium (Cd)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Calcium (Ca)-Dissolved	mg/L	300	247	241
Chromium (Cr)-Dissolved	mg/L	<0.050	<0.050	<0.050
Cobalt (Co)-Dissolved	mg/L	<0.010	<0.010	<0.010
Copper (Cu)-Dissolved	mg/L	<0.020	<0.020	<0.020
Iron (Fe)-Dissolved	mg/L	<1.0	<1.0	5.9
Lead (Pb)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	mg/L	91.7	81.2	80.3
Manganese (Mn)-Dissolved	mg/L	0.561	0.512	2.09
Molybdenum (Mo)-Dissolved	mg/L	<0.0050	<0.0050	0.0064
Nickel (Ni)-Dissolved	mg/L	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	75.3	30.9	22.8
Selenium (Se)-Dissolved	mg/L	<0.20	<0.0050	<0.0050
Sodium (Na)-Dissolved	mg/L	109	80.3	63.6
Zinc (Zn)-Dissolved	mg/L	<0.10	<0.10	<0.10

Appendix 2. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW105-13

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	2100	542	315
pH	pH units	7.77	7.14	6.93
Total Dissolved Solids	mg/L	1420	340	193
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	563	109	68
Ammonia, Total (as N)	mg/L	0.046	0.016	<0.010
Chloride (Cl)	mg/L	146	18.2	14.5
Fluoride (F)	mg/L	0.20	0.047	0.031
Nitrate (as N)	mg/L	<0.10	<0.020	<0.020
Nitrite (as N)	mg/L	<0.050	<0.010	<0.010
Total Kjeldahl Nitrogen	mg/L	0.70	0.47	0.42
Phosphorus, Total	mg/L	0.0899	0.0347	0.0219
Sulfate (SO_4)	mg/L	472	134	63.5
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.0050	<0.0050	0.0059
Arsenic (As)-Dissolved	mg/L	0.00155	0.00132	0.00111
Barium (Ba)-Dissolved	mg/L	0.00386	0.00097	0.00071
Boron (B)-Dissolved	mg/L	0.058	0.052	0.047
Cadmium (Cd)-Dissolved	mg/L	0.000011	0.000011	0.000010
Calcium (Ca)-Dissolved	mg/L	229	33.7	20.5
Chromium (Cr)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00064	0.00027	0.00020
Copper (Cu)-Dissolved	mg/L	0.00022	0.00104	0.00119
Iron (Fe)-Dissolved	mg/L	0.050	0.035	0.029
Lead (Pb)-Dissolved	mg/L	<0.000050	0.000053	0.000065
Magnesium (Mg)-Dissolved	mg/L	78.1	12.7	7.61
Manganese (Mn)-Dissolved	mg/L	0.517	0.0845	0.0537
Molybdenum (Mo)-Dissolved	mg/L	0.0192	0.00374	0.00172
Nickel (Ni)-Dissolved	mg/L	0.00288	0.00260	0.00219
Potassium (K)-Dissolved	mg/L	6.23	1.30	0.693
Selenium (Se)-Dissolved	mg/L	0.000070	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	153	57.6	29.7
Zinc (Zn)-Dissolved	mg/L	0.0027	0.0059	0.0054

Appendix 3. Third Party Analyses of AmmEL and ESD Treated Water – Tote EW107-15

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	2750	1200	417
pH	pH units	8.04	7.96	7.51
Total Dissolved Solids	mg/L	1950	828	306
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	1130	417	113
Ammonia, Total (as N)	mg/L	0.066	0.03	<0.010
Chloride (Cl)	mg/L	216	32	4.93
Fluoride (F)	mg/L	<0.10	<0.10	<0.020
Nitrate (as N)	mg/L	<0.10	<0.10	<0.020
Nitrite (as N)	mg/L	<0.050	<0.050	<0.010
Total Kjeldahl Nitrogen	mg/L	4.4	2.88	2.5
Phosphorus, Total	mg/L	1.8	1.18	0.735
Sulfate (SO_4)	mg/L	272	177	86.4
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.050	0.0267	0.0257
Arsenic (As)-Dissolved	mg/L	0.00300	0.00246	0.00191
Barium (Ba)-Dissolved	mg/L	0.01230	0.00395	0.0017
Boron (B)-Dissolved	mg/L	<0.10	0.078	0.073
Cadmium (Cd)-Dissolved	mg/L	<0.000050	<0.000010	<0.000010
Calcium (Ca)-Dissolved	mg/L	275.0	79.0	17.3
Chromium (Cr)-Dissolved	mg/L	<0.0050	0.00306	0.00236
Cobalt (Co)-Dissolved	mg/L	<0.0010	0.00048	0.00035
Copper (Cu)-Dissolved	mg/L	<0.0020	0.00126	0.00148
Iron (Fe)-Dissolved	mg/L	<0.10	0.100	0.079
Lead (Pb)-Dissolved	mg/L	<0.00050	0.000478	0.00046
Magnesium (Mg)-Dissolved	mg/L	90.6	28.60	4.82
Manganese (Mn)-Dissolved	mg/L	0.8200	0.2910	0.0768
Molybdenum (Mo)-Dissolved	mg/L	0.02190	0.00890	0.00461
Nickel (Ni)-Dissolved	mg/L	<0.0050	0.00290	0.00257
Potassium (K)-Dissolved	mg/L	17.20	7.960	2.19
Selenium (Se)-Dissolved	mg/L	0.00944	0.000166	0.00013
Sodium (Na)-Dissolved	mg/L	291.0	172.0	66.9
Zinc (Zn)-Dissolved	mg/L	<0.010	0.0049	0.0059

Appendix 4. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW5-09

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	1980	564	92.8
pH	pH units	8.08	7.46	6.36
Total Dissolved Solids	mg/L	1420	373	75
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	525	85	<10
Ammonia, Total (as N)	mg/L	0.213	0.059	0.012
Chloride (Cl)	mg/L	111	9.25	2.14
Fluoride (F)	mg/L	0.15	0.034	<0.020
Nitrate (as N)	mg/L	<0.10	<0.020	<0.020
Nitrite (as N)	mg/L	0.156	0.012	<0.010
Total Kjeldahl Nitrogen	mg/L	0.66	0.3	<0.15
Phosphorus, Total	mg/L	0.0049	0.0156	0.011
Sulfate (SO_4)	mg/L	510	179	28.2
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.0050	0.0075	0.0093
Arsenic (As)-Dissolved	mg/L	0.00034	0.00023	0.00016
Barium (Ba)-Dissolved	mg/L	0.00744	0.00154	0.00038
Boron (B)-Dissolved	mg/L	0.062	0.054	0.048
Cadmium (Cd)-Dissolved	mg/L	0.000021	<0.000010	<0.000010
Calcium (Ca)-Dissolved	mg/L	242	33	4
Chromium (Cr)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00024	0.00014	<0.00010
Copper (Cu)-Dissolved	mg/L	0.0019	0.00451	0.00442
Iron (Fe)-Dissolved	mg/L	<0.010	0.013	0.017
Lead (Pb)-Dissolved	mg/L	0.000188	0.000182	0.000444
Magnesium (Mg)-Dissolved	mg/L	80.2	13.2	1.7
Manganese (Mn)-Dissolved	mg/L	1.96	0.313	0.040
Molybdenum (Mo)-Dissolved	mg/L	0.00746	0.00166	0.0004
Nickel (Ni)-Dissolved	mg/L	0.00202	0.00188	0.00120
Potassium (K)-Dissolved	mg/L	8.1	2.30	0.25
Selenium (Se)-Dissolved	mg/L	0.000051	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	133	65.3	9
Zinc (Zn)-Dissolved	mg/L	0.0096	0.0080	0.0046

From: Hook, Jordan (MECP)
To: Endenburg, Sarah (MECP)
Subject: FW: Convertus" Discharge of Leachate at 5123 Hawthorn Road, Ottawa
Date: July 3, 2025 1:57:13 PM
Attachments: image001.png
image002.png
image003.png
image004.png

Confidential. For FOI purposes only.

From: David Veinot <dveinot@convertusgroup.com>
Sent: Monday, April 29, 2024 3:44 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Jordan,

To ensure we have all the time and management attention we need, let's plan on meeting at Convertus Ottawa on **Wednesday afternoon at 1:30pm**. I'll be available all afternoon, or as much time as you like.

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Monday, April 29, 2024 10:05 AM
To: David Veinot <dveinot@convertusgroup.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Hi David,

No problem. I have a meeting scheduled in the morning, if we could do 10:00- 10:15 am, that would be great.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 29, 2024 9:07 AM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Jordan,

I found out that the Convertus Ottawa facility is hosting their annual tour with representatives from the City of Ottawa this Thursday afternoon starting at 1pm. The City likes to bring new hires and waste management reps by every year as an orientation on their green bin program.

To ensure that we can get participation of the site management representatives as needed, can we move your visit to Thursday morning instead. Say 9:00am?

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Thursday, April 25, 2024 2:56 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Great, thanks for letting me know. I may attend the Site for a few hours on one of these days. Were you planning on being at the Ottawa Site for any of these days?

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 25, 2024 2:50 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the

sender.

Jordan,

The Spring sampling schedule at Convertus Ottawa has been moved up to next week, from May 1-3, 2024.

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Thursday, April 25, 2024 2:27 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Hello David,

No problem. Thank you for the explanations and confirming the monitoring tier you will be in for 2024. The pictures you attached of the underground holding tanks was a great visual.

If you could please let me know when the spring sampling does occur, that would be appreciated.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 22, 2024 4:08 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Jordan,

Sorry for the delay. I was in Manassas, Virginia last week to visit our newly acquired composting site.

1. All three manholes, or catch basins, connected to the USTs were constructed the same way. The manholes are reinforced segmented concrete sections connected with rubber gaskets.

   While six USTs were approved, only five were installed. As an aside, all of the USTs are two-piece 10,000-gallon reinforced concrete tanks with a mastic-sealed joint (not a gasket) joining the two halves.

   Only two of the five installed UST tanks are used to hold leachate. The two tanks are connected to each other via two 6" PVC pipes, effectively making one large tank. Only one of the tanks is connected to the manhole, or catchbasin, in the neighbouring Technical Hall. Please see the attached Figure to help understand the layout. Photos are also included. The first photo shows the tanks during their installation, the second shows the manholes in the Tech Hall, the third shows the PVC connections between the two process tanks. Photos four and five show the manhole's gasket.

2. GHD has confirmed that the Spring 2024 sampling event is scheduled to occur the week of May 6th. I have asked GHD to see if the sampling can be moved up to remain consistent with previous years (April, August & November).

3. The Trigger Program was set up for the purpose of identifying when additional confirmation of groundwater impacts is appropriate, and when implementation of a remedial response is appropriate. Routine monitoring is Tier I monitoring. Additional confirmation monitoring is triggered when two or more parameters exceed their respective trigger levels in a single sample from Tier I monitoring. When this is triggered, the follow up duplicate monitoring is referred to as Tier II monitoring. The purpose of Tier II monitoring is to confirm the presence of groundwater impacts.

   When Tier II monitoring (duplicate follow-up sampling) is undertaken and the impacts are confirmed, an evaluation of the impact is undertaken. This evaluation was undertaken formally as part of the Trigger Program in the past and as a result EW107-15 was commissioned in 2016 as a groundwater extraction well. Operating EW107-15 as a groundwater extraction well is a remedial response. Accordingly, the monitoring that is undertaken at the site is in Tier III (post remedial response monitoring).

   The Trigger Program evaluation included in the 2023 AMR identifies that there are multiple trigger exceedances at several shallow groundwater monitoring wells. The report describes that since remediation has already been implemented, there is no need for Tier II response monitoring at these locations during 2024. Accordingly, regular routine monitoring will continue through 2024. It should be noted that the monitoring program undertaken under Tier I or Tier III is the same.

Please let me know if you have any further questions.

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Tuesday, April 16, 2024 1:49 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

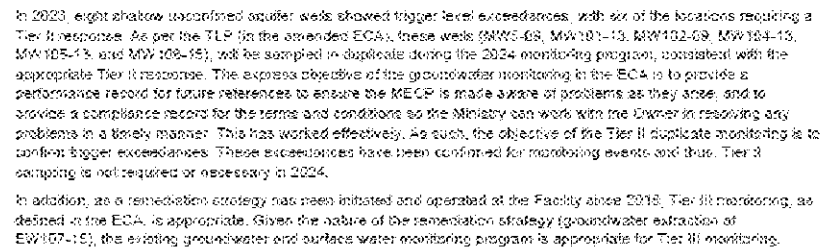
Hello David,

Thank you for providing me with further information on the event. I understand that at this time it is unknown to Convertus if any leachate actually entered any parts of the natural environment (i.e., groundwater). I am glad to hear that the gasket has been repaired and there is no current sign of groundwater entering the underground storage tanks.

I have a few additional questions:

1. There are six underground storage tanks listed in your sewage ECA, are these access manholes all constructed the same way with a rubber gasketed seal? Are only two of these tanks being used for the storage of leachate?
2. Do you have dates set to conduct the future supplemental groundwater monitoring and your remedial activities? Are you considering your "pump and treat" at EW107-15 a remedial activity and thus remaining in Tier I of the TLP? I also see reference in the AMR that Tier III of the TLP is appropriate?

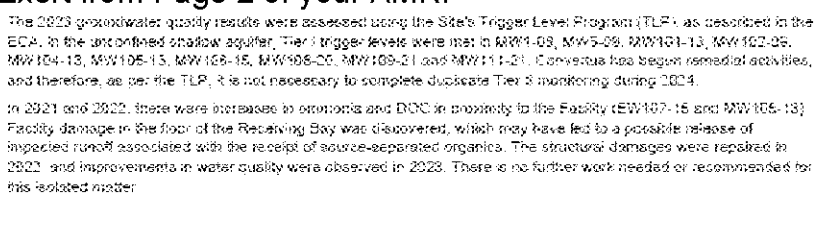
Exert from Page 21 of your AMR:



In 2023, eight shallow unconfined aquifer wells showed trigger level exceedances, with six of the locations requiring a Tier II response. As per the TLP (in the amended ECA), these wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW108-15), will be sampled in duplicate during the 2024 monitoring program, consistent with the appropriate Tier II response. The express objective of the groundwater monitoring in the ECA is to provide a performance record for future references to ensure the MECP is made aware of problems as they arise, and to provide a compliance record for the terms and conditions so the Ministry can work with the Owner in resolving any problems in a timely manner. This has worked effectively. As such, the objective of the Tier II duplicate monitoring is to confirm trigger exceedances. These exceedances have been confirmed for monitoring events and thus, Tier II sampling is not required or necessary in 2024.

In addition, as a remediation strategy has been initiated and operated at the Facility since 2018, Tier III monitoring, as defined in the ECA, is appropriate. Given the nature of the remediation strategy (groundwater extraction at EW107-15), the existing groundwater and surface water monitoring program is appropriate for Tier III monitoring.

Exert from Page 2 of your AMR:



The 2023 groundwater quality results were assessed using the Site's Trigger Level Program (TLP) as described in the ECA. In the unconfined shallow aquifer, Tier I trigger levels were met in MW1-09, MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, MW106-15, MW108-20, MW109-21 and MW111-21. Convertus has begun remedial activities, and therefore, as per the TLP, it is not necessary to complete duplicate Tier II monitoring during 2024.

In 2021 and 2022, there were increases in chlorides and DOC in proximity to the Facility (EW107-15 and MW105-13). Facility damage in the floor of the Receiving Bay was discovered, which may have led to a possible release of impacted runoff associated with the receipt of source-separated organics. The structural damages were repaired in 2022, and improvements in water quality were observed in 2023. There is no further work needed or recommended for this isolated matter.

For your awareness, the MECP Technical Support Section is reviewing your 2023 Annual Monitoring Report.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 15, 2024 4:23 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Jordan,

The issue identified from the 2023 Annual Monitoring Report was not a spill. It was not a 'discharge of leachate to the natural environment', but a discharge of the natural environment into the leachate.

We were experiencing higher than expected volumes of leachate at the site during the late winter months that couldn't be accounted for by the moisture in the incoming SSO alone. We conducted an investigation of potential causes for this excess leachate, and while doing so we pumped out a manhole under the Tech Hall connected directly to the underground leachate storage tanks. Once empty, we saw an inflow of groundwater coming into the manhole through a gasketed seam (the manhole is a two-piece concrete unit connected by a rubber gasket around the circumference). What we saw was the opposite of a spill. The groundwater was flowing into the manhole, not the other way around. Our leachate volume was being increased by the incoming volume of this groundwater. We arranged for a tank maintenance company to professionally seal the leak using injected epoxy.

Now this event raised a secondary issue for us. If groundwater could flow in under certain conditions, is it possible for leachate to flow out under different conditions? Neighbouring water level measurements were reviewed to see if the water table was typically above, or below, the level of the leak (63" below grade). Because these wells were not very close to the manhole, and the water levels varied spatially, some extrapolations needed to be made. It was found that that during the past few years the groundwater level was consistently above the height of the leak, and the system experience inflow. However, there were occasions in the past when the water table may have dropped below the level of the leak and there could have been an outflow of leachate into the groundwater, IF a pathway was present. We don't know if this actually happened, as we don't know when the gasket failure actually occurred. We monitor the groundwater quality from the neighbouring extraction well on a monthly basis, and see concentrations rise and fall, but that is what you'd expect to see from an extraction well pumping intermittently. We also have level sensors in the tanks connected to the SCADA system, but the leachate levels rise and fall so frequently due to the tunnel irrigation process that a small volume loss may not have been noticed. However, we certainly did notice the rapid increase in the leachate volume within our USTs this winter that initiated the excess leachate investigation, so it is possible the leak is a recent development.

In the end, we have no hard evidence of a leachate leak to groundwater, but in the spirit of

transparency, we wanted to offer up the possibility of one intermittently occurring in the past. Despite the fact that this excess leachate investigation, and resulting corrective action, actually happened in 2024, we didn't want to wait until next year's annual report to describe it to the MECP. As stated in the report, future groundwater monitoring results will provide insight into any effect of this gasket deficiency. Along with the broken knee wall concrete in the Receiving Department described to the MECP in 2022, this may (or may not) be a source of organic-related compounds into the groundwater. We only offer them as potential sources. In both cases, the deficiency was identified and corrective action quickly taken.

Please let me know if you need anything else.

David Veinot
Environmental Compliance Manager

---

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Monday, April 15, 2024 3:12 PM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Good afternoon David,

It has been brought to the Ministry's attention that a discharge of leachate to the natural environment was discovered on February 8, 2024 at Convertus Canada Ltd.'s Ottawa facility located at 5123 Hawthorn Road. It's stated in Convertus Canada Ltd's 2023 Groundwater and Surface Water Monitoring Report that the leak in the underground process water (leachate) storage tank system was identified on February 8, 2024. It is also stated in the report that it is believed to be a result of a rubber gasketed-seam on a manhole and it was repaired on February 26, 2024.

Exert from the GHD produced 2023 Groundwater and Surface Water Monitoring Report for Convertus Canada Ltd.'s site in Ottawa:

GHD understands that another potential release into the shallow groundwater was discovered on February 8, 2024. A pre-cast concrete manhole, connected to the underground process water (leachate) storage tank system, was observed to have a leak along a rubber gasketed-seam. This was detected during a maintenance activity when the manhole was pumped dry. Groundwater was observed to be unexpectedly entering the manhole due to hydrostatic pressure, at a depth of 63 inches below grade. This groundwater inflow was causing excessive volumes of leachate to be generated and requiring off site disposal. The subject manhole is located on the east side of the Facility, where shallow groundwater quality impacts have been identified. Based on the elevation at the manhole, in relation to the seasonally fluctuating groundwater levels, it is possible that this gasket failure could have been an intermittent contributor for process water to enter the shallow groundwater from the Facility's leachate storage system when the groundwater level dropped below the level of the manhole. The time period over which this could have occurred is not known, nor is there any hard evidence of the process water actually leaving the manhole and going into the groundwater. Convertus had a specialized third-party contractor repair the gasket on February 26, 2024. Future groundwater monitoring results will provide insight into the effect of this repair on shallow groundwater quality near, and downgradient, of the Facility.

If you could please provide more details on this spill event via email, that would be appreciated.

Thanks,

Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environnementale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.
Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.
Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

From: Hook, Jordan (MECP)
To: Endenburg, Sarah (MECP)
Subject: FW: Convertus Ottawa Facility Odour Complaint
Date: July 3, 2025 2:00:32 PM
Attachments: image001.png

Confidential. For FOI purposes only.

From: Hook, Jordan (MECP)
Sent: Monday, May 26, 2025 11:37 AM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Katie Sheridan <ksheridan@convertusgroup.com>; Chris Jones <cjones@convertusgroup.com>; Erik Brown <ebrown@convertusgroup.com>
Subject: RE: Convertus Ottawa Facility Odour Complaint

Good morning David,

Thank you for answering my questions and providing a maintenance update for the facility.

The complainant did not provide a lot of detail with their initial complaint. The complainant is located in the Hawthorne Industrial Park area along Rideau Road (West of Convertus). If I receive any further information related to this complaint, I will let you know.

I am acknowledging the review and actions that were taken by Convertus on May 23, 2025.

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: Friday, May 23, 2025 5:00 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Katie Sheridan <ksheridan@convertusgroup.com>; Chris Jones <cjones@convertusgroup.com>; Erik Brown <ebrown@convertusgroup.com>
Subject: RE: Convertus Ottawa Facility Odour Complaint

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon Jordan,

Thank you for letting us know about the odour complaint earlier today.

Unfortunately, your email was sparse on details regarding the nature of the complaint. Your email didn't provide the complaint's address, or a description, frequency, intensity or duration of the odour (F.I.D.O.L). No specific dates or times were provided, except for today's. Its hard

to review meteorological data for prevailing wind direction if such information is missing.

Some things we do know to answer your follow-up questions. There have been no process upset conditions during the past month. However, there have been some maintenance activities conducted. In late March/early April, we did complete a new door installation on an (emptied) composting tunnel, which actually allowed better sealing of the process tunnels and lessened the load on the air system.

Since mid-April, the site has consistently been working through the weekends, but this consisted of mainly maintenance activities (primarily Screening Line upgrades), so no organic material was actually being received or moved within the plant on those days. All active composting tunnels would be closed, negative pressure throughout the plant maintained, and the odour abatement system would be working. The exterior doors would be closed as no SSO trucks would be received. No one working on-site on the weekends reported unusual odors on those days.

Our site personnel conducted an odour tour of the neighbourhood earlier today following receipt of your complaint notification. No odour associated with the facility was detected in any area visited. Odours that were observed included smoke from controlled brush fire on Blais Rd and a mild tire/asphalt smell along Rideau Rd.

Since we have no details about the historical weekend odours, I am not recording them as formal complaints. Today's investigation did not uncover any activity occurring at Convertus that should result in an unusual odour event. Therefore, I am logging today's complaint as unsubstantiated.

Condition 8.2(b) of our Air ECA requires us to notify the MECP of every odour complaint received by our facility. If we had received odour complaints in the past few months, you would have been told. We have not received any complaints from our direct phone line, email address, 24-hour community complaint line, or social media accounts. Today's complaint was the first received at Convertus Ottawa since February 2023.

Today's complaint has been electronically logged in accordance with Condition 8.2 (a) of our Air ECA and an investigation report has been completed.

Please let me know if you require anything else.

David Veinot
Environmental Compliance Manager
Convertus Group

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: May 23, 2025 10:55 AM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Convertus Ottawa Facility Odour Complaint

Good morning David,

I received an odour complaint on May 23, 2025 that was allegedly coming from the Convertus' facility in Ottawa.

The complainant stated that the odours are usually worse on weekends (no specific dates were provided). Could you please confirm if there have been any process upsets or changes in operations at the Ottawa facility? Have you received any complaints in the last few months?

Thanks,

Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environmentale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.
Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.

Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

From:	Hook, Jordan (MECP)
To:	Endenburg, Sarah (MECP)
Subject:	FW: Ministry Technical Support Section Review of Convertus Ottawa"s 2024 Groundwater and Surface Water Monitoring Report
Date:	July 3, 2025 2:00:35 PM
Attachments:	Convertus 2024 Annual Report and Workplan - MECP Groundwater Comments.pdf image001.png

Confidential. For FOI purposes only.

From: Hook, Jordan (MECP)
Sent: Wednesday, June 4, 2025 3:18 PM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Ministry Technical Support Section Review of Convertus Ottawa's 2024 Groundwater and Surface Water Monitoring Report

Good afternoon David,

The Ministry's Technical Support Section has completed their review of Convertus' 2024 Groundwater and Surface Water Monitoring Report for the Convertus Ottawa Facility at 5123 Hawthorne Road in Ottawa (the "Site").

I have attached the Ministry's technical review memorandum for your review and action. Based on this technical review, the Ministry is recommending that Convertus notifies the impacted adjacent property owners of this shallow groundwater contamination from the Site.

Once you have had a chance to review it, please let me know if you have any questions.

Thanks,
Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environmentale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.

Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.
Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	3466-BZNNSY	**Module Type:**	Other
Status:	To be assigned	**File Storage Number:**	
Program:	Air	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
David	Veinot
Name of Company:	
Convertus	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(226)268-6869		**Fax**	

Date Reported to MOE:	2021/04/01	**Time Reported to MOE:**	13:43
Date of Incident:	2021/04/01	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Convertus Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Convertus: front end loader caught fire, no spill

Initial Incident Description (as reported):
Created: Akiko Date (Spills Action Centre) - 2021/04/01 01:43:56 PM
Caller reports that a front end loader caught on fire, while it was outside on the paved parking lot to perform maintenance. The engine overheated. The FD arrived and put the fire out with water only. The firewater run off went to a catch basin that goes to their contained storm water management pond No evidence of fuel spilled, and believed to be consumed in the fire. Some smoke was visible at the time.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
To be determined	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8102-BZNNYF
Originating Document:		**Created by:**	Akiko Date
Date Created:	2021/04/01	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Akiko Date
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name: **Badge No:**	

Work Unit: District/Area Office: Date: Signature:	

District/Area Supervisor:

Name: Work Unit: District/Area Office: Date: Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8383-A7MRXR	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 211
Program:	Air	**Activity:**	Inspections - Air Facilities

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2015/12/21	**Time Reported to MOE:**	15:25
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Air Facility Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/03/01 03:25:08 PM
On December 21, 2015 an Air Facility Inspection was completed at Orgaworld's Ottawa Site, located at 5123 Hawthorne Road in Ottawa, to determine compliance during the 2014 operating year under Environmental Compliance Approval Number 7021-7HQNDE and the 2015 operating year under Environmental Compliance Approval Number 1613-A2ELCQ which revoked and replaced Environmental Compliance Approval Number 7021-7HQNDE on December 10, 2015. As a result of the inspection the following non-compliance issues were identified: Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE - Failure to submit the 2014 Written Summary by May 31, 2015 Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE & Section 20.6 of the Environmental Protection Act by undertaking modifications outside of the Limited Operational Flexibility time period

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2020/04/08 02:20 PM
Since the Air Facility Inspection, additional Ministry inspections have occurred which confirmed the Facility has submitted the Annual Written Summary each year as required. No further Ministry action is required at this time. File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	

No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	3226-A63LFF	1. The Facility must ensure all ...	2016/04/13	2016/04/13
VAI	3226-A63LFF	2. By May 31, 2016, the Facilit ...	2016/05/31	Abatement ended

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	2716-A7MSEQ
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/03/01	**Date Completed:**	2021/06/16
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**

Badge No:	
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2020/04/08
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2021/06/16
Signature:	

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	3226-A63LFF	**Compliance Date:**	2016/04/13

Work Description:

1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.

Work Type:	Submit Report / Confirm Compliance to Ministry
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2016/04/13

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	4722-AAYMYP	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Brian	Begg
Name of Company:	
Orgaworld Ottawa Inc.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	K1G 1Y3
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)822-2056		**Fax**	

Date Reported to MOE:	2016/06/16	**Time Reported to MOE:**	12:55
Date of Incident:	2016/06/16	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
Large Door Open

Initial Incident Description (as reported):
Created: Tor Rustad (Ottawa District Office) - 2016/06/16 01:01:50 PM
Thursday, June 16, 2016, 12:55, telephone call from Caller: a large door at the facility is jammed open and cannot be closed. Caller is reporting this matter under a Standard Operating Procedure with the Ottawa District office.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/09/12 04:35 PM
June 16, 2016 - EO Straberger Voicemail Message - Tor Rustad - Reports that Brian Begg, Orgaworld, contacted the Ottawa District Office to report a door of the Orgaworld Ottawa Facility is not able to close and therefore requested to speak with EO Straberger. June 17, 2016 - EO Straberger (11:05) Phone call to Brian Begg, (613)822-2056. Voice mail box full and no message could be left. Email sent to Brian Beggs, cc'd Nick Pora & Michael Rooke (all Orgaworld staff), requesting an update and actions taken to address and rectify the failed door. 11:57am - MSG - Nick Pora, Orgaworld Ottawa, stated out of the office today and inquired if follow-up could be completed Monday. If not, contact him at (613) 797-4671. 1:33pm - Received email from Brian Begg, Orgaworld Ottawa, stating that yesterday at 10:30am door #2 was stuck in the open position as a result of a broken cable on the right side. The Door Company was contacted who arrived on-site at approx. 1pm with repairs completed at 3:30pm. No issues with curbside waiting was reported. 2:00pm - Sent email to Brian Begg, Orgaworld Ottawa, thanking for the update to the event and inquiring if any complaints were reported to Orgaworld Ottawa. Confirmed receipt of Nick Pora's voicemail message indicating any remaining follow-up can be completed on Monday. No complaints were received by the Ministry of the Environment and Climate Change as a result of the malfunction of the door during 10:30am to 3:30pm. No additional follow-up was required based on repairs being completed same day with not

complaints received by the MOECC.

No further MOECC action is required at this time.

Recommend File Closed

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	6268-AAYN3F
Originating Document:		**Created by:**	Tor Rustad
Date Created:	2016/06/16	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Tor Rustad
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/09/12**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	3484-93LSDJ	**File Storage Number:**	SI OT GL HA 210
Module:	Incident Reporting	**Module Type:**	Condition of Operation
Cross Reference:	(doc link)	**Task Link:**	8616-93LSNM
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		3484-93LSDJ	
Date Created:	2013/01/03	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Air	**Activity:**	Compliance Monitoring

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/01/03 15:46		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Source Testing Report Submission *cannot be longer than 60 characters*
Incident Description:	As required under Condition 10 of issued ECA No. 7021-7HQNDE, Orgaworld retained the services of Conestoga-Rovers & Associates to undertake a compliance source testing program at their Facility (5123 Hawthorne Road, Ottawa, On). The compliance source testing program was completed in November of 2012. On January 3, 2013, the Ottawa District Office and Standards Development Branch (SDB) received a copy of the Source Testing Report - Determination of Odour for Compliance with Certificate of Approval (Air) No. 7021-7HQNDE. The submission of the report satisfies the requirements of Condition 10.(7) which requires the company to submit the report to the Director and District Manager within two (2) months after source testing was completed. The District Office is awaiting review comments from SDB. Document & File

Links & Comments:	
Attachments Names.	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/01/03		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Not Anticipated		
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/06/03

Signature:

District/Area Supervisor:

Name:

Work Unit:
District/Area Office:
Date:

Signature:

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0153-93HL97	**File Storage Number:**	SI OT OT HA 230
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	3052-93HLBU
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		0153-93HL97	
Date Created:	2012/12/31	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2012/12/31 10:32		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Minor non-compliance with sampling requirements *cannot be longer than 60 characters*
Incident Description:	Following an Industrial Sewage Works Inspection of Orgaworld Canada located at 5123 Hawthorne Road in the City of Ottawa, the following actions are being required by the IO: 1.) Ensure samples are collected on a monthly basis as required by Condition 5 - Surface Water Monitoring and Recording 2.) Ensure monthly samples are analysed for the parameters outlined in Table 1 - Effluent Monitoring SWM Pond EO was informed of reasons why samples were not collected as per the requirements of the ECA. No further MOE action is required at this time; document and file. (Closed)

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2012/12/18		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Possible		
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		
What effluent types are being assessed?	Process (Effluent), Stormwater		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	0153-93HL97	1.) Ensure samples are collecte ...	2013/01/31	2013/01/01
VAI	7182-8YZHG8	2.) Ensure monthly samples are ...	2013/01/01	2013/01/01
VAI	7182-8YZHG8	1.) Ensure samples are collecte ...	2013/01/01	2013/01/01

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/06/03

Signature:

District/Area Supervisor:

Name:

Work Unit:
District/Area Office:
Date:

Signature:

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	3125-AWWNYQ	**Module Type:**	Legislation Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 700
Program:	Waste - Hazardous & Liquid industrial	**Activity:**	Inspections - Reg. 347 Generators

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			

Date Reported to MOE:	2018/03/15	**Time Reported to MOE:**	13:53
Date of Incident:	2017/04/04	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Adminstrative Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2018/03/16 01:53:08 PM
Subject Waste Generator Inspection occurred on March 15, 2018 at Orgaworld Ottawa. Manifest records review determine Copy 6 of Manifest No. RS77263 was missing. Company is will be following up with the receiver site to determine status of copy.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2018/03/23 03:47 PM
March 23, 2018 - Email from David Veinot, Compliance Officer, Orgaworld Ottawa, provided copy 6 of Waste Manifest No. RS77263 dated April 4, 2017. The Carrier, OGI of Mitchell (1111971 Ontario Limited) still had the copy of the manifest in their files through a clerical error. Orgaworld is currently arranging for training for HWIN and O. Reg 347 training for both Ontario locations (Ottawa & London) to ensure this error does not occur in the future. A Subject Waste Generator Inspection was conducted at Orgaworld Ottawa to assess compliance with O. Reg 347 and HWIN generator requirements. Based on the findings the company did not have the required records to indicate proper disposal of subject waste. The company has followed up with the waste carrier and disposal site involved in the transfer of waste and received the missing manifest record. Training is being arranged for the company to ensure future events do not occur. No further action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2018/03/15	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	

Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	3125-AWWNYQ	Company to follow up with carri ...	2018/03/23	2018/03/23
VAI	3867-AWTRVN	Confirm Copy 6 of Manifest No. ...	2018/03/23	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

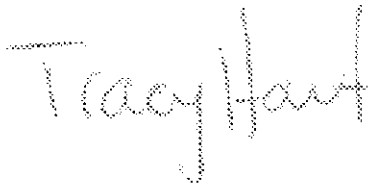
Cross Reference:	(doc link)	**Task Link:**	7116-AWWPCR
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2018/03/16	**Date Completed:**	2019/11/19
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2019/08/22
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2019/11/19
Signature:	

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	6801-BFDRE7	**Module Type:**	Spill
Status:	Closed	**File Storage Number:**	NOT FILED
Program:	Water - Ground & Surface	**Activity:**	Spills

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Ron	Clyne
Name of Company:	
Ron Clyne Heating	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)2961567			

Date Reported to MOE:	2019/08/25	**Time Reported to MOE:**	15:57
Date of Incident:	2019/08/23	**Time of Incident:**	15:30
Incident Date Confirmation:	Actual		

Client(s)

Client Details

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
TSSAfsb - 10L Diesel, Broken Nozzle

Initial Incident Description (as reported):
Created: Ian Oosting (Spills Action Centre) - 2019/08/25 03:57:03 PM
Caller reports a 10L diesel spill to asphalt due to a broken nozzle. Nozzle was attached to a 30 foot hose. Nozzle has been replaced. No drains impacted. Absorbent was placed down and swept up. copy sent to TSSAfsb

SAC Action Class:	TSSA - Fuel Safety Branch - Hydrocarbon Fuel Release/Spill
Non-Standard Procedure:	No

Incident Description:
Last update: Angela Cappello (Ottawa District Office) - 2019/08/29 11:51 AM
ODO Duty Officer: small spill contained on asphalt, no off-site or water impacts and cleaned up. NFA required at this time.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Land
Incident Event:	Leak/Break
Incident Reason:	Equipment Failure

Source Type:	Service Station
Sector Type:	Miscellaneous Industrial
MOE/Other Agencies Involved:	Provincial Agency - Technical Standards & Safety Authority
Was there a discharge / emission / spill of a contaminant to the environment?	
Yes	

Contaminants Table

Contaminant Name	Description	Code	UN#	Limit	Quantity	[units]	[freq]
DIESEL FUEL		13	1202		10	L	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

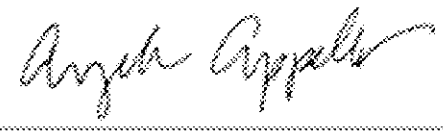
Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	5150-BFDSDX
Originating Document:		**Created by:**	Ian Oosting
Date Created:	2019/08/25	**Date Completed:**	2019/09/10
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Ian Oosting
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Angela Cappello
Badge No:	
Work Unit:	Ottawa District Office
District/Area Office:	Ottawa District Office
Date:	2019/08/29
Signature:	

Area Supervisor:

Name:	Emily Tieu
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2019/09/10
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8448-AEMP9Q	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 211
Program:	Air	**Activity:**	Inspections - Air Facilities

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2016/10/11	**Time Reported to MOE:**	14:07
Date of Incident:	2016/09/29	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Minor Administrative Non-Compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/10/11 02:07:28 PM
As a result of an Air Facility Inspection, the Inspecting Officer noted that copies of the Emission Summary Table and Acoustic Assessment Summary Table were not available during the inspection. A request was made and copies were provided post inspection. As per Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ, the Company shall make the Emission Summary Table and Acoustic Assessment Summary Table available by any person, with charge, by posting it on the Internet or by making it available during regular business hours at the Facility.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/11/14 09:06 AM
It was noted that these were not available at the Facility therefore the Inspecting Officer is requring hardcopies to be available during regular business hours at the Facility and updated as necessary. Electronic copies were provided as part of the inspection. No further MOECC action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2016/09/29	**Time of Arrival at Site:**	09:30
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	

Was there a discharge / emission / spill of a contaminant to the environment?
No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8448-AEMP9Q	Ensure hardcopies of the Emissi ...	2016/10/18	2016/10/18
VAI	1604-AE9RRM	Orgaworld Ottawa must ensure ha ...	2016/10/18	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8177-AEMPCV
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/10/11	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	1529
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2016/11/14
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	6777-A9NQXU	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

Name of Company:

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**

Date Reported to MOE:	2016/05/05	**Time Reported to MOE:**	11:50
Date of Incident:	2016/05/05	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
Odour Complaint - Orgaworld Ottawa

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/05/05 03:34:07 PM
Caller states that while at the intersection of Hawthorne Road and Rideau Road an odour was detected. Caller reports the odour resembled a rotting / sour milk odour. The odour was detected at 11:50am and noted the Orgaworld Facility had their doors open.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/05/05 04:09 PM
May 5, 2016 - EO Straberger contacted Nick Pora, Ontario Operations Manager - Orgaworld, and left a voicemail message of the odour complaint reported to the ministry. (1:05pm) EO Straberger received a voicemail message from Nick Pora indicating an investigation has been completed which included a site visit to the area. Weather conditions may not support the source being Orgaworld as the wind direction was SW and the location would be north of the facility. Not discounting the complaint. Orgaworld filled out a log of the investigation and request a call back to discuss. (1:45pm) EO Straberger received email from Nick Pora providing a copy of the investigation log form completed in response to the odour complaint reported to the ministry. Field response initiated (walking referenced roads) and no odours detected. Wind direction suggests complaint is invalid. (2:15pm) EO Straberger contacted Nick Pora to discuss the investigation into the odour complaint. Reviewed investigation log which suggests the complaint may not be associated with Orgaworld operations due to wind direction at the time of the complaint. All doors are functional and are closed with the exception to allow receipt of waste. Negative pressure system functional. Will ensure doors are only open to allow trucks to access tipping floor. No further action is required at this time. Will document and file complaint and follow-up information. --- The ministry received a complaint of a odour at the intersection of Hawthorne Road and Rideau Road. Caller described the odour as rotten sour milk and further noted the doors of the Orgaworld Facility was open. Complaint details were provided to Orgaworld who completed an investigation which determined all operational systems (doors, negative pressure system) were operating properly. Field investigations was completed with no odours detected. Weather conditions were reviewed for the time period of the complaint which determine the complaint did not support Orgaworld Ottawa as being the source due to wind direction and location. Copy of the investigation log was provided to the ministry. No further MOECC action is required at this time. Recommend file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	6661-A9NRN6
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/05/05	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/05/05**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0210-9YVQ22	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 600
Program:	Waste - Solid/Non-hazardous	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Michael	Rooke
Name of Company:	
Orgaworld Ottawa	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(519) 663-4446	104	(613) 630-6324 **Cell**	mrooke@orgaworld.ca

Date Reported to MOE:	2015/07/29	**Time Reported to MOE:**	09:10
Date of Incident:	2015/07/28	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road
Address: 5123 Hawthorne Rd, Ottawa, City
District Office: Ottawa
LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664
Site #: 4871-9KKR3W

Incident Summary:

Fire in Composting Tunnel

Initial Incident Description (as reported):

Created: Kyle Straberger (Ottawa District Office) - 2015/07/29 02:46:25 PM

EO Straberger received an email from Michael Rooke, Orgaworld Ottawa, stating that last night, on July 28, 2015, a small fire started in Tunnel 8 of the Ottawa Orgaworld Composting Site. The fire caused no damage, nor injuries. The material was moved outside and the fire department sprayed the water from the on-site hydrant in order to put out the hot spots and as a precaustionary measure prevent any possible re-ignition. All water applied to the material stayed on-site and will eventually flow into the approved stormwater management pond. The water will either used in the facility as per usually operations or if compliant with trigger parameters outlined in the ECA, will be discharged. The City of Ottawa has been notified and Orgaworld anticipates no other adverse effect to the site, or to service.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2016/03/01 03:08 PM

July 29, 2015 - EO emailed Michael Rooke to obtain answers to the following questions:

1. Do we know the cause of the fire other than the generation of a hot spot?
2. Is this event similar to the previous fires regarding the composting of 12-20?
3. Has the material been relocated back inside the facility?

July 29, 2015 - EO received the following response from Michael Rooke in response to the above questions:
Hello Kyle:

Sorry for the delay in responding. No, the ignition source is still under investigation, but I agree with you and tend to believe it was a localized hot spot. This material is comprised of residual plastic and material greater than 15mm. It was not being composted, but was being stored in Tunnel 8, so I don't believe this event to be similar to previous fires. The material is still outside. It is our belief that it would pose unnecessary risk to health and safety to bring this material back into the facility. Our intention to dispose of the material, but first, we wish to make sure we are not transferring our problems to another facility/landfill. We are currently wetting down the material and spreading it out it ensure there are no further hotspots. We plan to ship to final disposal as fast as possible, but this may take several days. Please let me know if you have any concerns, or require further information regarding this matter. Thanks for your time Kyle.

Kind regards,

Mike Rooke
Compliance Officer

July 29, 2015 - EO Straberger emailed Michael Rooke to inquire the duration of the storage of this material in the composting tunnel as well as agree witht he approach Orgaworld is taking to prevent further fire hazards.

July 30, 2015 - EO received email from Michael Rooke stating that the material was stored in the composting tunnel for 23 days.

July 30, 2015 - EO emailed Michael Rooke and requested that the MOECC be updated when disposal of this material occurs.

July 30, 2015 - EO received an email from Michael Rooke confirming this will be completed.

EO received confirmation that the waste material was transported to BFI over a phased in approach to ensure waste was fully extinguished and to prevent anaerobic conditions that could trigger any concerns and/or complaints.

Summary: The fire located in the tunnel 8 consisting of residuals and overs was extinguished by the City of Ottawa Fire Department. Waste was transported to Progressive Waste Solutions (formerly known as BFI) for disposal. No complaints or on-going fire incidents were received nor occurred since the July 2015 event.

No further MOECC action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	2287-9YVQGQ
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2015/07/29	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/03/01**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	

Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8087-9TVQL9	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			
Date Reported to MOE:	2014/07/16	**Time Reported to MOE:**	14:15
Date of Incident:	2014/07/16	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Non-Compliance with Condition 9(8) of ECA Number 7251-8GKRPD

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2015/02/19 02:15:32 PM
Industrial Sewage Works Inspection was completed at Orgaworld Ottawa to assess compliance with ECA Number 7251-8GKRPD. Non-compliance with Condition 9(8) which requires Orgaworld to establish a Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. Since 2013 Orgaworld has been in discussion with the Ottawa District Office regarding contamination of groundwater as a result of operations at the site (ammonia primarily). In 2014 Orgaworld submitted a Groundwater Assessment and Work Plan to outline current and historic groundwater quality as well as provide a path forward to remediate the groundwater impacts. MOECC's TSS reviewed the report and accepted Orgaworld's proposal with an additional requirement to implement surface water sampling in the surrounding ditches immediately to determine if surface water is being impacted by shallow groundwater.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2015/02/19 02:25 PM
Orgaworld has been provided the review comments by TSS and is currently in the process of installing a remediation monitoring well to extract the contaminants. The extracted water is to be used in the composting process as process water as ammonia (as well as other contaminants of lesser concentration) does not pose a risk to compost quality. Additional updates to be provided as Orgaworld proceeds with the Groundwater Assessment and Work Plan.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Surface Water
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent)
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	

No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8087-9TVQL9	Implement Work Plan as outlined ...	2014/10/17	2014/10/17
VAI	0741-9T7RLS	Implement Work Plan as outlined ...	2014/10/17	2014/10/17

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	1042-9TVQST
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2015/02/19	**Date Completed:**	2015/03/13
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	1529
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2015/03/11
Signature:	

Senior Environmental Officer:

Name:	Jena Leavoy
Work Unit:	
District/Area Office:	
Date:	2015/03/13
Signature:	

View

Voluntary Compliance

OK

Parent Reference #:	8087-9TVQL9	**Compliance Date:**	2014/10/17

Work Description:

Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

Work Type:	Conduct Study - Monitoring or Sampling Program
Compliance Status:	Compliance Attained
Original Compliance Date:	2014/10/17
Compliance Attained Date:	2014/10/17

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	0741-9T7RLS	**Compliance Date:**	2014/10/17

Work Description:

Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

Work Type:	Implement Remedial or Clean-up Actions
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2014/10/17

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	6701-9K4QZA	**File Storage Number:**	SI OT GL HA 610
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	1023-9K4R88
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		6701-9K4QZA	
Date Created:	2014/05/14	**Date Completed:**	2014/11/07
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Notifications

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:		**Name of Company:**	
First Name Mike	**Last Name** Rooke	Orgaworld Ottawa	
Contact Mailing Address			
Civic Address:			**Unit Identifier:**
5123 Hawthorne Road			
Delivery Designator:			**Delivery Identifier:**
Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/05/13 14:36		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Overhead Door Malfunction *cannot be longer than 60 characters*
Incident Description:	Email Notification from Orgaworld Ottawa indicating an issue with the overhead bay doors of the SSO receiving bay. The email below outlines the actions that will be taken to ensure limited odour issues, if any, during the manual operation of the doors until repairs can be made. Condition 6.2 outlines Orgaworld's responsibility to ensure odourous emissions are contained Condition 6.2 - The Company shall keep all doors in the enclosed building of the Facilityfully closed at all times, except when used for necessary personnel or vehicle entrance and exit. Hello Kyle: Orgaworld Ottawa is currently experiencing issues with one of our overhead doors. The problem is with the main spring needing replacement. Currently the door is down, however, if we need to use this door (due to the large number of city trucks wanting to enter the facility) then we will open the door, and leave it open until all the trucks are out. This action will be taken to minimize the risk while the door opens and closes. Repairs are slated to occur tomorrow morning when we do not have so many trucks entering the facility. Obviously we will attempt not to use this door, but wanted to give you advanced warning of this issue. If you have any questions or concerns, please let me know. Kind regards, Mike Rooke Compliance Officer Email fro Tanya Minarik stating the door repairs have been completed. Incident resolved. Hi Kyle, The repair to this door was just completed. Kind regards,

Tanya Minarik
Site Supervisor

Orgaworld has confirmed that the malfunction of the overhead doors for the receiving bay of the Facility has been fixed and is now operational. The ODO did not received any odour complaints for the two days when the door was operated manually. No further MOE action is required at this time; file closed.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/05/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		**Owner of Material:**	
Estimated Clean Up Cost:		**Who Cleaned Up:**	
% Clean Up:	**%**	**MOE/Other Agencies Involved:**	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	6701-9K4QZA	Confirm work completed	2014/05/14	2014/05/14

Offence(s)

Suspected Violation(s)/Offence(s):
Act - Regulation - Section,

Description
{General Offence}

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2014/05/14

Signature:

Senior Environmental Officer:

Name: Jena Leavoy

Work Unit:
District/Area Office: Ottawa District Office
Date: 2014/11/07

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	8804-BYHRY4	**Module Type:**	Pollution Incident Report (PIR)
Status:	Closed	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

Name of Company:

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**

Date Reported to MOE:	2021/02/23	**Time Reported to MOE:**	15:25
Date of Incident:	2021/02/23	**Time of Incident:**	11:52
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Convertus Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

MOE TIPS: Convertus Group ammonia smell inside & outside a building

Initial Incident Description (as reported):

Created: Brenda Capicciotti (Spills Action Centre) - 2021/02/23 03:25:44 PM

MOE TIPS email received:

From: Bekkout, Lamine (MECP) <Lamine.Bekkout@ontario.ca>
Sent: February 23, 2021 2:41 PM
To: Tips, MoE (MECP) <MOE.Tips.moe@ontario.ca>
Cc: Jurcic, Rose (MECP) <rose.jurcic@ontario.ca>
Subject: FW: Reply: No, Page: https://www.ontario.ca/page/ministry-environment-conservation-parks (Case: 246-2021-317)

Hello MOE Tips,

Please see forwarded anonymous report from a client.

Summary: anonymous client reporting ammonia smell inside and outside a building of Convertus Group at 5123 Hawthorne Road, Ottawa Ontario.

Thank you,
Lamine Bekkout (pronounced La-meen Bee-koot)
Public Education and Stakeholder Relations
Communications Branch
Ministry of Environment, Conservation and Parks
Tel: 437-778-8657

Message:
Convertus Group at 5123 Hawthorne Road, Ottawa Ontario. Ammonia smell inside and outside building. Less acid trucks come to side now, acid used to remove ammonia in the air but expensive. Bh always high.
Reply Request: No
Name: anonymous
E-mail:
Phone number:
Address:
User agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:78.0) Gecko/20100101 Firefox/78.0

**********MOE TIPS email attached below

SAC Action Class:	Pollution Incident Reports (PIRs) and "Other" calls
Non-Standard Procedure:	No

Incident Description:
Last update: Alexander J Baker (Ottawa District Office) - 2021/03/01 10:02 AM
EO BAKER followed up on the report with Convertus Ottawa to determine the accuracy of the report. Convertus Group's Environmental Compliance Manager confirmed that he toured the facility on February 25th and did not observe any of the reported odours. Additionally, the Operations Manager of the site confirmed that there has not been a reduction in the volume of acid used in the ammonia scrubbers. All three (3) scrubbers are fully operational and set to hold a pH of 4.0. Acid is automatically added to the system as needed to maintain this set pH level. Further details cannot be ascertained from the anonymous caller. The ministry will continue to monitor and address odour complaints at the site, but will not take action on this report at this time.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	FW Reply No Page httpswww.ontario.capageministry-environment-conservation-parks (Case 246-2021-317).msg
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part

of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8570-BYHSUE
Originating Document:		**Created by:**	Brenda Capicciotti
Date Created:	2021/02/23	**Date Completed:**	2021/03/25
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Brenda Capicciotti
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Alexander J Baker**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/01**
Signature:	

Supervisor:

Name:	**Adam Worth**
Work Unit:	**Ottawa District Office**
District/Area Office:	**Ottawa District Office**

Date:	2021/03/25
Signature:	

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	1052-BYPMJR	**Module Type:**	Pollution Incident Report (PIR)
Status:	Closed	**File Storage Number:**	SI OT
Program:	Waste - Solid/Non-hazardous	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
David	Veinot
Name of Company:	
Convertus	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Date Reported to MOE:	2021/02/12	**Time Reported to MOE:**	16:01
Date of Incident:	2021/02/11	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3

Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Convertus Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Rejected Load at Convertus Ottawa

Initial Incident Description (as reported):

Created: Alexander J Baker (Ottawa District Office) - 2021/03/01 11:39:28 AM

In accordance with condition 5.3 of ECA #2766-7HEPSZ, Convertus notified MECP of a rejected load.

The details of the load, and the actions taken, are as follows:

Date & Time: Thursday February 11, 2021 1:37pm
Customer: City of Ottawa
Carrier: Miller Waste
Weighbridge Ticket # 2177987
Description of Waste: Expected to be 4,090 kg of municipal organic SSO but turned out to be 3,040 kg of organic SSO mixed with 1,050 kg of contamination (primarily cardboard).
Weight of Rejected Load: 1,050 kg

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Adam Worth (Ottawa District Office) - 2021/03/25 02:13 PM

Since there is no way to load rejected material back into a curbside truck for disposal, Miller Waste sent out a crew and another truck a few hours later to separate the SSO from the contamination by manually sorting through the pile. They left with 1,050 kg of residual waste. The remaining 3,040 kg of SSO was accepted for composting. Convertus was told that they were disposing of the residual waste at the City of Ottawa's Trail Road Landfill 4475 Trail Road, Ottawa.

Copies of the incoming weighbridge ticket and several photos showing the pile before it was manually sorted to remove contamination, and after, are attached.

This is the first load of waste that was rejected at Convertus Ottawa in 2021.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	2021-02-11 Incoming SSO Scale Ticket.jpg; 2021-02-11 Pic (After).jpg; 2021-02-11 Pic (Before).jpg; Rejected Load at Convertus Ottawa on February 11_ 2021.msg
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	0660-BYPNAM
Originating Document:		**Created by:**	Alexander J Baker
Date Created:	2021/03/01	**Date Completed:**	2021/03/25
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Alexander J Baker
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Alexander J Baker**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/24**
Signature:	

Supervisor:

Name:	**Adam Worth**
Work Unit:	**Ottawa District Office**
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/25**
Signature:	

From:	David Veinot
To:	Hart, Tracy (MECP)
Cc:	Baker, Alexander (MECP); Ray Stevens; Tim Middleton; Brown, Anthony; Ashley Hauver
Subject:	Rejected Load at Convertus Ottawa on February 11, 2021
Date:	February 12, 2021 4:01:27 PM
Attachments:	image005.png image006.png 2021-02-11 Incoming SSO Scale Ticket.jpg 2021-02-11 Pic (Before).jpg 2021-02-11 Pic (After).jpg

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good Afternoon Tracy,

In accordance with Condition 5.3 (Rejected Waste Handling) of our ECA (Waste) #2766-7HEPSZ, I wish to notify you of a partial load of waste that rejected by our Ottawa composting facility yesterday afternoon.

The details of the load, and the actions taken, are as follows:

Date & Time: Thursday February 11, 2021 1:37pm
Customer: City of Ottawa
Carrier: Miller Waste
Weighbridge Ticket # 2177987
Description of Waste: Expected to be 4,090 kg of municipal organic SSO but turned out to be 3,040 kg of organic SSO mixed with 1,050 kg of contamination (primarily cardboard).
Weight of Rejected Load: 1,050 kg

Miller Waste offloaded SSO material at Convertus Ottawa from a curbside truck. Convertus Receiving personnel noticed the contamination right away and reported it to site management. Material was isolated from the incoming waste pile and the City of Ottawa and Miller Waste were notified.

Since there is no way to load rejected material back into a curbside truck for disposal, Miller Waste sent out a crew and another truck a few hours later to separate the SSO from the contamination by manually sorting through the pile. They left with 1,050 kg of residual waste. The remaining 3,040 kg of SSO was accepted for composting. We were told they were disposing of the residual waste at the City of Ottawa's Trail Road Landfill 4475 Trail Road, Richmond, ON.

Copies of the incoming weighbridge ticket and several photos showing the pile before it was manually sorted to remove contamination, and after, are included for your review.

This is the first load of waste that was rejected at Renewi Ottawa in 2021.

Please let me know if you have any questions.

David Veinot

Environmental Compliance Manager

---

t. 1(519)663-4446 x203 **c.** 1(226)268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4







001694

Page 1695

is not relevant

est non pertinente

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0053-9DZLKX	**File Storage Number:**	SI OT GL HA 610
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5880-9DZLUJ
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		0053-9DZLKX	
Date Created:	2013/12/02	**Date Completed:**	2016/05/31
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/12/02 10:49		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		

ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Non-compliance with ECA *cannot be longer than 60 characters*
Incident Description:	Waste Disposal (processing) Site inspection completed on November 21, 2013 to determine compliance with ECA and applicable environmental legislation. The following non-compliance items were noted after completing the inspection: 1. Incoming Organic Waste - incoming organic waste is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter polychlorinated biphenols (PCBs). 2. Finished Compost - finished compost is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter PCBs. Voluntary Abatement - The Facility immediately upon receiving the inspection report, shall ensure all incoming organic waste and finished compost is analyzed for all the parameters outlined in Schedule B of the ECA. The Facility, by no later than December 12, 2013, provide sample results for the following months of March, June and October of 2013 to determine if sample results indicate a further lack of sampling for PCBs parameter. See attached letter from Waste Policy Branch (Sones) to the Canadian Compost Council outlining the rollout of the new Ontario Quality Compost Standards and how it impacts facilities (ECA conditions, sampling requirements, etc). No further action is required at this time until direction is provided clarifying the MOECC position with respects to PCBs and the letter from Waste Policy Branch. File Closed

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/11/21		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Possible		
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		**Owner of Material:**	
Estimated Clean Up Cost:		**Who Cleaned Up:**	
% Clean Up:	**%**	**MOE/Other Agencies Involved:**	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	0053-9DZLKX	Effective immediately upon rece ...	2013/12/02	2013/12/02
VA	0053-9DZLKX	2. Finished Compost - finished ...	2014/01/16	2014/01/16
VAI	7476-9DMQ3R	1. Incoming Organic Waste - inc ...	2014/01/16	2013/12/12
VAI	7476-9DMQ3R	2. By no later than December 12 ...	2013/12/12	2013/12/12

Offence(s)

Suspected Violation(s)/Offence(s):

Act - Regulation - Section,
Description
{General Offence}

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office:

	Ottawa District Office
Date:	2016/03/01
Signature:	

Supervisor:

Name:	Tara MacDonald
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2016/05/31
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	5433-A7HJUS	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
City of Ottawa			
Date Reported to MOE:	2016/02/26	**Time Reported to MOE:**	09:22
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Non-compliance-Industrial Sewage Works Environmental Compliance Approval

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/02/26 09:21:58 AM
On December 21, 2015 the Ministry of the Environment and Climate Change completed an Industrial Sewage Works Inspection at the Orgaworld Ottawa Composting Facility located at 5123 Hawthorne Road in the City of Ottawa. The inspection concluded that Orgaworld was non-compliant with Condition 5.1 & Condition 10.3 in 2014.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/04/14 09:32 AM
No non-compliance was identified in the 2015 operating year that was available for review at the time of the inspection (Condition 10.3 - Annual Report - submission date of March 2016). Orgaworld must ensure the following action items are addressed to be compliant with their ECA. 1. Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 5 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year. 2. Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10 of the ECA, to the Ottawa District Office by no later than March 31, 2016. It should be noted that during the review of the district file and information requested as part of the inspection that Orgaworld had complied with Condition 5.1 for the 2015 operating year by analysing all samples collected as per Table 1 of the ECA. No environmental complaints or impacts were reported to the ministry as a result of lack of sample analysis for the 2014 operating year. The lack of analysis will impact Orgaworld's potential for relief for a reduction in the list of parameters and monitoring frequencies specified in Condition 5.3 as it pertains to Condition 5.1. Orgaworld will be required to demonstrate compliance with this condition consecutively over a period of time before the ministry would modify the monitoring program. --- March 10, 2016 - EO received email from Mike Rooke, Orgaworld (RM), providing copy of the 2014 Annual Report as required by action item #2 of the Industrial Sewage Works Inspection Report. All actions required outlined in the Industrial Sewage Works Inspection Report have been addressed. A copy of the 2014 Annual Report was submitted as required. No further MOECC action is required at this time; file closed.

Incident Description Continuation:

Incident Update:

	No

Was there an MOE field response?	
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	1 - Administrative

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent), Stormwater
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	5433-A7HJUS	Orgaworld must continue to ensu ...	2016/03/31	2016/03/31
VA	5433-A7HJUS	Orgaworld shall complete and su ...	2016/03/31	2016/03/10
VAI	3356-A63LEJ	1. Orgaworld must continue to e ...	2016/03/31	2016/03/31
VAI	3356-A63LEJ	2. Orgaworld shall complete and ...	2016/03/31	2016/03/10
VAI	3356-A63LEJ	3. Orgaworld shall provide an e ...	2016/03/31	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8851-A7HK9F
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/02/26	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/04/14**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

View

OK

Voluntary Compliance

Parent Reference #:	5433-A7HJUS	**Compliance Date:**	2016/03/31

Work Description:

Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 5 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year.

Work Type:	Implement Process or Procedures Change and associated Training
Compliance Status:	Compliance Attained
Original Compliance Date:	2016/03/31
Compliance Attained Date:	2016/03/31

View

OK

Voluntary Compliance

Parent Reference #:	5433-A7HJUS	**Compliance Date:**	2016/03/31

Work Description:

Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10.3 of the ECA, to the Ottawa District Office by no later than March 31, 2016.

Work Type:	Submit Report / Confirm Compliance to Ministry
Compliance Status:	Compliance Attained
Original Compliance Date:	2016/03/31
Compliance Attained Date:	2016/03/10

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	3356-A83LEJ	**Compliance Date:**	2016/03/31

Work Description:

1. Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 5 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year.

Work Type:	Implement Process or Procedures Change and associated Training
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2016/03/31

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	3356-A63LEJ	**Compliance Date:**	[redacted]

Work Description:

3. Orgaworld shall provide an explanation as to why sample collection did not occur for the months outlined in Section 2.4 of this Report for the 2014 & 2015 operating year. Please provide an explanation by no later than March 31, 2016.

Work Type:	Submit Report / Confirm Compliance to Ministry
Compliance Status:	VA not Required **VA Not Required Rationale:** Other
Original Compliance Date:	
Reason:	Not required as part of inspection

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	3358-A63LEJ	**Compliance Date:**	2016/03/31

Work Description:

2. Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10 of the ECA, to the Ottawa District Office by no later than March 31, 2016.

Work Type:	Submit Report / Confirm Compliance to Ministry
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2016/03/10

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0321-A85RET	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 610
Program:	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2016/03/17	**Time Reported to MOE:**	15:58
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Waste Transfer / Processing Inspection - Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/03/17 03:58:04 PM
On December 21, 2015 a Waste Transfer Processing Inspection was conducted which resulted in the following actions to be taken by Orgaworld: 1. By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report. 2. By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file. Awaiting completion of VAMA actions items.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/04/13 03:11 PM
April 12, 2016 - EO received email from Mike Rooke, Orgaworld (MR), providing copies of the updated Operations & Maintenance Manual and Daily Site Inspection Record Sheet. April 13, 2016 - (14:20) EO contacted Mike Rooke, Orgaworld, to discuss the actions taken by Orgaworld when an "On and off-site litter" issues is deemed "not OK" as per the findings in the 2015 inspection report. MR stated that when the daily inspection noted issues with on and off-site litter the issues was either pertaining to litter (dust/sand) on the paved areas of the site resulting in a street sweeper to be retained or was small amounts of litter (plastics) in which Orgaworld Staff would clean up as part of their daily tasks. - The new daily inspection record requires that all actions are to be entered when an item is assigned a "Not OK" in the check box. EO stated the review of the O&M Manuanl will be completed with comments provided by email when completed. --- As a result of the Inspection Report completed, Orgaworld Ottawa has submitted both updated documents as requested in Section 5.0 of the report. No further action is required at this time. File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	Yes

Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2015/12/21	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	6280-A63LG9	By no later than April 29, 2016 ...	2016/04/29	2016/04/12
VAI	6280-A63LG9	By no later than April 29, 2016 ...	2016/04/29	2016/04/12

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8544-A85RH5
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/03/17	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

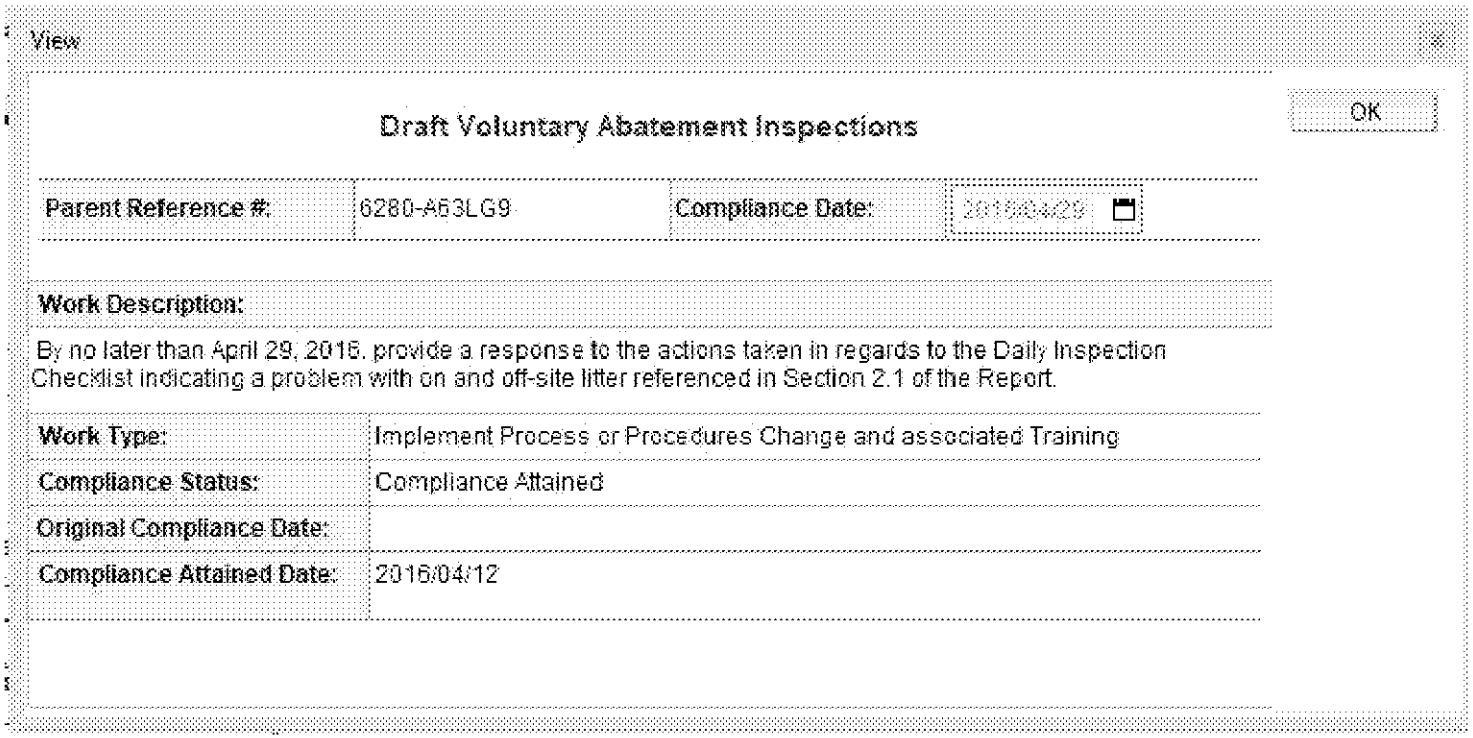
Signatures

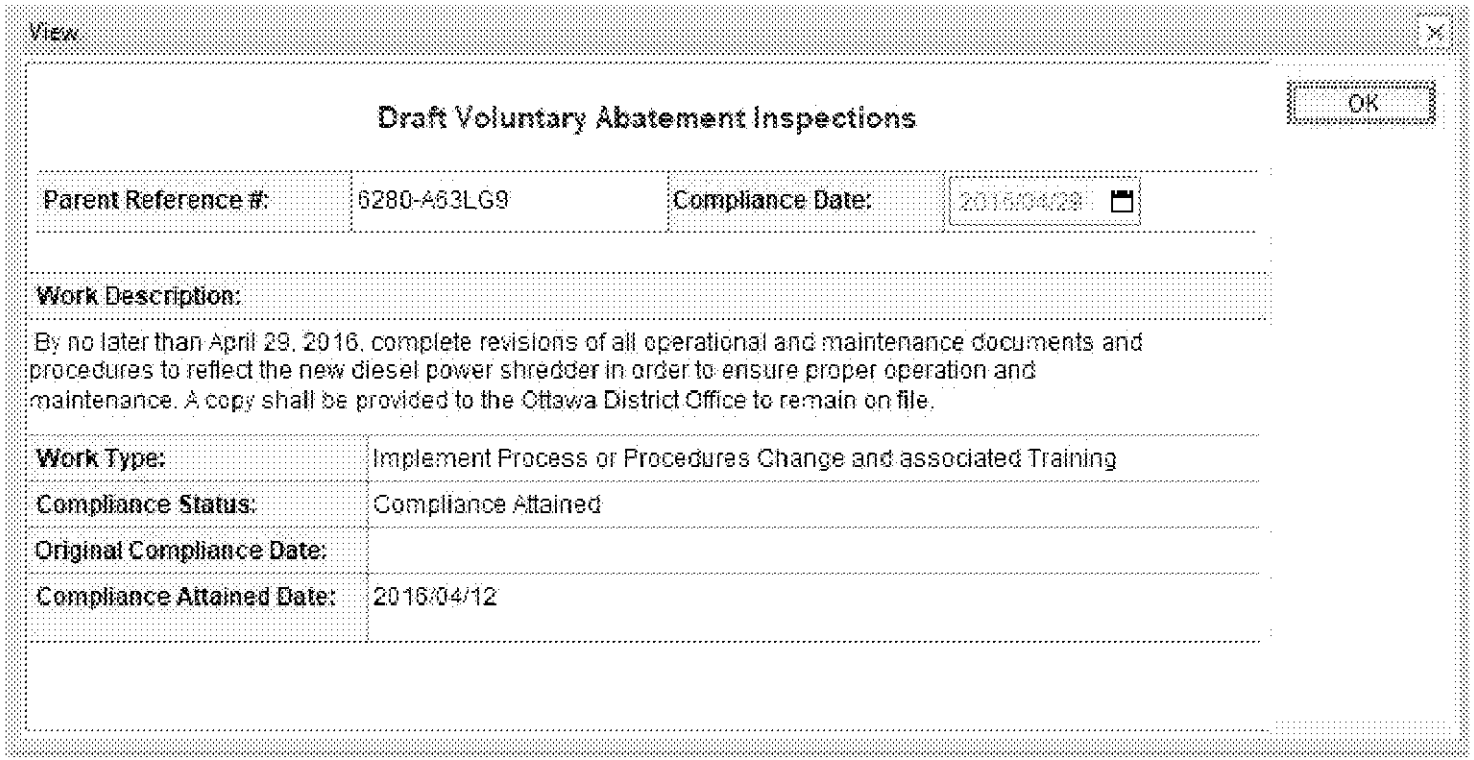
Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/04/13**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
6280-A63LG9
Compliance Date:
2016/04/29
Work Description:
By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/04/12


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
6280-A63LG9
Compliance Date:
2016/04/29
Work Description:
By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/04/12

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2746-9E3LUL	**File Storage Number:**	SI OT GL HA 230
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	0734-9E3LX4
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		2746-9E3LUL	
Date Created:	2013/12/04	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/12/04 11:03		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Non-compliance - ECA - Monitoring Program *cannot be longer than 60 characters*
Incident Description:	A ministry inspection was completed at Orgaworld Ottawa to determine compliance with issued Industrial Sewage Works Environmental Compliance Approval. The results of the inspection determined that the Site had failed to obtain and record temperature of the SWMP during the monthly sample collection as required by Condition 5 of the ECA. As a result, the Facility must ensure the following action item is completed within the provided time frame to ensure compliance: 1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year. --- December 27, 2013 - EO Straberger received an email from Michael Rooke of Orgaworld with an attached document updating Caduceon Laboratories to inlcude 'temperature' as a parameter for the analysis of industrial sewage work samples. The submission of this information satisfies the actions requested of Orgaworld Ottawa. Documents received attached. Email to Mike Rooke acknowledging acceptance of the updated sample submission form and requesting implementation. Email received back indicating the sample submission document to Caduceon Labs has been implemented. No further MOE action is required at this time; file closed

Links & Comments:	
Attachments Names:	Email to EO Straberger from Michael Rooke, Orgaworld - Action Required for Stormwater Inspection Report.msg; Response to Action Required in Inspection Report 2012.pdf

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/11/21		
Source Type:		**Sector Type:**	

Nearest Watercourse:		Watershed Category Code:	
Environmental Impact:	Not Anticipated		
Nature of Impact:			
Incident Event:		Incident Reason:	
Damaged Party:	No		
What effluent types are being assessed?	Process (Effluent)		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	2746-9E3LUL	1. Develop and implement a proc ...	2014/01/03	2013/12/27
VAI	5470-9DNJAG	1. Develop and implement a proc ...	2014/01/03	2013/12/27

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/12/27

Signature:

District/Area Supervisor:
Name:

Work Unit:
District/Area Office:
Date:

Signature:

View

OK

Voluntary Compliance

Parent Reference #:	2746-9E3LUL	**Compliance Date:**	2014/01/03

Work Description:

1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

Work Type:	Implement Process or Procedures Change and associated Training
Compliance Status:	Compliance Attained
Original Compliance Date:	2014/01/03
Compliance Attained Date:	2013/12/27

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	5470-9DNJAG	**Compliance Date:**	2014/01/03

Work Description:

1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

Work Type:	Submit Remedial or Action Plan
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2013/12/27

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	1327-8CCQJX	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	Legislation Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	3718-8CCQLJ
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		1327-8CCQJX	
Date Created:	2010/12/21	**Date Completed:**	2011/05/02
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Abatement - Voluntary

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/11/25 14:11		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: h.kaskens@orgaworld.nl
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	sewage inspection non compliance *cannot be longer than 60 characters*
Incident Description:	non compliance found during inspection; -unapproved alteration of sewage works - breach of the stormwater sewage lagoon Action items listed in inspection report: 1- Submit to the Ministry of the Environment a complete application for an amendment to the Sewage Works Certificate of Approval # 7032-88XPRAto reflect the alterations made to the system. Due by March 18th, 2010. 2- Submit to the undersigned, a report detailing the maximum pumping capacity of the sump pump at the site. Due by January 21st, 2010 TH. - report emailed on January 21st, 2011 detailing pump capacity. Company indicated that they have plugged the inlet of the pit therefore eliminating the need to pump groundwater. TH - Application to amend CofA was received by EAAB on March 21st, 2011

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2010/11/25		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

What effluent types are being assessed?	

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	1327-8CCQJX	Submit pump information	2011/01/21	2011/01/21
VA	1327-8CCQJX	submit application to amend CofA ...	2011/03/18	2011/03/21

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:

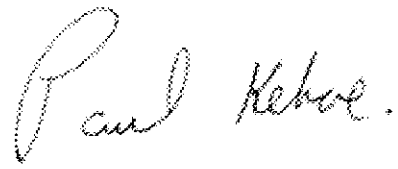


Area Supervisor:

Name: Paul Kehoe

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/05/02

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	5327-8CCR48	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	4666-8CCR5B
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		5327-8CCR48	
Date Created:	2010/12/21	**Date Completed:**	2011/04/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Abatement - Voluntary

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/10/21 14:38		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: h.kaskens@orgaworld.nl
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Air inspection non compliance *cannot be longer than 60 characters*
Incident Description:	Air inspection revealed some non compliance issues. 1- Create and implement a maintenance schedule as discussed in Section 2.8 of this report. 2- Create, implement and maintain as spare parts list and inventory. 3- Submit a report of compliance with actions items 1 and 2 listed above to the undersigned officer. Due: February 4th, 2010. T.H. Email received on Feb 4th, 2011 confirming compliance.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2010/10/21		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	5327-8CCR48	Submit a report of compliance	2011/02/04	2011/02/04

Offence(s)

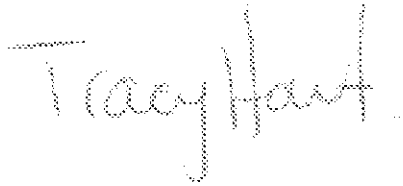
Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:

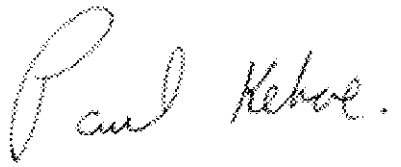


Area Supervisor:

Name: Paul Kehoe

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	4566-BDVJ82	**Module Type:**	Pollution Incident Report (PIR)
Status:	To be assigned	**File Storage Number:**	SI OT GL HA 100
Program:	Waste - Solid/Non-hazardous	**Activity:**	Pollution Incident Reports

Date Reported to MOE:	2019/07/02	**Time Reported to MOE:**	13:10
Date of Incident:	2019/06/29	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Renewi Canada Ltd. Mailing Address: 2940 Dingman Dr, London, Ontario, Canada, N6N 1G4 Physical Address: 2940 Dingman Dr, London, City, County of Middlesex, Ontario, Canada, N6N 1G4 Telephone: (999)999-9999 Client #: 5810-B5NJ5L, Client Type: Corporation

Site(s)

Site Details
Renewi Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456665.96, UTM Northing: 5016595.9, Latitude: 45.301529, Longitude: -75.55272 Site #: 6165-B9LSA2

Incident Summary:
Odour Complaint - Renewi Ottawa

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2019/07/08 09:48:46 AM
MECP Public Information Centre received an email on July 2, 2019 pertaining to an odour complaint from Renewi Ottawa operations:

There's been an continuous odor emitting form Orgaworld at 5123 Hawthorne Rd, Gloucester, ON since June 29 , 2019. We live approximately 1.5 kms southeast and have been smelling this for over 3 days now , normally we get a whiff once in a while , but not for 3 days.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	
Were there samples collected / analyzed at any time?	
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
To be determined	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	

	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	0313-BDVJEC
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2019/07/08	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	
Badge No:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0885-AXBR46	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			
Date Reported to MOE:	2018/03/15	**Time Reported to MOE:**	10:00
Date of Incident:	2018/03/15	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Industrial Sewage Works Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2018/03/29 03:40:59 PM
As a reuslt of an Industrial Sewage Works Inspection on March 15, 2018, the following non-compliance items were identified: 1. Failure to collect monthly sample for October 2017 as per ECA condition 2. Failure to collect monthly sample due to ice covered conditions

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2020/05/25 11:10 AM
Please see the VAMA Table for actions required. April 24, 2018 - David Veinot sent a letter to the ministry providing responses to the action items outlined in the Industrial Sewage Works Inspection Report. See responses below: Action Item #1: Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events. Response: Orgaworld is committed to ensuring that water samples will be taken from the Storm Water Retention Pond on a monthly basis in accordance with Condition 4(1) of our Industrial Sewage ECA – Action Item Completed 4/24/2018. Action Item #2: Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the facility plans to satisfy the requirements of the ECA. Response: Orgaworld is exploring accessability options at our Storm Water Retention Pond which will allow for year-round water sampling while ensuring the safety of our staff. A description of the corrective action taken will be sent to the MOECC once the infrastructure has been installed and tested, but no later than December 31, 2018 – Action Item Outstanding. December 10, 2018 - David Veinot sent a letter to the ministry providing a follow-up to the outstanding Action Item #2. Action Item #2: Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the facility plans to satisfy the requirements of the ECA. Response: Orgaworld explored a variety of accessability options at our Storm Water Retention Pond which would allow for year-round water sampling while ensuring the safety of our staff. Since your inspection, Renewi Canada has installed 6 aerators in the stormwater retention pond which will be operated year-round. The aerators are expected to prevent a build-up of ice in the areas immediately surrounding them. A pond water sample will be drawn on a monthly basis from this ice-free area, and submitted for analysis in accordance with our ECA. It is anticipated that the aerators will improve the ammonia concentrations found in the water through improved aeration - but the open water may also attract more well-fed geese. A photo of the operating aerators is provided on the next page. – Action Item Closed July 10, 2018 - The company installed the first of six aerators in the stormwater management pond. November 28, 2018 - The company installed the remaining five aerators.

The 2019 Annual Monitoring Report reported that the aerators worked continuously throughout the 2019 operating year with unplanned downtime as a result of units freezing. During the 2019, all months were sampled.

The company has addressed the non-compliance identified in the Industrial Sewage Works Inspection Report by installing aerators within the stormwater management pond. As a result, all monthly samples were able to be collected during the 2019 operating year.

No further MECP action required at this time; File Closed

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2018/03/15	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		2 - Minor Environment	

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent), Stormwater
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	8338-AXAPUW	Orgaworld Canada Inc. must ensu ...	2018/04/27	2018/04/24
VAI	8338-AXAPUW	Orgaworld Canada Inc. must revi ...	2018/12/31	2018/12/10

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

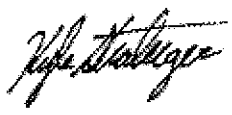
Waste / EGR Information entries:

Document Related Information

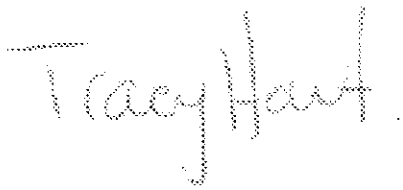
Cross Reference:	(doc link)	**Task Link:**	5152-AXBR6Q
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2018/03/29	**Date Completed:**	2021/06/16
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2020/05/25**
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2021/06/16
Signature:	

View

OK

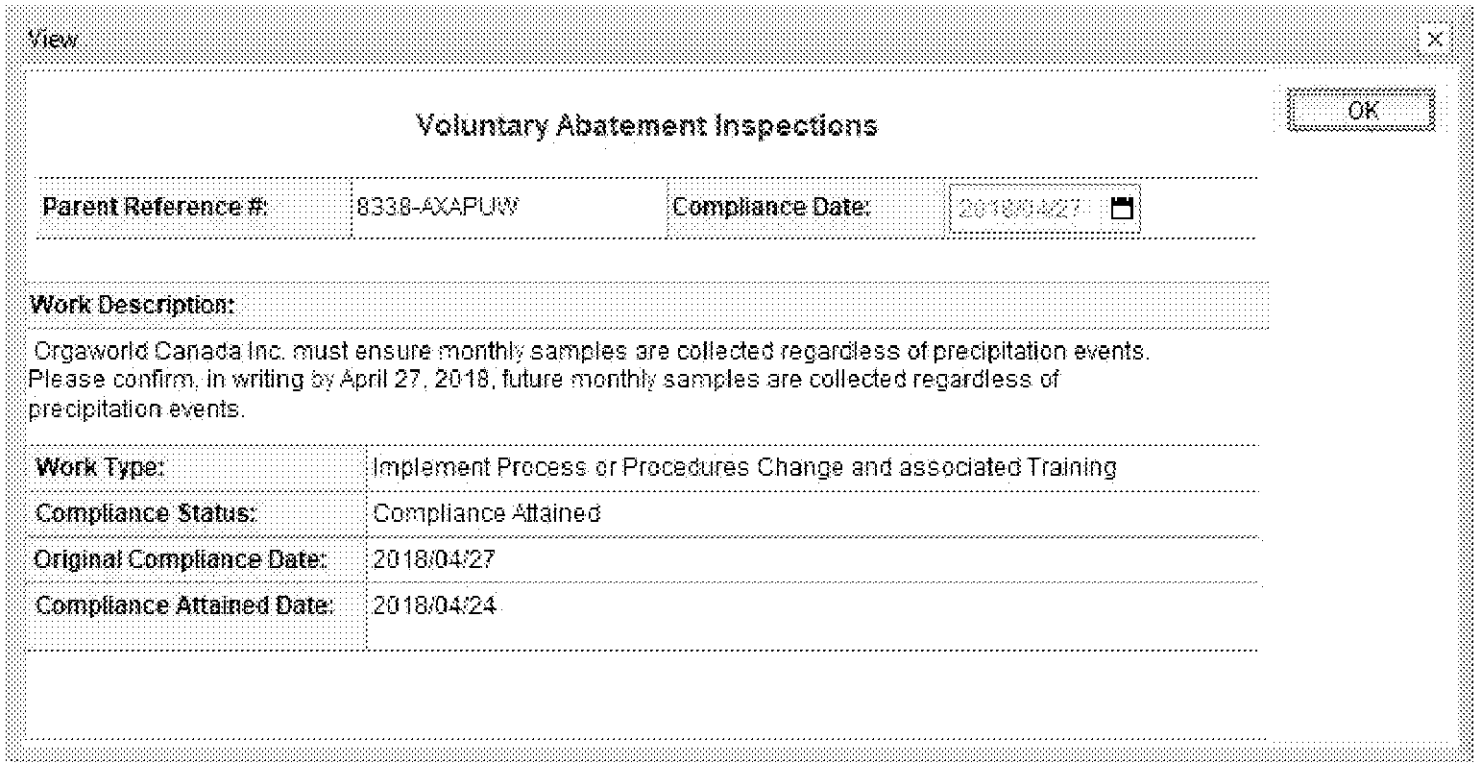
Voluntary Abatement Inspections

Parent Reference #:	8338-AXAPUW	**Compliance Date:**	2018/12/31

Work Description:

Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the Facility plans to satifiy the requirements of the ECA.

Work Type:	Submit Remedial or Action Plan
Compliance Status:	Compliance Attained
Original Compliance Date:	2018/12/31
Compliance Attained Date:	2018/12/10


View
OK
Voluntary Abatement Inspections
Parent Reference #:
8338-AXAPUW
Compliance Date:
2018/04/27
Work Description:
Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
2018/04/27
Compliance Attained Date:
2018/04/24

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	3026-9L2P9M	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	5052-9L2PAM
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		3026-9L2P9M	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By: **Name of Company:**

First Name **Last Name**

s.21

Contact Mailing Address

Civic Address: **Unit Identifier:**

Delivery Identifier:

Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
		Ontario	
	Extension:	**Other Number:**	**Email Address:**
		Fax	

Reported By:

MOE Information

Date & Time Reported to MOE:	2014/06/13 14:01		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint - VALID *cannot be longer than 60 characters*
Incident Description:	Caller stated that Orgaworld stinks this morning. JM - Complaint deemed valid due to wind direction

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/06/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

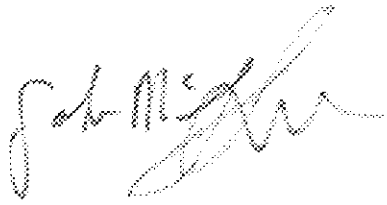
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

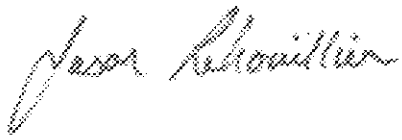


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0484-9L2NZW	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	7288-9L2P37
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		0484-9L2NZW	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:		**Name of Company:**	
First Name	**Last Name**		
Orgaworld	Answering service		

Contact Mailing Address

Civic Address:			**Unit Identifier:**
Delivery Designator:			**Delivery Identifier:**
Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
London		Ontario	
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/06/12 16:55		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint- VALID *cannot be longer than 60 characters*
Incident Description:	Odour complaint from Roma Lynn Gillis at 4:50pm June 12, 2014. JM - Complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2014/06/12		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

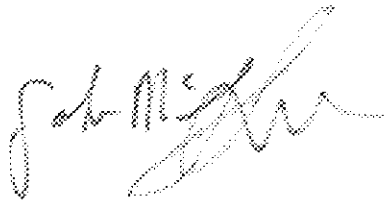
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

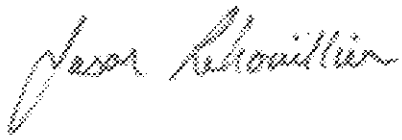


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0163-9L2PLE	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	1377-9L2PMV
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		0163-9L2PLE	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

s.21

[redacted]

ame of Company:

Unit Identifier:

Delivery Identifier:

rovince/State:

Postal Code:

ntario

ther Number:

Email Address:

ax

Reported By:

MOE Information

Date & Time Reported to MOE:	2014/06/13 14:24		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint - VALID *cannot be longer than 60 characters*
Incident Description:	Caller states that Orgaworld stinks this morning. JM - complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/06/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

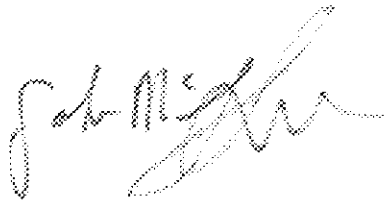
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

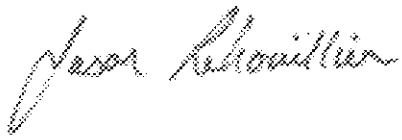


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0114-AE9RA4	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Anthony	Brown
Name of Company:	
City of Ottawa - Program Co-ordinator for Recycling and Material Diverions.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)327-3568		**Fax**	

Date Reported to MOE:	2016/09/29	**Time Reported to MOE:**	15:50
Date of Incident:	2016/09/29	**Time of Incident:**	15:44
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Simcon Steel
Address: 3436 Rideau Rd, Ottawa, City, K1G 3N4
District Office: Ottawa
LIO GeoReference: Zone: 18, UTM Easting: 455792.7, UTM Northing: 5016718.5, Latitude: 45.302578, Longitude: -75.56387
Site #: 0034-7AALHB
+ + + +
Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Orgaworld: Odour complaint from nearby worker.

Initial Incident Description (as reported):

Created: Jeremy Weiss (Spills Action Centre) - 2016/09/29 03:50:27 PM

-City of Ottawa reporting they received a call from a citizen regarding an odour complaint suspected from Orgaworld.
-Caller to City of Ottawa did not leave their name, but works at Simcon Steel Ltd (3436 Rideau Road, 613.822.9494), which is reported to be near Orgaworld (Google Maps shows approx. 655m "as the crow flies").
- City of Ottawa had notified Orgaworld of the odour complaint and will provide Orgaworld with 311 File Number and IDS IR #. Upon speaking with Orgaworld, City of Ottawa was informed that they (Orgaworld) was conducting inspections around the time of the complaint and that operations were okay at the facility.
-Message left to City of Ottawa stated they work near Orgaworld and odours were horrendous, hard to work with and wanted an investigation into the odours.

___ CONTACTS ___

Orgaworld:
Nick Pora, 613.797.4671

1611
SACjw
Wunderground.com, Ottawa International (45.32 deg N, 75.60 deg W) as of 16:11
Temp: 17.6 deg. C
Wind: only states from NORTH with no speed
Humidity: 57%
Pressure: 1032 hPa

SAC Action Class:	Pollution Incident Reports (PIRs) and “Other” calls
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2016/11/14 09:27 AM

EO Straberger

September 30, 2016

- Review weather data for September 29, 2016 collected from Ottawa International Airport:

Wind Direction = North
Average Wind Speed = 22.4km/hr
Weather = Clear in the morning and cloudy in the afternoon

Distance from Orgaworld stack to Simcon Steel Ltd = 825m
Complaint Location = east north east of the Orgaworld Stack

(9:24) Phone call to Nick Pora, Orgaworld, to discuss the complaint. Nick stated that he is currently working on the complaint investigation and is reviewing the meteorological in comparison to the SCADA system for Orgaworld. Nick also conducted a site visit to complaint site and spoke with an employee to discuss the odours. Nick stated an odour was detected but was difficult to describe and was not comparable to Orgaworld however could not rule it out. Other sources were observed, Tomlinson evaporation stacks (direct plan of view) and other industrial operations in the industrial park. Nick will provide the formal complaint response report to the MOECC once complete.

(10:58) Received email from Nick Pora, Orgaworld Ottawa, providing the complaint log completed as a result of the odour complaint. The summary of the complaint is as follows:

Name of Complaint - Simco Steel
Address - 3436 Rideau Road, Ottawa
Telephone Number - (613) 822-9494
Date: September 29, 2016
Time: 3:35pm (Received at 3:50pm)
Weather Conditions: ENE, 27 gust 37 km/hr, 17.6C, partly cloudy
Detail of Complaint - Business on Rideau Road phones City's 311 line to complain about "a bad smell"
Action Taken: Nick Pora went directly to location of complaint to investifate. Spoke to complainant about this smell being different (3:55pm). Directly downwind from 2 Tomlinson staks. Drive to different location but could not detect "Orgaworld" odours
Possible Cause(s) for Complaint: Odour orginating from other source. Doors open to let in/out curbside
End Result of Investigation: Some SCADA programming work was being done but plant was functioning correctly (normally). Ensure that receiving doors are only open when trucks passing through them.

October 5, 2016 - Emailed Nick Pora outlining the requirements of Condition 8 of the ECA requiring the submission of a report to the District Manager outlining the complaint and the follow-up completed.

October 5, 2016 - Received email from Nick Pora stating that the report will be submitted tomorrow if acceptable.

October 6, 2016 - Nick Pora sent email to Steve Burns, District Manager, providing the report into the complaint and investigation completed.

October 11, 2016 - Response letter sent to Orgaworld Ottawa acknowledging compliance with notification requirements and accepting the results of the investigation into the odour complaint.

It is of the opinion of the Environmental Officer that the results from the investigation completed by Orgaworld representative that the complaint of odours was not related to compost odours. The ministry and Orgaworld will continue to follow-up with odour complaints when received by the public.

No further MOECC action is required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	Orgaworld Ottawa Complaint Log - September 29, 2016 (Odour).pdf
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	3146-AE9RQK
Originating Document:		**Created by:**	Jeremy Weiss
Date Created:	2016/09/29	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Jeremy Weiss
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/11/14**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	8466-9NQQNL	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	7460-9NQQQK
Originating Document:		**Created by:**	John Crouter
Incident Report Reference Number:		8466-9NQQNL	
Date Created:	2014/09/07	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

s.21

[redacted]

Reported By:

MOE Information

Date & Time Reported to MOE:	2014/09/07 15:17		
Office Receiving Incident Report:	Spills Action Centre		
Incident Info Received By:	John Crouter		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:	Air Spills - Gases and Vapours		
Non-Standard Procedure:	No		
ERP Call-out Initiated:	No		

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7
Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7
Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca
Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB
+ + + +
1125 Wellington Road South
Address: 1125 Wellington Rd S, London, City, County of Middlesex
District Office: London - District
LIO GeoReference: Zone: 17, UTM Easting: 482022.5, UTM Northing: 4753115.5, Latitude: 42.930454, Longitude: -81.220314
Site #: 1966-5LNRP5

Incident Information

Incident Summary:	Orgaworld- odour complain - VALID *cannot be longer than 60 characters*
Incident Description:	Caller indicates that there is an odour coming from the Orgaworld. The caller indicates that the odour is quite strong. The odours have been going on all day. Caller rates the odour was about a 9 and is ongoing. (JM) Complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/09/07		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			

Nature of Impact:			
Incident Event:		Incident Reason:	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

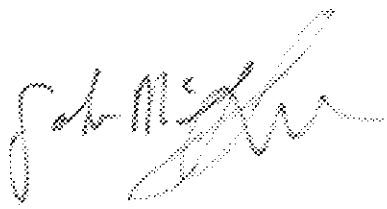
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

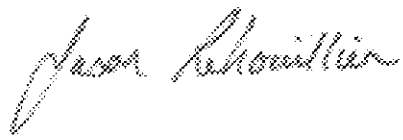
Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/29

Signature:



Wru Supervisor:

Name:	Jason Lehouillier
Work Unit:	
District/Area Office:	
Date:	2016/01/29
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8187-BPMNHB	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 610
Program:	Waste - Solid/Non-hazardous	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ministry of the Environment, Conservation and Parks			

Date Reported to MOE:	2020/04/30	**Time Reported to MOE:**	13:28
Date of Incident:	2020/04/30	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd , Lot 27, Conc.6, Reference Plan 2003 Official Plan, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , Site #: 2167-7FJPKB

Incident Summary:

FA Re-Evaluation - Environmental Compliance Approval 2766-7HEPSZ

Initial Incident Description (as reported):

Created: Kyle Straberger () - 2020/05/15 01:28:15 PM

On April 30, 2020 the Ministry of the Environment, Conservation and Parks generated a Non-compliance Stub for a Financial Assurance (FA) re-evaluation for non-compliance with Condition 1(20) of Environmental Compliance Approval Number 2766-7HEPSZ.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2020/05/15 03:53 PM

Condition 1.(20)
(a) Within twenty two (22) days from the date of this Approval, the Owner shall submit to the Director an additional Financial Assurance in the amount of CAD$190,226.00. This additional Financial Assurance shall be in a form acceptable to the Director.

(b) The Owner shall maintain the existing Financial Assurance in the amount of CAD$727,700.00.

(c) The new total Financial Assurance in the amount of CAD$917,926.00 shall provide sufficient funds for the transportation, Site clean-up and disposal of all quantities of waste on the Site at any one time.

(d) Commencing on April 30, 2020 and at intervals of three (3) years thereafter, the Owner shall submit to the Director, a re-evaluation of the amount of Financial Assurance to implement the actions required under Condition 1.(20)(c). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of contingency plans required by the Director upon review of the closure plan and annual reports.

(e) Commencing on April 30, 2018, the Owner shall prepare and maintain at the Site an updated re-evaluation of the amount of Financial Assurance required to implement actions required under Condition 1.(20)(c) for each of the intervening years in which a re-evaluation is not required to be submitted to the Director under Condition 1.(20)(d). The re-evaluation shall be made available to the Ministry staff, upon request.

(f) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial assurance at least sixty (60) days before the Financial Assurance terminates, the Financial Assurance shall forthwith be replaced by cash.

May 7, 2020 - David Veinot, Convertus (formerly known as Orgaworld or Renewi), emailed EO Straberger and provided an update to the FA re-evalutation as required by Condition 1(20) of Environmental Compliance Approval Number 2766-7HEPSZ. On April 30, 2020 Convertus sumbitted, by mail, the 2020 Financial Assurance Re-Evaluation package to MECP's Client Services and Permissions Branch.

May 8, 2020 - Emailed David Veinot acknowledging receipt of the email and advised the information will be updated into the MECP's system.

The Ministry of the Environment, Conservation and Parks created a Non-Compliance Stub as a result of not receiving a FA Re-evaluation for Environmental Compliance Approval Number 2766-7HEPSZ on April 30, 2020. On May 7, 2020 Convertus advised the Ottawa District Office that on April 30, 2020 the financial re-evaluation package was submitted to the Ministry's Client Services and Permissions Branch via mail.

The Ministry's Client Services and Permissions Branch will review the information and provide a response to the company regarding the FA re-evaluation package.

No further action required by the local Ottawa District Office at this time.

File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	1 - Administrative

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8187-BPMNHB	Submit Financial Assurance Re-E ...	2020/04/30	2020/04/30

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

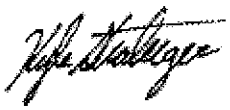
Waste / EGR Information entries:

Document Related Information

Cross Reference:	0127-9V4HMK (doc link)	**Task Link:**	8124-BPMRDP
Originating Document:	CofAs 0127-9V4HMK	**Created by:**	Kyle Straberger
Date Created:	2020/05/15	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2020/05/15**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0335-AVPTEJ	**Module Type:**	Spill
Status:	In progress	**File Storage Number:**	
Program:	Air	**Activity:**	Spills

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Brian	Begg
Name of Company:	
Orgaworld Ottawa Inc.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	K1G 1Y3
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)822-2056	142	**Fax**	

Date Reported to MOE:	2018/02/05	**Time Reported to MOE:**	16:39
Date of Incident:	2018/02/05	**Time of Incident:**	09:00
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Orgaworld Canada: Facility Fire(Smothering) tunnels 7 and 8, contained

Initial Incident Description (as reported):
Created: Aaron Richards (Spills Action Centre) - 2018/02/05 04:39:58 PM
Brian Begg, Orgaworld Canada to SAC(ar). Brian states the facility experienced a fire(smothering) today involving tunnels #7 and #8. The cause of the fire is reported to be a result of the fermentation process, producing smoke. Brian states the Ottawa FD was contacted and arrived on site shortly after 09:00 where water was applied to the waste piles. Brian does not know how much water was applied but states that the on site reservois tank with a capacity of 125,000 US gallons was emptied. Brian states that the water was contained to the concrete bunker which is surrounded by a trench that leads to on site storage tanks. Brian states that there have been no off site impacts regarding run off water or smoke. Brian states one pumper truck is remaining on site to ensure all smouldering has been put out. Brian states that the waste involved willl be stored outside the bunker until it can be determined that all smouldering has ceased. 17:01 SAC(ar) to Ottawa FD, Jennifer. Jennifer states she will aquire information regrading volume of water applied and if there was any off site runoff related to the event and provide SAC with an update. 17:16 Ottawa FD, Jennifer to SAC(ar). Jennifer provided contact information for fire chief on site, Kevin Lambert (613-913-4605). 17:18 SAC(ar) to Kevin Lambert, Ottawa FD. Kevin states that the reservoir on site (14, 000 L capacity) was drained to apply to the waste material. Kevin states there is a catchment system on site and that the water that was applied was recaptured. Kevin states there were no observations of off site impact and no concerns for residential areas. One pumper truck has remained on site to spray the waste pile to prevent re-ignition. Kevin anticipates crews to remain on site until approximately 22:00 tonight. SAC(ar) requested an update when crews leave site for the night. *** SIte not within SWPA ***

SAC Action Class:	Air Spills - Fires
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2018/02/26 02:17 PM
EO Straberger

9am - Phone call from Brian Begg (BB), Orgaworld stating a fire (smouldering of SSO) has occurred at the Orgaworld Ottawa Facility. FIre Department has been notified and just arrived on-site. Further updates will follow

---

Email to BB - Outlined requirements in the ECA to report spills to teh SAC and follow-up report to the DM.

Hi Brian,

As part of Orgaworld's ECA, Condition 11 – Emergency Situations Response and Reporting requires all spills (fires are considered a spill to air) to be reported to SAC. As part of the condition, a report is to be submitted to the District Manager (Steve Burns) within 3 calendar days following the event.

This may already be outlined in Orgaworld's Emergency Response and Contingency Plan however this email may serve as a reminder. Please let me know if you have any questions.

Thank you,

Kyle Straberger

MSG - (11:00) BB, Orgaworld - Call back (613-790-0146

11:05am - Phone call to BB, Orgaworld. The material will be pulled outside and extinguished. The Fire Department has control of the site and Orgaworld is not allowed to enter until it has been released (health & safety reasons). Material could be outside for several days. City of Ottawa trucks hauling source separated organics are arriving and wanted to unload. Orgaworld would like to request the temporary storage of approx. 6 trucks (10 tonnes) and relocated it back inside when the fire department releases the site back to Orgaworld. Orgaworld believes it will be relocated back inside int he afternoon (1/2pm).

11:20am - Phone call BB outlining the ministry is in agreement with proposal. Email sent outlining additional requirements.

Hello Brian,

I concur with your proposal to allow for the temporary outdoor storage of approx. 10 tonnes (6 truckloads) of source separated organics at the Orgaworld Ottawa Facility today only, February 5, 2018, until the Ottawa Fire Department releases the site back to Orgaworld Ottawa.

In order to temporarily store the waste outside the following conditions will need to be complied with:

- Orgaworld Ottawa shall maintain records of the total amount of waste received and stored temporarily outside

- No additional waste or materials are to be stored outside; only incoming source separated organics from the City of Ottawa

- In the event complaints are received by Orgaworld Ottawa or the Ministry of the Environment and Climate Change, the source separated waste being stored at the site shall be either moved into the building immediately (if agreed to by the Ottawa Fire Department) or disposed of at a ministry approved waste disposal site by an approved waste management system

- Orgaworld Ottawa is approved to accept waste Monday to Friday from 6am to 7pm. In the event waste will not be relocated back into the processing building by 7pm, Orgaworld Ottawa will be required to remove the waste off-site to a ministry approved waste disposal site by an approved waste management system.

If you have any questions please contact me to discuss.

Regards,

Kyle Straberger

Email from BB - Agree thank you

Email from BB - Good afternoon Kyle it is now 6:00 PM all the Sso that was stored outside while the fire department had control is now all inside receiving thank you

February 6, 2018 - (9:30am) Phone call to BB. Approx. 600-800 tonnes (8 trucks) of the residual material is stored outside while the fire department has control of the site. The residual pile is still outside and will need to remain there until it is safe to go back in. Pile was steaming this morning and Orgaworld is monitoring it. Looking to have the pile moved inside by the weekend or early next week. No run-off from the pile has occurred since it was moved outside. Update will be provided to the MOECC on Friday as to the status of the residual pile

February 7, 2018 - Site visit to Orgaworld. Met with BB. Pile of residual is smouldering as of this morning. Orgaworld will be having a loader adjust the pile and put out the smouldering spot. No water will be applied to prevent run-off and surface water impacts. Advised Orgaworld when material is relocated back into the facility the soil where the pile was located be scrapped up and disposed of. BB agreed and will have it completed. Orgaworld has 24/7 shifts this week and next therefore the pile will be monitored.

- Walked around the pile and noted no off-site impacts or run-off from the pile. Odour minimal. No concerns identified.

February 14, 2018 - Phone call from BB stating the pile was smouldering today (front portion) and as a result, Orgaworld does not want to bring it inside over the weekend for fear of another potential fire (no shifts). MOECC agreed the pile can remain outside until the following week provided the pile is routinely inspected for runn-off and off-site impacts. The inspections are to be recorded. Orgaworld agreed and will provide an update next week.

Feb. 20 - Phone call to BB, Orgaworld - Left message requesting an update to the status of the pile given the amount of rain received and projected in the upcoming days. Contact information provided.

Phone call from BB - Pile is dry (soaking in rain) and hot in some areas. Weekend inspections were completed and documented. Plan to have pile relocated into the processing plant starting Thursday and ending Friday. No run-off from pile but will contact MOECC if condition changes. Orgaworld will remediate area where the pile was located once the pile is relocated inside. Orgaworld to contact MOECC Thursday when they start moving the pile inside.

February 26, 2018 - Phone call to BB. Material was all brought into the facility on Friday and clean-up of the soil was completed. Any residual soils/rocks will be disposed of at the landfill. No run-off from the material being stored outside occurred. The ground underneath the pile remained frozen. The material is approx. half processed and will be fully processed by the weekend.

Orgaworld

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Air, Land
Incident Event:	Fire/Explosion
Incident Reason:	Natural Phenomenon
Source Type:	Waste Disposal Site

Sector Type:	Miscellaneous Industrial
MOE/Other Agencies Involved:	Municipal - Ambulance/Fire/Police, Province - MOE-District Office
Was there a discharge / emission / spill of a contaminant to the environment?	
Yes	

Contaminants Table

Contaminant Name	Description	Code	UN#	Limit	Quantity	[units]	[freq]
FIRE SUPPRESSANT		27	n/a		14000	L	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	7736-AVPTNH
Originating Document:		**Created by:**	Aaron Richards
Date Created:	2018/02/05	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Aaron Richards
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name: Badge No: Work Unit: District/Area Office: Date: Signature:	

District/Area Supervisor:

Name: Work Unit: District/Area Office: Date: Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2228-8PCTN7	**File Storage Number:**	SI OC OT HAW 230
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	7022-8PCTQQ
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		2228-8PCTN7	
Date Created:	2011/12/08	**Date Completed:**	2013/04/16
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2011/09/19 16:50		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:	2011/09/19		
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Geographic Township: GLOUCESTER, Ottawa, City, K1G 3Y3
District Office: Ottawa
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Industrial Sewage Inspection *cannot be longer than 60 characters*
Incident Description:	Industrial Sewage Inspection Report revealed non compliance issued to be addressed by the following action items 1. Submit a report on the effluent monitoring explaining why the parameters noted in Section 2.2 of this report were not sampled for. Report was due on May 31st, 2012 and was received on May 31st, 2012. See file for report.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2011/09/19		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		
What effluent types are being assessed?			

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	4851-8KYQGX	Submit a report on the effluent ...	2012/05/31	2012/05/31

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: None Assigned
Badge No:

Work Unit:
District/Area Office:
Date:

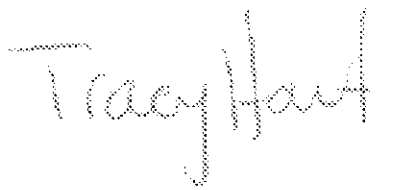
Signature:

District Manager:

Name: Tracy Hart

Work Unit:
District/Area Office: Cornwall Area Office
Date: 2012/07/04

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2520-8PCSV3	**File Storage Number:**	SI OC GL HA 671
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5523-8PCSYF
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		2520-8PCSV3	
Date Created:	2011/12/08	**Date Completed:**	2013/04/17
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:

Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2011/09/19 16:10		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:	2011/09/19		
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		

ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Geographic Township: GLOUCESTER, Ottawa, City, K1G 3Y3
District Office: Ottawa
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Non-Hazardous Waste Transfer Processing Inspection *cannot be longer than 60 characters*
Incident Description:	Non-Hazardous Waste Transfer Processing Inspection revealed non compliance issues that are to be addressed with the following action items: 1. Review and provide an update on the methods used to monitor negative pressure inside the building. 2. Submit a detailed explanation as to how the finished compost is sampled. The explanation should include how the company handled the exceedences noted in Section 2.1 of this report. 3. Explain discrepency in tonnage amounts between the excell spreadsheet and the 2010 annual report. 4. Submit confirmation that monitoring and maintenance of the pollution control equipment is being conducted in accordance with the Odour Monitoring Program dated October 2009. Include odour system monitoring report spreadsheets for the month of June, 2011 for the ammonium scrubber, the biofilter and the bioscrubber. TH - Report of compliance received on May 31st, 2012. See file No further action

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2011/09/19		

Source Type:		Sector Type:	
Nearest Watercourse:		Watershed Category Code:	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		Incident Reason:	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	3088-8KYSCU	Explain discrepency in tonnage ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Submit confirmation that monito ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Submit a detailed explanation a ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Review and provide an update on ...	2012/05/31	2012/05/31

Offence(s)

Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: None Assigned

Badge No:

Work Unit:

District/Area Office:

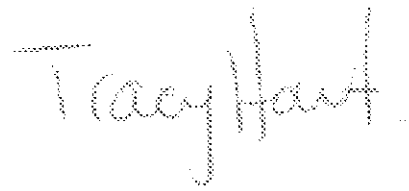
Date:

Signature:

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	Cornwall Area Office
Date:	2012/07/03

Signature:



View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	3088-8KYSCU	Compliance Date:	2012/05/31

Work Description:

Submit confirmation that monitoring and maintenance of the pollution control equipment is being conducted in accordance with the Odour Monitoring Program dated October 2009. Include odour system monitoring report spreadsheets for the month of June, 2011 for the ammonium scrubber, the biofilter and the Bioscrubber.

Work Type:	Submit Report / Confirm Compliance to Ministry
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2012/05/31

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	4032-83SSC7	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5053-83ST67
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		4032-83SSC7	
Date Created:	2010/03/22	**Date Completed:**	2010/04/26
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Abatement - Mandatory

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/03/22 12:39		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation

Site(s)

Site Details

Orgaworld SSO Facility, Ottawa
Address: 5123 Hawthorne Rd Part Lot 27, Concession 6, Ottawa, City
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Industrial Sewage Works non compliance *cannot be longer than 60 characters*
Incident Description:	Orgaworld Canada Lt. operates an organic composting facility on Part Lot 27, Concession 6, Ottawa, ON. The facility operates under three certificate of approvals issued by the ministry. Waste Disposal Site CofA #2766-7HEPSZ Air CofA#7021-7HQNDE Industrial Sewage Works CofA #9465-7NVRWT These certificates of approval were issued on September 16th, 2009. The facility began receiving waste on the 27th of January 2010. In November 2009 I went through the companies certificate of approval to verify compliance with pre-operating conditions set out in the approvals. Condition 9(3) of the sewage works certificate of approval sates that within sixty (60) days of the issuance of this certificate of approval the owner shall: (a) complete an assessment of the ground-water quality for each stratrigraphic unit; (b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and (c) submit to the District Manager for review and concurrence. Since the certificate of approval was issued on September 16th, 2009. the documents listed in this condition should have been submitted to the District Manager by November 15th, 2009. Condition 9(9) of the certificate of approval also states: The Owner shall enter into an agreement with Tomlinson Development Corporation, owner of the Hawthorne Industrial Park (or the current owner of that site), for the long-term operation and maintenance of the monitoring wells, and provide a copy of such agreement to the District manger prior to commencement of operation of the Works. Original proposed gorundwater monitoring was submitted to EAAB on June 25th, 2009. Wells TW-1, TW-2, TW-3, TW-4, TW-5, and TW-6 formed part of the proposed monitoring plan. November 17th, 2009, I sent the company an email reminding them of the condition, requesting a status on the ground-water assessment and requesting a copy of the agreement with Tomlinson Development. November 23rd - conversation with Greg Mariotti, site operations manager. Consultants were on site sampling today in order to prepare ground-water assessment. November 24th, 25th, 26th - - email exchange with Greg Mariotti. He submitted the Tomlinson Lease Agreement but after reviewing it I noted that it did not include any mention of the monitoring wells, subsequent phone conversations and email exchanges indicated that they would write up an agreement and get Tomlinson to sign it.

December 11th, received an email from Ron Cherkewski, CRA, explaining that two rounds of sampling have been done and that groundwater assessment will follow shortly.

Week of January 14th - I had a conversation with Greg, where he mentioned that they no longer have access to off site monitoring wells and that their consultants will be contacting me with regards to the issue.

January 22nd, 2010 - Teleconference with consultants and Orgaworld - detailing issues with wells off Orgaworld land. TW3 was "lost" ...it has been abandoned. TW1 gives bad results therefore they don't use it..... TW6 is in a different fracture zone
They will send a draft memo to summarise data to date and describe stratrigraphic unit. Looking to amend the problem, should send me something by Monday or Tuesday. Two offsite wells that they were relying on (TW2 and TW5 proposing to move them within the boundaries of Orgaworld. they are hoping to drill new wells in February or March.
I told them to submit to me their proposal but that it sounds like they will need to amend their certificate of approval.

February 5th 2010 - Received email technical memorandum presenting an up to date assessment of the ground-water and surface water quality at the location of the Orgaworld Source Separated Organics Processing Facility as well as proposed changes to the Monitoring Program to replace some deep bedrock wells which are no longer accessible to Orgaworld.

In March I had the chance to review the proposed monitoring plan, review the certificate of approval. I then contacted Tech support and sent them the proposed monitoring plan for their review, I also contacted Edgardo at EAAB to discuss the companies situation and potential application to amend their certificate of approval.

I then discussed the situation with Paul Kehoe, district supervisor and the decision was made to inform the company that they are required to apply to amend their certificate of approval and that we would send the file to IEB for their review.

I sent an email to Greg Mariotti on March 22nd indicating as much. He has replied that the application to amend is currently being put together, that he will send me a copy of the agreement he has with Tomlinson for the use of wells on the Orgaworlds site.

March 29th, 2010 received a copy of application to amend CofA.

April 8th, 2010, Meeting at Ottawa district office, with Greg Mariotti, Orgaworld; Tej Gidda, CRA; Paul Kehoe and myself.

We discussed the non compliance issues and agreed to use voluntary compliance measures in order to achieve compliance this time. The company has submitted an amendment to EAAB.

No further action at this time.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2009/11/17		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			

Nature of Impact:			
Incident Cause:		Incident Reason:	
Damaged Party:	No		
What effluent types are being assessed?			

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	4032-83SSC7	submit amendment to Industrial se...	2010/04/08	2010/04/08

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2010/04/22

Signature:



Area Supervisor:

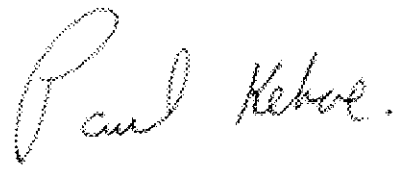
Name: Paul Kehoe

Work Unit:

District/Area Office: Ottawa District Office

Date: 2010/04/26

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Circular Waste Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103 Client #: 1032-BMERB6, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Circular Waste Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa Site #: 5981-BMERE9, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Environmental Compliance Manager
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2018/03/15		
Inspection Start Date:	2020/02/27	**Inspection Finish Date:**	2020/03/27
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment, Conservation and Parks conducted a Non-Hazardous Waste Transfer Processing Inspection at Circular Waste Canada Ltd. (referred to herein as the "Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (referred to herein as the "Site"). The purpose of the inspection was to assess compliance with Environmental Compliance Approval No. 2766-7HEPSZ (ECA), dated September 16, 2009, as amended.

The focus of the inspection was on conditions related to the management of non-hazardous organic waste. The Site is not currently producing compost therefore conditions specifically related to composting were not applicable and assessed at this time. The Site generates Non-Agricultural Source Material (NASM) which is tested and applied to met agricultural requirements of the Nutrient Management Act and Ontario Regulation 267/03 regulated by the Ontario Ministry of Agricultural, Food and Rural Affairs and the Ministry of the Environment, Conservation and Parks.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (Monday to Fridays) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details: The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case

No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

Notice #4 - Issued on April 18, 2017
Details: The amendment was to reflect the re-evaluation of financial assurance required as per Condition 1(20.)

2.1 SITE OPERATION:

Specifics:
2. SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2018 and 2019 Annual Reports state that the Facility is in compliance with Condition 2(1) by only accepting waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA. Mass balances were provided for both the 2018 and 2019 operating years which confirmed all sources of incoming source separated organic waste to be compliant with Condition 2(1).

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2018 and 2019 Annual Reports state that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

In 2019 the Facility and the City of Ottawa sought an agreement to allow for the collection of source separated organics in plastic bags and pet waste as part of the Green bin Collection Program within the City of Ottawa. On July 2, 2019 the City of Ottawa announced pet waste and the use of plastic bags for source separate organics for collection and disposal is permitted.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2018 and 2019 Annual Reports provided the monthly and annual tonnages for the 2018 and 2019 operating year. As part of the inspection the Inspecting Officer reviewed the mass balance for the 2018 and 2019 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in ECA.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the processing of organic waste were located inside the confines of the Processing Building.

No issues identified.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment, Conservation and Parks issued Notice #3 to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

In 2019 the Ministry of the Environment, Conservation and Parks was informed of the inclusion of plastic bags and

pet waste as part of the changes to the City of Ottawa Green Bin Collection Program. As required by Condition 2(11) of the ECA, the Facility was required to submit reasonable notice to the District Manager for the acceptance of the new waste type as well as supporting information about the waste and the operational modifications, if needed, to process the waste. Notification was provided to the MECP in January 2019 and on February 15, 2019 the MECP requested documentation to support the new waste acceptance. On February 26, 2019 the Facility provided the required documentation to support the new waste.

In order to ensure the Ottawa Facility would be able to manage the increase of plastic bags and the new waste source, the Facility undertook a waste trial using Toronto source separated organics which contained plastic and pet waste. A total of 552 metric tonnes of Toronto organic waste containing plastic bags and pet waste was processed through the Facility mixed with the City of Ottawa waste feedstock. Stack inspections and odour assessments were completed using an Odour Wheel indicating no change to odour characteristics. No complaints were received by the Ministry of the Environment, Conservation and Parks or the Facility during the trial. The Facility sampled the waste and confirmed the results were within the ECA and NASM limits.

The Facility constructed additional tunnels for processing/storage and installed new equipment (biofilter, screening line, ammonia scrubber) to accommodate the new waste stream. The installation of the new equipment was captured under Condition 2 of Air Environmental Compliance Approval Number 1631-A2ELCQ. No amendments were required under the waste ECA for the upgrade to the Site. The installation of the new equipment was completed in the summer of 2019 to support the change in the City of Ottawa Green Bin Program.

In March of 2020, the Facility provided the Ministry of the Environment, Conservation and Parks notice of intent to commence accepting two new waste sources at the Ottawa Facility. The new sources were outlined as City of Toronto and Region of York source separated organics. Both sources are associated with the municipal waste collection programs previously sent to the London Facility, however, planned to be diverted to the Ottawa Facility as a result of COVID-19 pandemic resulting in capacity concerns at the London Facility. Supporting documentation, previously requested as part of prior new waste sources notifications, was provided to the District Manager. Acknowledge was provided to the Facility for both new waste sources in March of 2020.

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility has a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. However, as discussed in the 2019 Annual Report a name change occurred in 2020 from Renewi to Convertus Canada Ltd. The 2019 Annual Report states the Facility will ensure all signage present at the Site is change to reflect the new name.

Verification of the change of the sign will be completed in future inspections of the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

The Site has installed a fence with a lockable gate to restrict access to the Site. The 2018 and 2019 Annual Reports confirmed compliance with Condition 4 of the ECA. No issues were observed with site security during the inspection.

5. SITE OPERATIONS

(3) **Rejected Waste handling:**

(a) In the event that waste is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that all Rejected Waste:

(i) is stored in a way that ensure that no adverse effects result from such storage;
(ii) is segregated from all other waste;
(iii) is handled and removed from the Site in accordance with *O. Reg. 347* and the *EPA* ;
(iv) is removed from the Site within three (3) days of its receipt or as acceptable to the District Manager

(b)

(i) In the event that Rejected Waste is advertently accepted at the Site, a record shall be made in the daily log book or in an electronic file of the reason why the waste was rejected and of the origin of the waste, if known.

(ii) The District Manager shall be notified in writing of the receipt of unacceptable waste within four (4) business days of its receipt. The following information shall be included in the notification to the District Manager:

- quantity and type of Rejected Waste;
- source of the Rejected Waste, if known;
- final destination of the Rejected Waste; and
- date of receipt and time and date of removal from the Site.

In 2018 four events occurred of excessive contamination being received from Metro grocery store locations at the Site. The waste consisted of styrofoam and plastic packaging. The Facility arranged for the waste to properly disposed of at a waste disposal site with notification provided to both Metro and the Ministry of the Environment, Conservation and Parks.

During the inspection it was discussed that an event of rejected waste occurred on July 25, 2019 but notification was not provided to the District Manager as required by Condition 5(3)(b)(ii). This issue was discussed at the time of the inspection and on March 4, 2020 the Facility sent a notification email to the District Manager provided information on the rejected load.

****Please see Section 5.0 of this Report****

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin

Upon arriving to and entering the Site, no litter, presence of vector and vermin, run-off or presence of fugitive dust was observed. Security fence and property line appeared to be in good working order.

The Facility has the required documents and procedures which speak to the Facility's inspection program for the above condition. The previous inspection incorporated a review of the procedures and records associated with the

above condition with no concerns identified. No changes were made for the 2018 and 2019 operating year therefore the Inspecting Officer did not review the records as part of the inspection.

In 2019 the following documents were reviewed and updated:

- Emergency Response & Contingency Plan for Spills, Odours, Process Upsets, Fires, Power Failure, and Labour Disruptions (revised report provided to the Ministry of the Environment, Conservation and Parks)
- Spill Contingency and Pollution Prevention Plan - Stormwater Site Management System and Process Water Recirculation System
- Site Plan, Services, and Grading Plan

(4) Should outdoor storage of leaf & yard waste be undertaken, the following handling procedures must be followed:

(a) The Owner shall ensure that, if needed, the leaf & yard waste storage stockpiles are turned at a rate frequent enough to reduce the likelihood of anaerobic conditions arising within the stockpiles.

(b) Upon the receipt of the leaf & yard waste at the Site, the Owner shall inspect the received waste, separate potentially odourous components and immediately transfer these potentially odourous components into the Processing Building.

(c) Should anaerobic conditions arise in a leaf & yard waste pile, or, in a specific portion of a leaf & yard waste pile, the Owner shall ensure that this portion of leaf & yard waste is prioritized for use within the composting process within twenty four (24) hours of anaerobic conditions occurring, or, if this is not practical, the Owner shall remove of the waste from the Site within twenty four (24) hours.

At the time of the inspection no outdoor storage of leaf and yard waste was occurring. The 2018 and 2019 Annual Reports confirmed no outdoor leaf and yard waste occurred in 2018 and 2019.

(5) Residual Waste handling:

(a) The Owner shall ensure that storage of solid Residual Waste resulting from processing of Organic Waste at the Site is undertaken within the confines of the Processing Building.

At the time of the inspection all solid Residual Waste was stored inside the Processing Building.

(6) Waste Processing:

(a) The Owner shall ensure that all Organic Waste pre-processing, composting, screening and curing of Immature Compost are undertaken within the confines of the Processing Building.

At the time of the inspection all Organic Waste processing was occurring inside the Processing Building. No operations were occurring outside.

(7) Odour Control:

(a) The Owner shall maintain and monitor a negative air pressure atmosphere within the Processing Building at all times in accordance with the documents in Schedule "A". In the event that adequate negative air pressure cannot be maintained within the Processing Building, the Owner shall cease accepting additional Organic Waste waste and shall keep the loading bay doors and the air intake louvers closed until such time that negative pressure is re-established.

(b) The Owner shall ensure that the outside loading bay doors into the Small Truck and Large Truck Halls of the Processing Building are kept closed at all times except to permit the entry or exit of waste transportation vehicles.

(c) The Owner shall ensure that the loading bay doors into the Compost Curing Storage Hall of the Processing Building are kept closed at all times except to permit the entry or exit of Compost transportation equipment.

(d) The Owner shall maintain an air lock when Organic Waste is received in the Small Truck Receiving Hall of the Processing Building.

(e) The Owner shall ensure that, at all times, the air from the Processing Building is exhausted through an appropriate air pollution control equipment approved by the Ministry in the Certificate of Approval (Air/Noise).

(f) If in the opinion of the District Manager, the air emissions originating from the leaf & yard waste stockpile in the future outdoor storage area result in odour complaint(s), the Owner shall within two (2) days of the receipt of the written notification from the District Manager move the leaf & yard waste from the future outdoor storage area into the Processing Building.

(g) The Owner shall ensure that no equipment handling Organic Waste or their storage containers are kept outside, unless they have been washed to prevent odours.

The 2018 and 2019 Annual Reports confirmed the Facility operated in compliance with Condition 5(7) for the 2018 and 2019 operating years. No concerns identified during the inspection.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.
(b) On an emergency basis, the Owner may use equipment utilized in processing of incoming Organic Waste to process the Immature Compost / the Finished Compost and the Compost provided that the equipment has been cleaned to prevent the Immature Compost / the Finished Compost and the Compost from being contaminated by the incoming Organic Waste.

The 2018 and 2019 Annual Reports state the Facility is in compliance with the above condition by keeping incoming organic waste separated from finished product. During the inspection all finished NASM product is stored within the Curing Hall, separate from any pre-processed organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

(b) The incoming Organic Waste shall be re-characterized following any process changes, operational issues or other factors that may affect the quality of the incoming Organic Waste from the pre-approved source/stream.

The 2018 and 2018 Annual Reports state the Facility is in compliance with the above condition and sends incoming source separated organic waste for testing to ensure compliance with the ECA conditions. No process changes, operational issues or other factors occurring in the 2018 and 2019 operating years required the re-characterization of incoming organic waste.

Finished compost quality criteria outlined in additional sections of Condition 7 of the ECA was not incorporated into the inspection as the Facility is not currently producing compost as defined by the Ontario Compost Quality Standards. The Site is currently producing Non-Agricultural Source Material (NASM) which is not defined as a type of compost in the ECA or the Ontario Compost Quality Standards.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2018 and 2019 Annual Reports, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2018 and 2019 Annual Reports, the Facility provides rakes, brooms and a pressure washer, if necessary, to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2018 and 2019 Annual Reports confirms that during the 2018 and 2019 operating years the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2018 and 2019 Annual Reports state that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site. No concerns identified.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the Site the roads on-site were snow covered. The Facility retains a company to conduct road sweeping and washing.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. NASM material is stored within the confines of the Processing Building.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost

stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection as the inspection was conducted during the winter season and covered in snow. However, no complaints of dust have been reported to the Ministry of the Environment, Conservation and Parks to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2015 the Operations Manual was updated due to changes to operating procedures and equipment. A copy of the updated manual was provided to the Ottawa District Office. With the recent installation of equipment, the Facility will need to determine whether revisions to the Operations Manual are required.

****Please see Section 6.0 of this Report****

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure which was updated and provided to the Ministry of the Environment, Conservation and Parks in 2019. No issues identified.

11. EMERGENCY SITUATIONS RESPONSE AND REPORTING

(1) **The Company shall immediately take all necessary measures, as outlined in the Emergency Response and Contingency Plan, to handle the emergency situations occurring at the Site.**

(2) **The Company shall ensure that the equipment and materials outlined in the Emergency Response and Contingency Plan are immediately available at the Site at all times and are in a good state of repair and fully operational.**

(3) **The Company shall ensure that all Site personnel are fully trained in the use of the equipment and materials outlined in the Emergency Response and Contingency Plan, and in the procedures to be employed in the event of an emergency.**

(4) **All Spills, as defined in the *EPA* , shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book as to the nature and cause of the spill, and the action taken for clean-up, correction and prevention of similar future occurrences.**

(5) **Should a Spill, as defined in the *EPA* , occur at the Site, in addition to fulfilling the requirements from the *EPA* , the Company shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.**

In the 2018 operating year the Facility did have a spill to air requiring the activation of the Emergency Response and Contingency Plan. A fire of processed organic waste occurred on February 5, 2018 within the Processing Building. Notification and information was provided to the District Ministry as required by Condition 11. The waste material was managed by re-processing in the tunnels and disposing as NASM.

No spills occurred during the 2019 operating year.

12. RECORDS KEEPING

Annual Report

(9) **By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:**

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2018 and 2019 Annual Reports was found to be complete as required. The 2018 Annual Report was submitted to the Ministry of the Environment, Conservation and Parks in March of 2019 and the 2019 Annual Report was submitted to the Ministry of the Environment, Conservation and Parks in March 2020.

2.2 FINANCIAL ASSURANCE:

Specifics:
Condition 1(20.) of the ECA outlines the amount of financial assurance required for the operation of a solid non-hazardous waste transfer processing Site. In April of 2017, the ministry issued Notice #4 - ECA amendment to reflect a re-evaluation of the financial assurance needed for the site. The Facility submitted the remaining amount which forms the new total of financial assurance from the previous re-evaluation. The next re-evaluation of financial assurance is scheduled for April 30, 2020 and future re-evaluations at 3 year intervals.

In 2018, the Facility updated their surety bonds to reflect the previous name change from Orgaworld Canada Ltd. to Renewi Canada Ltd. and in 2019, the Facility updated their surety bonds to reflect the name change from Renewi Canada Ltd. to Circular Waste Canada Ltd. In March 2020, the Facility updated their surety bonds to reflect the current name of Convertus Canada Ltd.

2.3 SITE SERVICE AREA:

Specifics:
The Facility is approved to operate a waste disposal site (transfer processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste as outlined in Condition 2 of the ECA..

2.4 APPROVED SITE CAPACITY:

Specifics:
The Facility is approved to operate a waste disposal site (processing) for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste as outlined in Condition 2(3) of the ECA.

Below is a summary of incoming organics waste and outgoing NASM, product and residual waste for the 2018 and 2019 operating years:

2018 Operating Year (January 1, 2018 to December 31, 2018):

Incoming
City of Ottawa Green Bin Program = 76,571 tonnes
IC&I Sector = 2,191 tonnes
Total = 78,762 tonnes (97% municipal, 3% IC&I)

Outgoing
NASM = 10,861 tonnes
Bedding = 11,710 tonnes
Mids = 13,881 tonnes
Structural Mids = 3,871 tonnes
Residual = 18,911 tonnes
Total = 59,234 tonnes

2019 Operating Year (January 1, 2019 to December 31, 2019):

Incoming
City of Ottawa Green Bin Program = 80,321 tonnes
City of Toronto (trial) = 526 tonnes
IC&I Sector = 2,043 tonnes
Total = 82,860 tonnes (98% municipal, 2% IC&I)

Outgoing
NASM = 5,876 tonnes
Bedding = 15,343 tonnes

Mids = 9,186 tonnes
Residual = 12,493 tonnes
Total = 42,898 tonnes

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completed the Non-hazardous Waste Transfer Processing Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the inspection, the following action item is required to be reviewed and addressed by the Facility:

1. The Facility must ensure all future rejected waste events are reported to the District Manager as per Condition 5(3)(b)(ii) of Environmental Compliance Approval Number 2766-7HEPSZ

6.0 OTHER INSPECTION FINDINGS

The following recommendation is provided for the Facility to review and taken action if necessary:

1. The Facility must review the Operations Manual to determine the need for revisions to reflect the installation of new equipment.

7.0 INCIDENT REPORT

Not Applicable

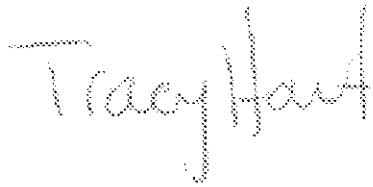
8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2020/04/01
Signature



REVIEWED BY:
District Supervisor:
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2020/06/02

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

We want to hear from you. Please tell us about the quality of your interaction with our staff. You can provide feedback at 1-888-745-8888.

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

Air Facility Inspection Report

Client:	Circular Waste Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103 Client #: 1032-BMERB6, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Circular Waste Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456665.94, UTM Northing: 5016595.9, Latitude: 45.301529, Longitude: -75.55272 Site #: 5981-BMERE9, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Environmental Compliance Manager
Contact Telephone:	(519) 663-4446 **ext** 103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2018/03/15		
Inspection Start Date:	2020/02/27	**Inspection Finish Date:**	2020/02/27
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

The Ministry of the Environment, Conservation and Parks (MECP) conducted an Air Facility Inspection at Circular Waste Canada Ltd. (referred to herein as the "Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (referred to herein as the "Site"). The purpose of the inspection is to assess compliance with Environmental Compliance Approval No. 1631-A2ELCQ, Ontario Regulation 419/05, NPC-300 and the Environmental Protection Act (EPA).

The focus of the inspection was on conditions related to the equipment associated with air treatment from emission generated by the processing of source separated organics (SSO).

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The inspection incorporated the entire operations of the Site as it relates to the air and noise emissions.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

Yes, the facility is in a target sector identified in Schedule 5.

☐ NAICS exemption

Note that s. 1(2) of Reg. 419/05 sets out exemptions for facilities whose activities would not be captured in NAICS 221112 (Fossil-Fuel Power Generation) and NAICS 5622 (Waste Treatment and Disposal)

Specifics:

The Facility operates under North American Industry Classification System (NAICS) code 562210 - Waste Treatment & Disposal for the operation of land fill sites, incinerators, or other treatment or disposal facilities for non-hazardous or hazardous waste. Establishments that integrate the collection, treatment and disposal of waste are also included.

The Facility is currently processing SSO from the City of Ottawa's Green Bin Collection Program, parts of the City of Toronto and York Region municipal collection program and selected Industrial, Commercial & Institutional sectors for the production of Non-Agricultural Source Material (NASM). The NASM is applied to the agricultural operations as a soil conditioner under approved NASM Plans, issued by the Ontario Ministry of Agriculture and Rural Affairs, or used as an animal bedding product.

2.0 INSPECTION OBSERVATIONS

Specifics:

Condition 2 of the ECA outlines the modifications that are permitted under the Limited Operational Flexibility. In reviewing the modification log for the 2018 and 2019 operating year it was observed the following modifications occurred:

2018: No modifications were conducted during the 2018 operating year.

2019:
April 2019
- Decommission existing ammonia scrubber resulting in an increased ammonia concentration to atmosphere. ESDM updated to reflect new ammonia concentration

July 2019
- Installation of 3 new ammonia scrubbers to provide additional treatment for ammonia resulting in a reduction of ammonia concentration. ESDM updated to reflect new ammonia concentration

July 2019
- Installation of two composting tunnels (#7 & #8) resulting in negligible impact on air emissions. ESDM Report updated based on November 2019 source testing results.

August 2019
- Replacement of screening line resulting in no impact on air emissions.

September 2019
- Installation of new biofilter (#3) to reduce air emissions. ESDM Report updated resulting in a reduction of concentrations of compounds

November 2019
- Installation of 2 new storage tunnels (#9 & #10) resulting in no impact on air emissions

2.1 SITE CONDITIONS

Operating

Specifics:

At the time of the inspection the Site was processing SSO for the production of NASM and animal bedding.

Odour: During the inspection the air treatment equipment was observed. The equipment operating included the biofilters (3), ammonia scrubbers (3) and bioscrubber. The emissions from the equipment, after treatment, is discharged through the stack to the environment. The stack is equipped with a odour port to assess the odours being discharged from the Site. An assessment of the odour was conducted at the time of inspection which noted the emission to not be odourous resulting in an adverse effect.

At the time of the inspection the Facility was operating and processing organic waste. Both air treatment processes, the bioscrubber and biofilters, were operating. The Facility operates under negative pressure therefore all odours are contained within the confines of the building and discharged through the pollution control equipment. The odour sampling port connected to the discharge stack was assessed at the time of the inspection and found not to be discharging emissions that would be considered an adverse effect.

The 2019 Source Testing Report was reviewed to determine the outcome of the odour assessment. Based on the results, the Facility is well within the frequency of odour exceedances allowable at the sensitive receptors.

Noise: During the inspection the air treatment equipment was observed. The equipment operating included the biofilters (3), ammonia scrubbers (3) and bioscrubber. The noise from the equipment is audible within the Process Building. Upon walking outside of the Site, noise was audible but not at levels that the Inspecting Officer would consider excessive.

As part of the inspection, the 2019 Acoustic Assessment Summary was requested and provided. In reviewing the summary, all sensitive receptors noise levels were below the limits of 45 Leq as outlined in NPC-300.

Vibration: No vibration issues were noted during the inspection, both inside and outside the building.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number 1631-A2ELCQ (ECA) with Limited Operational Flexibility until December 10, 2025.

The ECA approves the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

Based on the inspection, the Facility has not modified or installed equipment outside of the description of the ECA requiring an amendment.

In the event changes to the operations, outside the scope of the ECA as outlined in Condition 2, the Facility will need to amend the ECA prior to making changes or modifications.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

The Environmental Protection Act and the ECA outlines requirements for notifications to the Ministry of the Environment, Conservation and Parks. In reviewing the spills and complaints for the 2018 operating year, the Facility has met the notification requirements.

In 2019, the Facility had one (1) complaint related to odour. On July 2, 2019 the Facility received an odour complaint and on July 3, 2020 was reported to the District Manager as per Condition 8.2 of the ECA. On August 8, 2019 the Facility provided the report as per the requirements of the above referenced condition and reported the investigation concluded the odour complaint was determined to be caused by fugitive odour emissions from a temporary wall opening across from tunnels 7 & 8 as a result of construction activities to support upgrades to the Site. Following the complaint, the temporary wall was closed and other sections of the Site inspected and reinforced to ensure fugitive odour is not escaping the building envelop.

No further complaints were received by the Facility or the MECP to date.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 11 of the ECA requires the completion of annual source testing of the emissions. In 2018 and 2019 source testing at the Site was completed by the Facility and submitted to the MECP.

Condition 2 of the ECA and Ontario 419/05 under the Environmental Protection Act requires the Facility to complete annual ESDM and Acoustic Assessment Report updates to ensure modifications and changes in standards are up to date. As part of the inspection, a copy of the 2018 & 2019 ESDM Summary Table and AAR Summary Table were requested and provided. Based on the review of the summary tables, the Site is compliant with Condition 2 and Ontario Regulation 419/05.

Is an annual ESDM report on site?

● Yes ○ No

Specifics:

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of the ECA requires the Facility to submit Annual Written Summary Report to the MECP. The submission of the Annual Written Summary is to be submitted no later than May 31st of each year. It was confirmed the 2018 and 2019 Annual Written Summary Reports were submitted as required.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

As part of the inspections a review of the 2019 ESDM Emission Summary and Acoustic Assessment Summary was requested and received. The review concluded the Site is operating within compliance with emission standards and noise limits.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

A copy of the Operation Manual was requested and provided as required by Condition 7 of the ECA. Based on the review of the Operations Manual, the Site is in compliance with the requirements of Condition 7.

As a result of the installation of new air treatment equipment (ie. ammonia scrubber, biofilter), the Facility was informed to review the Operation Manual to ensure the document is reflective of the current equipment at the Site. This was also identified during the Non-Hazardous Waste Transfer Processing Inspection Report conducted on the same date.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of the ECA outlines the record keeping requirements for the operation of the Site and other conditions within the ECA.

During the inspection records were available for review. As discussed in previous inspections, the Facility has numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. No concerns identified in the way records are managed and retained on-site.

The Facility utilizes SCADA to program, adjust, measure and monitoring the organic waste processing. The SCADA system also records the data collected during the processing process.

Copies of specific documents were requested as part of the inspection and reviewed for completeness. No concerns were identified during the review.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated as of February 15, 2019.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

N/A

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required at this time.

6.0 OTHER INSPECTION FINDINGS

N/A

7.0 INCIDENT REPORT

○ Applicable ● Not Applicable

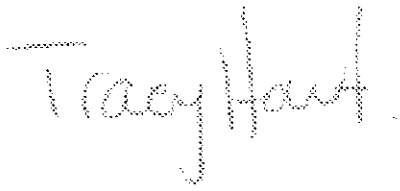
8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2020/04/02
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tracy Hart
District Office:	Ottawa District Office
Date:	2020/06/02

Signature:	

File Storage Number:	SI OT GL HA 101

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

We want to hear from you. Please tell us about the quality of your interaction with our staff. You can provide feedback at 1-888-745-8888.

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Subject Waste Generator Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext:**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:			
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted a Subject Waste Generator Inspection at Orgaworld Canada Inc.'s Ottawa Facility (the"Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (the "Site"), to determine compliance with regulatory requirements for the management of subject waste of Ontario Regulation 347 under the Environmental Protection Act.

No previous Subject Waste Generator Inspection had been completed by the ministry prior to the inspection.

2.0 INSPECTION OBSERVATIONS

Generator Registration Report No(s):

ON3338779

Date of last registration:

2018/01/24

2.1 REGISTERED WASTES

Has the generator properly registered?

☒ Yes. The generator has properly registered.
☐ No. The generator is exempt from generator registration.
☐ No. The generator has not registered and is not exempt.
☐ No. The generator has incorrectly classified the subject waste.
☐ No. The generator is currently registered, but not for all applicable subject wastes.
☐ No. The generator has incorrectly registered by not completing other required information on HWIN, or by mail-in registration.
☐ No. The generator has not properly registered all land disposal restriction (LDR) wastes.

The Facility has renewed their HWIN registration for the 2018 operating year. According to the Facility's HWIN account, the following waste classes are registered for generation at the Site:

113-L : Acid Waste - Other Metals
Description of Generating Process - Removal of airborne ammonia using an ammonia scrubber

147-L : Chemical Fertilizer Wastes
Description of Generating Process - Odour abatement system - ammonia scrubber

251-L : Oil Skimmings & Sludges
Description of Generating Process - Catch basin

252-L : Waste Oils & Lubricants
Description of Generating Process - Equipment

270-L - Other Specified Organics
Description of Generating Process - Organic composting (liquid leachate waste from sources separated organics)

2.2 DESCRIPTION OF PROCESS GENERATING WASTE MATERIALS

The subject waste generated at the Site is produced as a result of maintenance of equipment, on-site infrastructure (catch basins) and from the generation of leachate from the production of non-agricultural source material.

2.3 MANIFESTING

Has the generator properly released and manifested all subject waste shipped off site for disposal or reclamation?

☒ Not applicable
☐ Yes. The generator has properly released and manifested all subject waste shipped off site for disposal and/or reclamation.
☐ No. The generator has transported subject waste itself, without a proper Certificate of Approval for the waste type(s).
☐ No. The generator has released subject waste to a carrier without a proper Certificate of Approval for the waste type(s).
☒ No. The generator has not completed, or properly completed manifest(s).
☐ No. The generator has not properly notified the Ministry of the waste shipped.
☐ No. The generator has used paper manifests and has not retained the green copies for two years.

During the inspection waste manifest were reviewed for the 2017 operating year. In reviewing the manifest, only 1 manifest was found to missing Copy 6 (brown) - RS77263, dated April 4, 2017.

The Facility is currently following up with the receiver to determine the status of the missing Copy 6 manifest.

2.4 LAND DISPOSAL RESTRICTION (LDR)

Has the generator complied with the land disposal restriction requirements of Reg. 347?

☒ Not applicable

☐ Yes. The generator is in compliance with the applicable land disposal restriction requirements of Reg. 347.

☐ Yes. The generator is a small quantity generator.

☐ No. The generator is diluting wastes.

☐ No. The generator has shipped fully treated characteristic waste without providing a simple statement to the receiver.

☐ No. The generator has not notified the receiver of land disposal restriction waste shipments on or before the first shipment of the waste stream.

☐ No. The generator is mixing, blending or bulking waste not for the purposes of treating waste to land disposal restriction standards and does not have a Certificate of Approval that allows mixing, blending or bulking.

Comments:

The Facility has not registered any subject waste subject to land disposal restrictions of Ontario Regulation 347.

Is treatment required to meet land disposal restriction standards?

○ Yes ● No

2.5 ON-SITE STORAGE

Has the generator been storing all subject waste in accordance with Reg. 347 and in a secure manner as required by the Environmental Protection Act?

☐ Not applicable

☒ Yes. All subject wastes are stored in accordance with Reg. 347 and in a secure manner.

☐ No. The generator has not provided a notice to the Regional Director for subject waste stored for greater than 3 months.

☐ No. Wastes are stored in such a manner that there is a potential for fire, or explosions.

☐ No. Wastes are stored in such a manner that there is a potential for a spill that could adversely impact the natural environment.

☐ No. Wastes are not secured at the site and have been released to the natural environment.

☐ No. Wastes have been spilled from this site and have had, or are having an adverse impact on the natural environment.

☐ No. The generator has stored subject waste for a period greater than 24 months without applying for or not in accordance with a Certificate of Approval.

Subject waste is stored in low traffic areas and in a manner acceptable to the ministry.

2.6 OTHER PERTINENT CERTIFICATE(S) OF APPROVAL FOR THE SITE

The Facility operates a source separated organic composting operation under Environmental Compliance Approval No. 2766-7HEPSZ.

Does on-site disposal of subject waste(s) occur at this site?

○ Yes ● No

2.7 DISCHARGE OF WASTES TO MUNICIPAL SEWER(S)

Does the generator discharge subject waste to municipal sewers?

☒ No. Subject waste is not discharged to the municipal sewers.

☐ Yes. Subject waste is discharged to the municipal sewers, but the municipality is aware of this practise and the generator is properly registered for all hazardous waste.

☐ Yes. Subject waste is discharged to municipal sewers, but the municipality is not aware of this practise.

☐ Yes. Hazardous waste is discharged to municipal sewers, but is not registered.

The Site is not municipally serviced therefore the Facility is unable to discharge to municipal sewers.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous Subject Waste Generator Inspection therefore no review of previous non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

● Yes ○ No

Specifics:

Copy 6 of Manifest No. RS77263 was not received by the generator from the receiver site

5.0 ACTION(S) REQUIRED

As a result of the inspection the following actions are required by the Facility:

1. Confirm Copy 6 of Manifest No. RS77263 was received from the receiver site

6.0 OTHER INSPECTION FINDINGS

1. It is recommended the Facility provide further information on the description of waste generation section within their

HWIN account.

7.0 INCIDENT REPORT

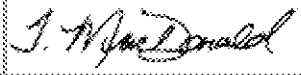
● Applicable ○ Not Applicable
3125-AWWNYQ

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2018/03/16
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2018/04/11
Signature:	

File Storage Number:	SI OT GL HA 700

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted a Non-Hazardous Waste Transfer Processing Inspection at Orgaworld Ottawa to assess compliance with Environmental Compliance Approval No. 2766-7HEPSZ (ECA), dated September 16, 2009, as amended.

The focus of the inspection was on conditions related to the management of non-hazardous organic waste and not compost production. The Facility is not currently producing compost therefore conditions specifically related to composting were not applicable and assessed at this time.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details: The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

Notice #4 - Issued on April 18, 2017
Details: The amendment was to reflect the re-evaluation of financial assurance required as per Condition 1(20.)

2.1 SITE OPERATION:

Specifics:
SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2017 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa and the Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2017 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

The Facility and the City of Ottawa is currently seeking agreement to allow for the collection of source separated organics in plastic bags and pet waste as part of the Green bin Collection Program within the City of Ottawa. If approved, the Facility will need to comply with conditions outlined in the ECA and assess whether the inclusions of

the new waste stream will require amendments to existing Environmental Compliance Approvals and other applicable approvals for the Site.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2017 Annual Report provided the monthly and annual tonnages for the 2017 operating year As part of the inspection the Inspecting Officer reviewed the mass balance for the 2017 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in ECA.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the processing of organic waste were located inside the confines of the Processing Building.

No issues identified.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2017 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding the Site's approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may

decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice #3 to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued ECA by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

It was discussed in the 2017 Annual Report of re-branding will take place in 2018 from Orgaworld to Renewi. The Facility is aware of the notifications requirements and physical changes required to ensure compliance with the conditions of the ECA.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

5. SITE OPERATIONS

(3) Rejected Waste handling:

(a) In the event that waste is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that all Rejected Waste:

(i) is stored in a way that ensure that no adverse effects result from such storage;
(ii) is segregated from all other waste;
(iii) is handled and removed from the Site in accordance with *O. Reg. 347* and the *EPA* ;
(iv) is removed from the Site within three (3) days of its receipt or as acceptable to the District Manager

On December 13, 2017 a total of 2.05 tonnes of waste was received from Metro and was rejected by the Facility due to contamination (Styrofoam and plastic packaging). The waste was shipped to landfill after Metro was notified of the

infraction. No rejected waste was accepted for processing or incorporated into the Facility's outgoing material.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin

Upon arriving to and entering the Site, no litter, presence of vector and vermin, run-off or presence of fugitive dust was observed. Security fence and property line appeared to be in good working order.

The Facility has the required documents and procedures which speak to the Facility's inspection program. The previous inspection incorporated a review of the procedures and records associated with the above conditions with no concerns identified. No changes were made for the 2017 operating year therefore the Inspecting Officer did not review the records as part of the inspection. Future inspections may include a review.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.
(b) On an emergency basis, the Owner may use equipment utilized in processing of incoming Organic Waste to process the Immature Compost / the Finished Compost and the Compost provided that the equipment has been cleaned to prevent the Immature Compost / the Finished Compost and the Compost from being contaminated by the incoming Organic Waste.

The 2017 Annual Report states the Facility is in compliance with the above condition by keeping incoming organic waste separated from finished product. The use of a stream pressure washer is used in the event of an emergency when process equipment used for incoming organic waste needs to be used for immature or finished compost. The inspecting Officer is not aware of an emergency event where this was required for the 2017 operating year.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

(b) The incoming Organic Waste shall be re-characterized following any process changes, operational issues or other factors that may affect the quality of the incoming Organic Waste from the pre-approved source/stream.

The 2017 Annual Report states the Facility is in compliance with the above condition and sends incoming organic waste for testing to ensure compliance with the ECA and the Ontario Compost Quality Standards. No process changes, operational issues or other factors occurring in the 2017 operating year requiring the re-characterization of incoming organic waste.

Finished compost quality criteria outlined in additional sections of Condition 7 of the ECA was not incorporated into the inspection as the Facility is not currently producing compost. The Site is currently producing Non-Agricultural Source Material (NASM) which is not defined as a type of compost in the ECA or the Ontario Compost Quality Standards.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2017 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2017 Annual Report, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2017 Annual Report confirms that during the 2017 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2017 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the Site the roads on-site did appear to be swept/washed as required. No dust was observed to be generated from vehicle traffic or wind conditions. The Facility retains a company to conduct road sweeping and washing.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. No concerns identified.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection. No complaints of dust have been reported to the ministry to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2016 the Operations Manual was updated due to changes to operating procedures and equipment. A copy was provided to the Ottawa District Office of the updated manual. No concerns identified.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. No issues identified and no revisions occurred in 2017.

11. EMERGENCY SITUATIONS RESPONSE AND REPORTING

(1) The Company shall immediately take all necessary measures, as outlined in the Emergency Response and Contingency Plan, to handle the emergency situations occurring at the Site.

(2) The Company shall ensure that the equipment and materials outlined in the Emergency Response and Contingency Plan are immediately available at the Site at all times and are in a good state of repair and fully operational.

(3) The Company shall ensure that all Site personnel are fully trained in the use of the equipment and materials outlined in the Emergency Response and Contingency Plan, and in the procedures to be employed in the event of an emergency.

(4) All Spills, as defined in the *EPA* , shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book as to the nature and cause of the spill, and the action taken for clean-up, correction and prevention of similar future occurrences.

(5) Should a Spill, as defined in the *EPA* , occur at the Site, in addition to fulfilling the requirements from the *EPA* , the Company shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.

In the 2017 operating year the Facility did not have a spill requiring the activation of the Emergency Response and Contingency Plan.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2017 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2018.

2.2 FINANCIAL ASSURANCE:

Specifics:
Condition 1(20.) of the ECA outlines the amount of financial assurance required for the operation of a solid non-hazardous waste transfer processing Site. In April of 2017, the ministry issued Notice #4 - ECA amendment to reflect a re-evaluation of the financial assurance needed for the site. The Facility submitted the remaining amount which forms the new total of financial assurance from the previous re-evaluation. The next re-evaluation of financial assurance is scheduled for April 30, 2020 and future re-evaluations at 3 year intervals.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (transfer processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste as outlined in Condition 2 of the ECA..

2.4 APPROVED SITE CAPACITY:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste as outlined in Condition 2(3) of the ECA.

2017 Operating Year (January 1, 2017 to December 31, 2017):

Incoming
City of Ottawa Green Bin Program = 77,505 tonnes
IC&I Sector = 5,264 tonnes
Total = 82,769 tonnes

Outgoing
NASM = 18,850 tonnes
Bedding = 13,447 tonnes
Orgapower = 653 tonnes
Residual = 16,530 tonnes
Total = 49,480 tonnes

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required at this time.

6.0 OTHER INSPECTION FINDINGS

The Site is approved for the purpose of compost production and is required to comply with the compost production conditions within the ECA as well as the Ontario Compost Quality Standards. Since the implementation of the Ontario Compost Quality Standards in 2015, the Site is unable to produce compost that meet the standards. As a result, the Facility is producing NASM for land application under approved NASM Plans.

As a recommendation, the Facility should re-evaluate the equipment and processes at the Site and determine modifications that could be implemented in order to producing a compost product that meet the requirements of the ECA and the Ontario Compost Quality Standards. If the Facility wishes to continue to produce NASM then the intent of the ECA is no longer applicable and therefore should be amended to reflect the actual waste processing activities from compost to NASM.

7.0 INCIDENT REPORT

Not Applicable

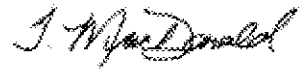
8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2018/03/27
Signature



REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2018/04/11

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change (MOECC) conducted an Industrial Sewage Works inspection at Orgaworld Canada Limited (the "Facility") on March 15, 2018 to assess compliance with issued Environmental Compliance Approval No. 2844-9YNGZC (ECA) issued on February 1, 2017. The Facility operates a waste organic processing site located at 5123 Hawthorne Road, Ottawa, Ontario (the "Site"). The Site receives organic waste from the City of Ottawa's Green Bin Collection Program and the Industrial, Commercial, and Institutional Sector.

The Site currently produces Non-Agricultural Source Material (NASM) for the use at agricultural operations and animal bedding.
A previous inspection occurred on September 29, 2016.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
N/A

Sector Type:
Other

Specify Other:
Organic Waste Processing

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT - issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA - issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD - issued May 30, 2011

Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC - issued February 1, 2017

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

The Site was issued the ECA for the following industrial sewage works system:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-Site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-Site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by Site operations staff as to disposal point (ditch/pond, into plant, or hauled off-Site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (metre)	Storage Volume (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

- inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

- overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the Site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet

structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the Site are as follows:

Storm Events	2-year	5-year	25-year	100-year
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

No modifications, alterations, or additions were noted during the inspection which would trigger the need for an amendment to Environmental Compliance Approval No. 7251-8GKRPD. No concerns identified.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 5(5) of the ECA requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2 - Trigger Parameters (see below) and meet the limits prior to discharging the effluent off-Site.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

In the 2017 operating year the Facility discharged effluent on three (3) occasions. As part of the inspection the Inspecting Officer requested the sample results for the effluent discharge events and were provided by the Facility. In reviewing the results and the 2017 AR, the following periods of discharge occurred:

Discharge Period	Sample Date	Pass / Fail
April 18, 2017 to May 15, 2017	April 10, 2017	Pass
July 26, 2017 to July 31, 2017	July 6, 2017	Pass
December 21, 2017 to December 31, 2017	December 14, 2017	Pass

Based on a comparison between Table 2 - Trigger Parameters and the sample results collected for the discharge events, the Facility is in compliance with Condition 5 of the ECA.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2015	Year 2 2016	Year 3 2017
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

N/A

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?

Certificate of Approval/Permit

Does the facility meet sampling requirements?

No

Condition 4 of the ECA outlines the requirements for the Facility to monitoring, on a monthly basis, the water quality of the Stormwater Management Pond.

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		

pH		

In 2017 monthly samples were collected by the Facility and sent for analysis for the parameters listed in Table 1 - Effluent Monitoring SWM Pond. As part of the inspection copies of the sample results were requested and received. All monthly samples were collected with the exception of January, February and October 2017. It was explained in the 2017 Annual Report samples were unable to be collected due to frozen pond conditions for January and February. The October monthly sample was not collected as it was reported that due to heavy precipitation, an accurate reading could not be collected.

****Please see Section 5.0 of this Report****

Condition 9 of the ECA outlines the requirement for the Facility to implement the groundwater monitoring program for the unconfined shallow aquifer and deep bedrock aquifer. As part of the ECA requirements, the Facility must complete an annual report outlining the completion of the groundwater monitoring program and the findings of the program of the operating year.

On March 22, 2018 the MOECC received a copy of the 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018. The report outlines the following conclusions and recommendations with respects to the findings of the 2017 report:

Conclusions:

1. Based on the groundwater elevations gathered in June and November 2017, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the hallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing trends of ammonia concentrations during previous monitoring periods have been observed downgradient of the Facility, however recent results show a reversal in these trends.
4. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2017 monitoring period.
5. Surface water was discharged three times from the on-Site Stormwater Management Pond during the 2017 monitoring period (April, July, and December). In the April, July, and December samples collected from the Stormwater Management Pond all parameters were below their respective trigger levels listed in the Site ECA.

Recommendations:

1. Operation of the groundwater extraction system should continue, removing as much impacted groundwater from the shallow flow system as is practical.
2. Future monitoring reports should assess the effectiveness of the extraction well and provide recommendations for continued operation or expansion, as appropriate, of the current remediation system.
3. Tier II confirmatory sampling should be completed during the spring of 2018 sampling event at MW5-09, MW102-09, MW105-13, TW-4, and TW-8.

The 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018, will be sent to the MOECC's Regional Technical Support Section's Groundwater Unit for review. Once the review is completed comments will be provided to the Facility.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?

Certificate of Approval/Permit

Does the facility meet reporting requirements?

Yes

Condition 10 of the ECA outlines the reporting requirements for the Facility:

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting

documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the District Manager requires from time to time.

At the time of the inspections records were available to the ministry for review (daily inspections, analytical results).

On March 22, 2018 The Facility submitted the annual performance report for the 2017 operating year which included the 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018. The 2017 Annual Report Organics Composting Facility was reviewed as part of the inspection and found to complete to satisfy the requirements of Condition 10.

2.6 FLOW MEASUREMENT

The ECA does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
The approved works was not discharging at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
Yes

Were all the spills reported to the ministry?
Yes

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations (updated 2016).

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?

Yes

Specifics:

1. Failure to collect monthly sample for the month of October as per the requirements of Condition 4 of the ECA

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

The following action items are required to be addressed by the Facility as a result of the inspection findings above:

1. Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events.

2. Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the Facility plans to satifiy the requirements of the ECA.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Applicable
0885-AXBR46 ☐

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2018/03/29
Signature



REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2018/04/11

Signature:



File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext** 103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted an Air Facility Inspection at Orgaworld's Ottawa Facility (the "Facility"), located at 5123 Hawthorne Road, Ottawa, On (the "Site"), to assess compliance with issued Environmental Compliance Approval No. 1631-A2ELCQ, Ontario Regulation 419, environmental regulations, guidelines and policies.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

○ Entire Facility ● Part of the Facility

Specifics:

The inspection focussed on the bioscrubber and biofilter air treatment process for the organic waste processing operation at the Site. The Site has one (1) bioscrubber and two (2) biofilters servicing the emission from the organic waste processing operations.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

Yes, the facility is in a target sector identified in Schedule 5.

☐ NAICS exemption

Note that s. 1(2) of Reg. 419/05 sets out exemptions for facilities whose activities would not be captured in NAICS 221112 (Fossil-Fuel Power Generation) and NAICS 5622 (Waste Treatment and Disposal)

Specifics:

The Facility operates under North American Industry Classification System (NAICS) code 562210 - Waste Treatment & Disposal for the operation of land fill sites, incinerators, or other treatment or disposal facilities for non-hazardous or hazardous waste. Establishments that integrate the collection, treatment and disposal of waste are also included.

The Facility is currently processing source separated waste from the City of Ottawa's Green Bin Collection Program and selected Industrial, Commercial & Institutional sectors for the production of Non-Agricultural Source Material (NASM). The NASM is applied to the agricultural operations as a soil conditioner under an approved NASM Plan, issued by the Ontario Ministry of Agriculture and Rural Affairs, or used as an animal bedding product.

2.0 INSPECTION OBSERVATIONS

Specifics:

Condition 2 of the ECA outlines the modifications that are permitted under the Limited Operational Flexibility. In reviewing the modification log for the 2016 operating year it was observed the following modifications occurred:

Composting Exhaust Stack - Change in exit diameter from 2m to as-built 1.47m
Emergency Generator - Generator relocated to north side of the building
Storage Piles (leaf & yard waste) - Not stored outdoors, no longer a significant source
Building dimension changed - Building parameters change slightly (Building height 11.00m to 11.58m)

Based on the modifications listed and completed in 2016, the Facility updated the figures, tables and dispersion modelling in the Emission Summary and Dispersion Modelling Report. This information was provided in the 2016 Written Summary Form required to be submitted to the ministry annual on May 31st.

No concerns identified.

2.1 SITE CONDITIONS

Operating

Specifics:

The following observations were noted during the inspections:

Odour: At the time of the inspection the Facility was operating and processing organic waste. Both air treatment processes, the bioscrubber and biofilters, were operating. The Facility operates under negative pressure therefore all odours are contained within the confines of the building and discharged through the pollution control equipment. The odour sampling port connected to the discharge stack was assessed during the inspection and found not to be discharging emissions that would be considered an adverse effect.

Noise: Noise from the Facility was not audible to a level that would cause impacts off-site at the time of the inspection. All doors of the Facility were closed at the time of the inspection. No concerns identified.

Dust: The roads and paved areas of the Site were observed to be clean to prevent fugitive dust. Unpaved surfaces surrounding the Site were damp or snow covered given the time of the year. No concerns identified.

Vibration: Vibration was not detected during the inspection and is not anticipated to be an issue with the operations occurring on-site.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015, the Facility received Environmental Compliance Approval No.1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

Based on the review of the equipment approved under the ECA, the Facility and Site has the required approval for the discharge of contaminants to air.

In the event changes to the operations, outside the scope of the ECA as outlined in Condition 2 of the ECA, the Facility will need to amend the ECA prior to making changes or modifications.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

The Environmental Protection Act and the ECA outlines requirements for notifications to the Ministry of the Environment and Climate Change. In reviewing the spills and complaints for the 2017, the Facility has met the notification requirements.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 10 of the ECA requires the Facility to monitoring the parameters of the Air Pollution Control Equipment. As part of the inspection the process data was requested for the biofilters and bioscrubber for the dates of January 18, 2017, March 15, 2017, May 1, 2017, July 3, 2017, September 29, 2017 and November 30, 2017. Based on the review of the records indicate the parameters of the Air Pollution Control Equipment are being monitored and recorded as required.

Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). On December 14, 2015 the Facility requested a reduction of the source testing parameters (removal of hydrogen sulphide and total mercaptans) and frequency of testing based on previous approval and source testing results. On December 15, 2015 the ministry issued a letter approving the request for a reduction in source testing parameters and a change in frequency from 6 months to 12 months.

On December 14, 2017 source testing was conducted by GHD Limited with a completed report received at the Ottawa District Office on February 22, 2018. The report is currently under review by the ministry's Standards Development Branch with comments to be followed once complete.

Is an annual ESDM report on site?

● Yes ○ No

Specifics:

N/A

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31, 2016 for the 2016 operating year.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the updated ESDM Report and Acoustic Assessment Report, the Facility demonstrates compliance with the ministry air emission standards and noise guidelines.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

The Facility provided a copy of 'Operating Procedures and Maintenance Program for Odour and Noise for Compliance with ECA (Air) No. 1631-A2ELCQ" dated February 2016, outlining the operating procedures and monitoring program for the pollution control equipment. A copy of 'Operations and Maintenance Manual, Version 2, dated March 2016, was provided outlining the maintenance procedures and inspections for all the equipment, support units, paved areas and monitoring equipment. The submission also included the procedure for responding and recording of environmental

complaints.

The document satisfies the requirements of Condition 7 of the ECA.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. No concerns identified in the way records are managed and retained on-site.

As part of the inspection records associated with Condition 7 - Operation and Maintenance and Condition 10 - Monitoring were requested following the inspection. Records were requested for the biofilters and bioscrubber as it relates to inspection and maintenance for random selected dates provided below:

January 18, 2017	March 15, 2017	May 1, 2017
July 3, 2017	September 29	November 30, 2017

Daily Site Inspection - Observed to be completed as required.

Odour Abatement Weekly Inspection - Observed to be completed as required. It was noted in all odour abatement weekly inspections the man Door Seals need to be replaced.

Maintenance Daily Sheet - Observed to be completed outlining maintenance activities for the odour abatement equipment and process equipment.

Process Data - The Facility utilizes SCADA to program, adjust, measure and monitoring the organic waste processing. The SCADA system also records the data collected during the processing process. In reviewing the process data, the records were collected as required and indicate the biofilters and bioscrubber are being properly operated and monitored.

Training: The Inspecting Officer was provided the training records for an employee and the training matrix that provides all the training requirements per position acceptance anion (ex. ECA training, contingency and emergency response, operations manual and procedures, and wasted shipment protocols) and re-training frequency.

Original Acoustic Assessment Report, dated May 2014, was confirmed to be on-site as required.
Original Emission Summary and Dispersion Modelling Report, dated May 2014, was confirmed to be on-site as required.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone

numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

The Ministry of the Environment and Climate Change is not aware of any Beyond Compliance Projects for the Site.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

In reviewing the previous Air Facility Inspection Report, the Facility was required to ensure copies of the Emission Summary Table and Acoustic Assessment Summary Table is available to the ministry and public upon request as per Condition 5.3 of the ECA. The inspection confirmed these records are available as part of the annual update requirement in Condition 5 of the ECA.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by the Facility at this time.

6.0 OTHER INSPECTION FINDINGS

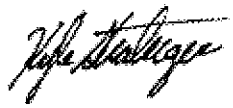
None at this time.

7.0 INCIDENT REPORT

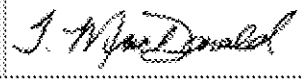
○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2018/03/29
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2018/04/11
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext**143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (the "Facility") is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing, through aerobic composting, of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The purpose of the inspection is to assess compliance with the Facility's Environmental Compliance Approval Number 2766-7HEPSZ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 347 under the above referenced *Act*. The inspection consisted of a district file review, site visit and discussions with Orgaworld Canada Limited representatives.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions to promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and processed organic waste. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The processed organic waste size material is placed in the compost curing area where it is required to cure for 21 days and subsequently tested to ensure it meets all requirements under Environmental Compliance Approval Number 2766-7HEPSZ and the Ontario Compost Quality Standards. Upon achieving the requirements of the approval and the standards, the material is deemed finished compost and removed from the site for use in accordance with the Ontario Compost Quality Standards. It

should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

The Facility started accepting organic material at the Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa Source Separated Organics collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the source separated organic waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the source separated organics and sending it to Orgaworld in April 2010. The Facility receives additional source separated organics from the industrial, commercial and institutional sector, in plastics, which started in February 2015. Environmental Compliance Approval Number 2766-7HEPSZ allows for the receipt of source separate organics in plastic as a result of an Environmental Review Tribunal decision which was reflected in an notice to Environmental Compliance Approval Number 2766-7HEPSZ on February 6, 2015.

It should also be noted that the Facility met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the *Environmental Protection Act*) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, the Facility ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed the Facility to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-Agricultural Source Material Plans. As of mid 2013, the Facility has worked with their clients in obtaining Non-Agricultural Source Material Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the *Environmental Protection Act* for the transportation of the 12-20 material.

On July 1, 2015 the Ministry of the Environmental and Climate Change implemented the entire Ontario Compost Quality Standards for the remaining standards for foreign matter content, compost maturity and compost labelling. In 2013 the Facility implemented Phase I of the Ontario Compost Quality Standards for metals in compost, quality of feedstock and pathogens. It was known through discussion with the Facility that the implementation of Phase II Ontario Compost Quality Standards would pose challenges for the production of AA compost given the requirements of the Ontario Compost Quality Standards. The challenges included compost technology and operations at the Site, capacity for the storage and curing of processed organic waste, and duration of time needed to meet the new requirements. As a result, the Ottawa District provided the Facility an opportunity to submit a Voluntary Abatement Plan to address the challenges and provide an abatement program to demonstrate the Facility's commitment to comply with the Ontario Compost Quality Standards and a strategy to land apply processed organic waste to reduce risk to human health and the environment. The Voluntary Abatement Plan submitted provided a program in which previously deemed unrestricted compost (pre-July 2015) to be land applied to agricultural operations within the legislative framework of the *Nutrient Management Act* and Non-agricultural Source Material. The Voluntary Abatement Plan outlined the Facility would enter into an agreement with the agricultural operators to submit a Non-agricultural Source Material Plan for land application of processed organic waste generated at the Site to the Ministry of Agriculture, Food and Rural Affairs and in the meantime, submit the supporting documentation to the Ottawa District Office to allow for land application prior to receiving approval under the Non-agricultural Source Material process. In addition to the Voluntary Abatement Plan, the Facility was required to retain the services of approval waste management systems to transport processed organic waste from the point of generation to the application site. The Ministry of the Environment and Climate Change reviewed and accepted the Voluntary Abatement Plan for period of six (6) months ending on December 31, 2015. To date, no off-site or environmental impacts were reported to the ministry during the duration of the Voluntary Abatement Plan which is now expired. Any further land application of processed organic waste is subject to the approval process outlined in the *Nutrient Management Act* .

Since December 31, 2015, the Facility has not produced AA compost and has continued to produce non-agricultural source material for the Ontario agricultural sector under NASM Plans and for the Quebec agricultural sector.

The inspection consisted of a district file review, site visit and discussions with Orgaworld Ottawa representatives.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details - The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

2.1 SITE OPERATION:

Specifics:

SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2015 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined in Environmental Compliance Approval Number 2766-7HEPSZ. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2015 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional

sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2015 Annual Report provided the monthly and annual tonnages for the 2015 operating year As part of the inspection the Inspecting Officer reviewed the mass balance for the 2015 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in Environmental Compliance Approval Number 2766-7HEPSZ.

No issues identified.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2015 Annual Report states that in the 2015 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in Environmental Compliance Approval Number 2766-7HEPSZ was also confirmed by the Facility staff during the inspection.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the composting process were located inside the confines of the Processing Building.

No issues identified.

(6)Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.
(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of

its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2015 Annual Report states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

In May of 2016 the Ottawa District Office of the Ministry of the Environment and Climate Change received a complaint from a motorist reporting Orgaworld Ottawa odours along Hawthorne Road. The complaint form was completed outlining the actions taken by the company with notification to the ministry once completed. The complaint was deemed to be invalid due to the location of the Facility in comparison to wind direction.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2015 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice, previously referred to as Notice #3, to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) **name of the Owner;**
(b) **this Certificate number;**
(c) **hours during which the Site is open;**
(d) **waste types that are approved to be accepted at the Site;**
(e) **Owner's telephone number (a hotline) to which complaints may be directed;**
(f) **Owner's twenty-four hour emergency telephone number (if different from above);**
(g) **a warning against unauthorized access;**
(h) **a warning against dumping at the Site.**

(2) **The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.**

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued Environmental Compliance Approval Number 2766-7HEPSZ by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) **All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.**

(2) **The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.**

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) **Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:**

(a) **loading/unloading area of the leaf & yard waste storage pad;**
(b) **parking lot area for evidence of run-off from the leaf & yard waste storage pad;**
(c) **Processing Building and the air pollution control equipment;**
(d) **security fence and property line;**
(e) **on-site roads for presence of leaks and drips from the waste delivery trucks;**
(f) **presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;**
(g) **on and off-site litter;**
(h) **presence of vector and vermin**

At the time of the inspection the Inspecting Officer requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The Inspecting Officer also reviewed procedures provided by the Facility located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system. The program was observed to be updated to reflect current operations.

No concerns identified.

(3) **The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.**

A copy of the preventative maintenance program was available for review at the time of the inspection. The program was observed to be updated to reflect current operations.

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost, finished compost and NASM are located separate from incoming organic waste. No issues identified.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the Inspecting Officer inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that new sources/streams of incoming organic waste began in February 2015 from the Industrial, Commercial and Institutional Sector. Sample analysis documentation was provided and determined to be compliant with the Ontario Compost Quality Standards. In February of 2015 Orgaworld requested and received approval from the ministry to start accepting the new source of organic waste received in plastic bags. No issues identified.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

The Facility is not currently producing compost, as defined by the Ontario Compost Quality Standards, therefore no records of analytical results were requested.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

The Facility is not currently producing compost, as defined by the Ontario Compost Quality Standards, therefore no records of analytical results were requested

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the Inspecting Officer requested information on how the Facility complies with the above condition. The Inspecting Officer was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. Inspecting Officer was able to verify this information by being provided screenshots of the SCADA system for the above process monitoring parameters during the 2015 inspection. The Inspecting Officer observed the SCADA system during the 2016 inspection which confirmed process monitoring is continuing to occur.

No issues were identified.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

Temperature monitoring is completed by use of temperature probes located in the compost tunnels. The Facility uses the SCADA system to monitoring and record temperatures during the compost process. No concerns identified.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2015 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2015 Annual Report, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2015 Annual Report confirms that during the 2015 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2015 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the site a water truck was on-site washing the paved areas. No dust concerns identified.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. No concerns identified.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection. No complaints of dust have been reported to the ministry to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2016 the Operations Manual was updated due to changes to operating procedures and equipment. A copy was provided to the Ottawa District Office of the updated manual. No concerns identified.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. No issues identified.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2015 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2016.

2.2 FINANCIAL ASSURANCE:

Specifics:

Financial Assurance re-evaluation was submitted by Orgaworld Ottawa in 2015 and is currently under review by the

ministry.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No outstanding non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld Canada Limited at this time.

6.0 OTHER INSPECTION FINDINGS

It is recommended Orgaworld Canada Limited continue their efforts in implementing procedural changes, modifications, and/or technology upgrades in order to meet the Ontario Compost Quality Standards.

7.0 INCIDENT REPORT

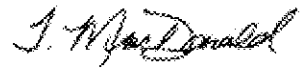
Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Kyle Straberger**
District Office:	**Ottawa District Office**
Date:	**2016/10/14**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2016/10/17**
Signature:	
File Storage Number:	SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext**143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for a minimum of 21 days, tested to ensure it meets all requirements of the waste Environmental Compliance Approval Number 2766-7HEPSZ and Ontario Compost Quality Standards and then removed from the site as finished compost or non-agricultural source material (NASM). All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process is recirculated with excess kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the source separated organic waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional source separated organics in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on September 29, 2016.

The purpose of this inspection is to assess compliance with issued Industrial Sewage Works Environmental

Compliance Approval Number 7251-8GKRPD and applicable environmental legislation such as the *Ontario Water Resources Act* .

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not Applicable

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s):

Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off-site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued Environmental Compliance Approval Number 7251-8GKRPD for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in closed position during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m,

discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2 - year	5-year	25-year	100-year
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post -development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply

- Piping for percolate/washdown water supply to the composting area including a sprinkling system;

- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

No modifications, alterations, or additions were noted during the inspection which would trigger the need for an amendment to Environmental Compliance Approval No. 7251-8GKRPD. No concerns identified.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6(5) of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

In March of 2016 the Facility discharged stormwater effluent from the sewage works in accordance with Table 2 - Trigger Parameters. A copy of the sample analysis was provided to the Inspecting Officer for review. In reviewing the results, all parameters were below their respected trigger levels. No concerns identified.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2015	Year 2 2016	Year 3 2017
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

Environmental Compliance Approval Number 7251-8GKRPD does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. No issues were identified.

No changes to the operation of the Works took place in 2016 requiring amendments to Environmental Compliance Approval Number 7251-8GKRPD.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Facility to monitor stormwater within the Stormwater Management Pond at a monthly frequency and compare against Table 1 - Effluent Monitoring SWM Pond provided below:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

The Stormwater Management Pond monitoring program was completed in 2015 and outlined in Industrial Sewage Works Inspection Report, dated December 21, 2015. The monitoring data for the 2016 operating year will be reviewed pending the submission of the 2016 Performance Report to the ministry's Ottawa District Office.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2015 operating year and was submitted to the ministry in 2016. The report was provided to the ministry Technical Support Section for groundwater comments. At the time of the inspection ministry comments were not complete but will be provided upon completion.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of Environmental Compliance Approval Number 7251-8GKRPD outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

After completing the inspection the Inspecting Officer reviewed the district file and determined the annual report required by the above condition was submitted for the 2015 operating year on March 18, 2016. The 2015 Annual Report outlined operational issues encountered during the 2015 operating year which are outlined below:

1. Blockages of the solids interceptor located west of the stormwater pond were identified and rectified.

2. The submersible pump used to pump water from the stormwater management pond to the fire suppression tanks was replaced due to age and observed effectiveness.
3. On-site trench was cleaned out by Orgaworld personnel as a result of vegetation growth and residual matter build-up.

No concerns identified.

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

Environmental Compliance Approval Number 7251-8GKRPD requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the Inspecting Officer reviewed the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or Orgaworld in relation to the operation of the industrial sewage works)
- One (1) discharge event occurred in the 2016 operating year with analytical results supporting compliance with

Table 2 - Trigger Parameters

2.6 FLOW MEASUREMENT

Environmental Compliance Approval Number 7251-8GKRPD does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?

No

Reason:

The Industrial Sewage Works was not discharging effluent at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?

No

Has the facility had any spills since the last inspection?

No

Were all the spills reported to the ministry?

N/A

Does the facility's operations or spill history suggest that a SPCP be developed?

No

Comments:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the Industrial Sewage Works Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld Canada Limited at this time.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2016/10/11
Signature

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2016/10/14**

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext** 143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material is placed in the compost curing area where it is required to cure for a minimum of 21 days, tested to ensure it meets all requirements under the waste Environmental Compliance Approval and Ontario Compost Quality Standards and then removed from the site as finished compost or non-agricultural source material (NASM). All process air and air from the receiving hall is directed through the pollution control equipment. Leachate generated as a result of the composting process is recirculated with excess kept within on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28th, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics (SSO) collection program which includes leaf and yard waste. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste. In 2015 Orgaworld started excepting industrial, commercial and institutional SSO in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on September 29, 2016.

The purpose of this inspection is to assess compliance with Environmental Compliance Approval No.1631-A2ELCQ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Orgaworld Ottawa representatives.

An Industrial Sewage Works Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with issued Environmental Compliance Approval Number 1631-A2ELCQ which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements. The Environmental Compliance Approvals outlines the approved operations for the Site as follows:

An aerobic composting facility, consisting of the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

The operations approved under the current Environmental Compliance Approval are not subject to the regulatory requirements for Schedule 4 or Schedule 5 targeted facilities of Ontario Regulation 419/05 under the *Environmental Protection Act* until the year 2020 in which schedule 3 standards will apply..

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Facility staff provided a tour of the facility incorporating an overview of the air pollution control devices for the treatment of air emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure treatment of emissions. The system is outlined below:

1.) Fans are located throughout the building, these fans draw air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and the composting tunnels goes through an ammonia scrubber, one of two biofilters, a bioscrubber, prior to discharging from a 40 meter stack located at the Site.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (elevated pH level) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is dry requiring the Facility to operate in a water negative environment in the summer and as such leachate generated in the operation of the Facility is re-circulated within the process. If the Facility requires additional water the Site draws from the stormwater management pond on-site.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack located at the Site is 40 meters high with a sampling port positioned outside at the bottom of the stack in order to sample air prior to entering the stack. There is an additional sampling port inside prior to the bioscrubber.

There are several odour ports throughout the Facility to monitor the process and effectiveness of the pollution control equipment.

2.1 SITE CONDITIONS

Operating

Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could pose potential impacts off-site. It was noted that noise levels outside the Site were at a level anticipated to not pose a concern to surrounding properties. No concerns identified.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing or could result in impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved areas were currently being washed. The Facility monitors the paved areas and provides dust control measures if needed. No concerns identified.

Odour: At the time of the inspection odour was assessed to determine if the operations of the Facility is causing odour impacts off-site. As part of the tour of operations at the Site, the Inspecting Officer and Facility staff exited the building to gain access to a separate area of the Site. During this time, the Facility was in operations and no odour was detected. The Facility also has a odour port located at the base of the stack which did not produce any odours that the Inspecting Officer believed were significant.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection. No concerns identified.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015, the Facility received Environmental Compliance Approval Number 1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/15		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

The Limited Operational Flexibility Environmental Compliance Approvals, previous referred to as Basic Comprehensive Environmental Compliance Approvals, allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions and noise to ensure compliance with applicable standards and limits outlined in the approval, Ontario Regulation 419/05 and NPC-300. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

The Facility submitted an application, dated May 21, 2014, to the ministry for renewal of their Limited Operational Flexibility Environmental Compliance Approval which was approved replacing and revoking Environmental Compliance Approval Number 7021-7HQNDE issued September 16, 2009. On December 10, 2015 the ministry issued Environmental Compliance Approval Number 1631-A2ELCQ the Facility.

As a result of the inspection the Inspecting Officer did not observe any new additions, alterations or modifications to equipment that would be subject to an amendment of the issued Environmental Compliance Approval Number 1631-A2ELCQ.

No modifications permitted under Condition 2 - Limited Operational Flexibility of Environmental Compliance Approval Number 1631-A2ELCQ occurred in the 2016 operating year to date.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer reviewed the district file review prior to completing the inspection. As a result of the file review no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility for the 2016 operating year.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1 of Environmental Compliance Approval Number 1631-A2ELCQ, the Facility is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:

- June & December 2010
- July & December 2011
- November 2012
- November 2013
- November 2014
- November 2015

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements.

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number1631-A2ELCQ and as a result, the Facility requested to continue the previous ministry approved reduction in the frequency of source testing and removal of hydrogen sulfide and mercaptions from the testing parameters. On December 14, 2015 the Facility was granted permission for the reduction in source testing frequency and removal of specific testing parameters. The last source test was completed in November of 2015 with copies provided to the Ministry of the Environment and Climate Change's Ottawa District Office and Standards Development Branch in January 2015.

Source testing has been scheduled for November 2016.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31, 2016 for the 2015 operating year in which Limited Operational Flexibility conditions were in place for a portion of the year.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the submitted updated Emission Summary Table and Acoustic Assessment Table, no exceedance of a legal limit was identified.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 7 of Environmental Compliance Approval Number 1631-A2ELCQ outlines the requirements for the development and implementation of operational and maintenance requirements for all processes with significant environmental aspects. In conducting the inspection, it was noted that not no changes were made within the inspection period requiring revisions. No concerns identified.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of Environmental Compliance Approval Number 1631-A2ELCQ outlines the requirements for the Facility to conduct record keeping of specific documents and records associated with the operations under the Environmental Compliance Approval. The following records are to be provided in a timely manner:

- Original ESDM Report and each updated version
- A copy of each version of the Acoustic Assessment Report
- Supporting information used in the emission rate calculations performed in the ESDM Reports and Acoustic Assessment Reports
- Copies of each Written Summary Form provided to the Ministry under Condition 6.1 of this Approval
- Records of maintenance, repair and inspection of Equipment related to all Processes with Significant Environmental Aspects
- All reports of Source Testing
- All records generated from the monitoring of the Air Pollution Control Equipment
- All records related to environmental complaints made by the public as required by Condition 8 of this Approval

As part of the inspection, the above reports and monitoring records were discussed. A majority of the reports and data are recorded/stored electronically through monitoring and recording software and can be made available upon request.

Updated Emission Summary Table and Acoustic Summary Table was not available at the time of the inspection and therefore the Inspecting Officer requested to be submitted to the ministry post inspection. On October 6, 2016 the Inspecting Officer was provided the updated Acoustic Assessment Summary Table, dated March 23, 2016, indicating compliance with ministry noise standards. On October 6, 2016 the Inspecting Officer was provided the updated Emission Summary Table, dated April 2016, indicating compliance with ministry air standards.

****Please see Section 5.0 of this Report for actions required****

Records of completed inspection of the equipment referenced in Environmental Compliance Approval Number 1631-A2ELCQ were reviewed at the time of the inspection with no issues identified. All records are completed in paper formed and filed on-site.

One environmental complaint was received in 2016 regarding odour from a motorist detecting odours when driving past/near the Facility. The complaint form was completed by Orgaworld Ottawa outlining the actions taken by the company with notification to the ministry once completed. The complaint was deemed to be invalid due to the wind direction in reference with the location of the Facility.

No concerns identified.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No ongoing non-compliance issues were identified during the file review prior to the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

● Yes ○ No

Specifics:

Copy of Emission Summary Table and Acoustic Assessment Summary was not available on-site as required by Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ.

5.0 ACTION(S) REQUIRED

The following action item(s) are required to be addressed by Orgaworld Ottawa Facility:

1. Orgaworld Ottawa must ensure hardcopies of the Emission Summary Table and Acoustic Assessment Summary Table is available to the ministry and public upon request as per Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ.

6.0 OTHER INSPECTION FINDINGS

No other inspecting findings noted.

7.0 INCIDENT REPORT

● Applicable ○ Not Applicable

8448-AEMP9Q

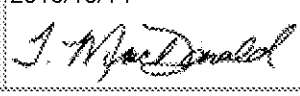
8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office

Date:	2016/10/11
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2016/10/14
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Michael Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(613) 822-2056 **ext**143	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements of the waste Environmental Compliance Approval Number 2766-7HEPSZ and Ontario Compost Quality Standards and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the source separated organic waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional source separated organics in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Industrial Sewage Works Inspection. The site visit for the inspection was conducted on December 21, 2015.

The purpose of this inspection is to assess the sites compliance with issued Industrial Sewage Works Environmental Compliance Approval Number 7251-8GKRPD and applicable environmental legislation such as the *Ontario Water Resources Act* .

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not Applicable

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat)

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the east-side of the building. Should the facility need to use water in their process (wetting the composting material) the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued Environmental Compliance Approval Number 7251-8GKRPD for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in closed position during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2 - year	5-year	25-year	100-year
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post -development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply

- Piping for percolate/washdown water supply to the composting area including a sprinkling system;

- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition

piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6(5) of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

The Facility indicated during the inspection that the stormwater management pond did not have a discharge event which would require the effluent to meet the Table 2 - Trigger Parameters during the 2014 and 2015 operating year.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2014	Year 2 2015	Year 3 2016
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

Environmental Compliance Approval Number 7251-8GKRPD does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. No issues were identified.

No changes to the operation of the Works took place in 2014 or 2015 which would require amendments to Environmental Compliance Approval Number 7251-8GKRPD.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Facility to monitor stormwater within the Stormwater Management Pond at a monthly frequency and compare against Table 1 - Effluent Monitoring SWM Pond provided below:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

As part of the file review, the Inspecting Officer reviewed the sample analysis provided in the 2014 Groundwater and Surface Water Monitoring Report and requested sample analysis for the 2015 operating year. Sampling data collected during the 2014 and 2015 operating year was compared against Table 1 - Effluent Monitoring SMW Pond of Environmental Compliance Approval Number 7251-8GKRPD.

In reviewing the data the following observations were noted:

2014 SWMP:

- Samples were not collected during the months of January, February, March and December (may be a result of frozen conditions or health and safety reasons - **See Section 6.0 of this Report**)
- **September** - Inorganic metals were not tested due to a lab error at ALS Laboratory (outlined in the 2014 Annual Report)
- **November** - Oil & grease was not analysed as per Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD

2015 SWMP:

- Samples were not collected during the months of January, February and March (may be a result of frozen conditions or health and safety reasons - **See Section 6.0 of this Report**)
- All parameters were sampled and analysed as per Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD

****Please see Section 5.0 of this Report****

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in

accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2014 operating year which was submitted to the in 2015. The report was provided to the ministry Technical Support Section for groundwater and surface water comments. At the time of the inspection ministry comments were not complete but will be provided upon completion.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of Environmental Compliance Approval Number 7251-8GKRPD outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

After completing the inspection the Inspecting Officer reviewed the district file and determined the annual report required by the above condition was not submitted for the 2014 operating year on March 31, 2015. The Inspecting Officer informed the Facility of the non-compliance event and on March 10, 2016 the Inspecting Officer received a copy of the 2014 Annual Report. The 2014 Annual Report outlined not operational issues were encountered during the 2014 operating year and inspections of the works were completed indicating no maintenance work required. No effluent was discharged from the sewage works.

The 2015 annual report is not required to be submitted until March of 2016 and did not form part of the inspection. Additional information was requested after the inspection report to confirm compliance with the above subsection of the condition which is outlined below:

(a) a description of any operating problems encountered and corrective actions taken

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

- All analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9, was submitted in a separate report for the 2014 operating year. The analytical results and water elevation data is currently under review by the ministry's Technical Support Section Groundwater and Surface Water Units.

(e) any other information the District Manager requires from time to time.

- No information was required to be submitted to the District Manager for the 2014 operating year

****Please see Section 5.0 of the Report****

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

Environmental Compliance Approval Number 7251-8GKRPD requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the Inspecting Officer reviewed the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or Orgaworld in 2014 or 2015)
- No discharge events occurred at the SWMP in the 2014 or 2015 operating year

2.6 FLOW MEASUREMENT

Environmental Compliance Approval Number 7251-8GKRPD does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
The Industrial Sewage Works was not discharging effluent at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
No

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
As referenced in Section 2.5 of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The Inspecting Officer confirmed this information as part of the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No outstanding non-compliance issues or actions were identified prior to completing the inspection. As referenced in the previous inspection report, dated January 29, 2015, the Facility has submitted the required documentation in the form of an application to amend the existing Environmental Compliance Approval Number 7251-8GKRPD to include a groundwater compliance and trigger level program and monitoring program to satisfy condition 9(8) of the approval. The application is currently under review by the Ministry of the Environment and Climate Change's Environmental Approvals Branch.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

1.) Non-compliance - Condition 5(1) of Environmental Compliance Approval No. 7251-8GKRPD by failing to analyse monthly samples per the parameters outlined in Table 1 - Effluent Monitoring SWM Pond for the 2014 operating year.

2.) Non-compliance - Condition 10(3) of Environmental Compliance Approval No. 7251-8GKRPD by failing to prepare and submit a performance report for the 2014 operating year by March 31, 2015.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the Industrial Sewage Works Inspection completed at the Site, the following action items require attention by Orgaworld:

1. 1. Orgaworld must continue to ensure all parameters are analysed as per Condition 5 of the ECA.
2. 2. Orgaworld shall ensure Annual Reports, as outlined in Condition 10 of the ECA, are completed and submitted to the Ottawa District Office by no later than March 31 annually.

6.0 OTHER INSPECTION FINDINGS

As noted in Section 2.4 of this Report, sample collection was not completed during certain operating months in 2014 and 2015. In past years, outlined in annual reports and inspection reports, samples were not collected during these months due to ice-covered conditions with risk to human health if sampling was to occur. It is recommended that Orgaworld revisit the monitoring program and determine if amendments or modifications a required to ensure compliance with Environmental Compliance Approval No. 7251-8GKRPD is obtained moving forward.

7.0 INCIDENT REPORT

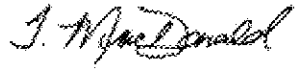
Applicable
5433-A7HJUS ☑

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2016/03/17**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**

Date: **2016/03/30**

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Mike Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(519) 663-4446 **ext** 104	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste Environmental Compliance Approval and Ontario Compost Quality Standards and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28th, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional SSO in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on December 21th, 2015.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval No.1631-A2ELCQ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Nick Pora, Plant Manager.

An Industrial Sewage Works Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with issued Environmental Compliance Approval Number 7021-7HQNDE from the period of January 2014 to December 9, 2015 and with issued Environmental Compliance Approval Number 1631-A2ELCQ for the period of December 10, 2015 to December 31, 2015 which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements. The Environmental Compliance Approvals outline the approved operations for the Site:

An aerobic composting facility, consisting of the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

The operations approved under the current Environmental Compliance Approval are not subject to the regulatory requirements for Schedule 4 or Schedule 5 targeted facilities of Ontario Regulation 419/05 under the *Environmental Protection Act* under the year 2020.

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Facility staff provided a tour of the facility incorporating an overview of the air pollution control devices for the treatment of air emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure treatment of emissions. The system is outlined below:

1.) Fans are located throughout the building, these fans draw air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and the composting tunnels goes through an ammonia scrubber, one of two biofilters, a bioscrubber, prior to discharging from a 40 meter stack located at the Site.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air

temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (elevated pH level) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is dry requiring the Facility to operate in a water negative environment in the summer and as such leachate generated in the operation of the Facility is re-circulated within the process. If the Facility requires additional water the Site draws from the stormwater management pond on-site.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.
Stack:

The stack located at the Site is 40 meters high with a sampling port positioned outside at the bottom of the stack in order to sample air prior to entering the stack. There is an additional sampling port inside prior to the bioscrubber.

There are several odour ports throughout the Facility to monitor the process and effectiveness of the pollution control equipment.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns identified.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing or could result in impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear cleaned and the trucks on-site were not generating dust. The Facility monitors the paved areas and provides dust control measures if needed. No concerns identified.

Odour: At the time of the inspection odour was assessed to determine if the operations of the Facility is causing odour impacts off-site. As part of the tour of operations at the Site, the Inspecting Officer and Facility staff exiting the building to gain access to a separate area of the Site. During this time, the Facility was in operations and no odour was detected. The ministry nor the Facility has received any odour complaints during the 2014 and 2015 operating year. No concerns identified.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection nor experienced when completing odour surveys in the surround area. No concerns identified.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On September 16, 2009 the Facility received Environmental Compliance Approval Number 7021-7HQNDE for the operation and pollution control equipment to manage and treat air emissions. The approval issued provided conditions that allowed for Limited Operational Flexibility which would allow modifications to be completed provided that the modifications were within the scope of the approval and Section 20.6 (1) of the Environmental Protection Act. The Limited Operational Flexibility conditions expiry after 5 years of the issuance date which after the expiry date no longer apply until an application is submitted and approved for renewal.

In May of 2014 the Facility submitted an application to the ministry's Environmental Approvals Branch to renew the Limited Operational Flexibility conditions as these conditions were set to expire on September 16, 2014.

On December 10, 2015, the Facility received Environmental Compliance Approval Number 1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16		
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☒ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

The Limited Operational Flexibility Environmental Compliance Approvals, previous referred to as Basic Comprehensive Environmental Compliance Approvals, allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

The Facility submitted an application, dated May 21, 2014, to the ministry for renewal of their Limited Operational Flexibility Environmental Compliance Approval which was approved replacing and revoking Environmental Compliance Approval Number 7021-7HQNDE issued September 16, 2009. On December 10, 2015 the ministry issued

Environmental Compliance Approval Number 1631-A2ELCQ the Facility.

As a result of the inspection the Inspecting Officer did not observe any changes or equipment implemented that would be subject to an amendment of the issued Environmental Compliance Approval Number 1631-A2ELCQ. The Facility was not required to submit a 2014 Written Summary as the condition that permits modifications had expired resulting in no modifications completed in 2014 therefore not requiring a submission. The 2015 Written Summary is not required to be submitted until May 31, 2016. The Inspecting Officer reviewed the modification logs provided by the Facility for 2015.

2015: The Facility completed one (1) modification to the operations / equipment at the Site during the 2015 operating year.

- Replace electrical shredder with diesel shredder - Updated ESDM Report and Acoustic Assessment Report - Changes reflected in 2015 ESDM Report

As previously mentions, the condition in Environmental Compliance Approval Number 7021-7HQNDE permitting modifications to be completed under Limited Operational Flexibility expired as of September 16, 2014 restricting the ability for modifications to be completed until an amendment is approved by the ministry. In May 2014 the Facility submitted an amendment to renew their Limited Operational Flexibility and did not receive an approval until December 2015. The Facility completed a modification in September 2015 resulting in a contravention of Section 20.6(1) and Condition 2.1 of ECA No. 7021-7HQNDE.

Please see Section 5.0 of this Report

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer reviewed the district file review prior to completing the inspection. As a result of the file review no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility for the 2014 and 2015 operating year.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the Facility is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:

- June & December 2010
- July & December 2011
- November 2012
- November 2013
- November 2014
- November 2015

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements.

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number1631-A2ELCQ and as a result, the Facility requested to continue the previous ministry approved reduction in the frequency of source testing and removal of hydrogen sulfide and mercaptions from the testing parameters. On December 14, 2015 the Facility was granted permission for the reduction in source testing frequency and removal of specific testing parameters. The

last source test was completed in November of 2015 with copies provided to the Ministry of the Environment and Climate Change's Ottawa District Office and Standards Development Branch in January 2015. Upon completion of the ministry's review, comments will be provided to the Facility.

The next source testing is scheduled for November 2016.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility is not required to comply with the above conditions until May 31, 2016 for the 2015 operating year in which Limited Operational Flexibility conditions were in place.

In 2014 the Facility was required to submit a similar Written Summary under Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE requiring the following information and documentation:

a. a signed statement that the *Facility* was in compliance with the *Performance Limits;*
b. a summary of each *Modification* that took place in the previous calendar year and resulted in a change in the previously calculated concentration at the *Point of Impingement* for any *Compound of Concern* or resulted in a change in the sound levels reported in the *Acoustic Assessment Summary Table* at any *Point of Reception;*
c. a list of each *Compound of Concern* submitted to the *Air Standards Manager* for review in the previous calendar year;
d. a review of any changes to a *Ministry Point of Impingement Limit* undertaken in the previous calendar year that affect a *Compound of Concern* emitted from the *Facility;*
e. a tabulated summary of the changes in the emission rate of any *Compound of Concern* and the resultant increase or decrease in the *Point of Impingement* concentration reported in the *ESDM Report* over the previous calendar year; and
f. the *Emission Summary Table* and *Acoustic Assessment Summary Table* for the *Facility* as of December 31 from the previous calendar year.

In reviewing the district file the 2014 Written Summary was not submitted to the District Manager of the Ottawa District Office as required by Condition 5.

****Please see Section 5.0 of this Report****

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the most updated Emission Summary & Dispersion Modelling Report (May 2014), no exceedance of a ministry limit was observed. The review of the Emission Summary & Dispersion Modelling Report was completed by the ministry's Environmental Approvals Branch which accompanied the Facility's application to renew their Limited Operational Flexibility condition.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

The Inspecting Officer was informed that the above referenced documents are current and no changes have been made requiring revisions with the exception to the *Site Inspection and Monitoring Program* and *Operations Manual* for the modification that includes the replacement of an electric shredder to a diesel shredder. Provided the recent issuance of Environmental Compliance Approval Number 1631-A2ELCQ, Condition 7.1 requires an updated operations and maintenance manual to be completed by March 10, 2016.

No issues identified.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of Environmental Compliance Approval Number 1631-A2ELCQ (formerly Condition 8 of Environmental Compliance Approval Number 7021-7HQNDE) outlines the requirements for the Facility to conduct record keeping of specific documents and records associated with the operations under the Environmental Compliance Approval. The following records are to be on-site:

- Original ESDM Report and each updated version
- a copy of each version of the Acoustic Assessment Report
- supporting information used in the emission rate calculations performed in the ESDM Reports and Acoustic Assessment Reports
- copies of each Written Summary Form provided to the Ministry under Condition 6.1 of this Approval
- records of maintenance, repair and inspection of Equipment related to all Processes with Significant Environmental Aspects
- all reports of Source Testing
- all records generated from the monitoring of the Air Pollution Control Equipment
- all records related to environmental complaints made by the public as required by Condition 8 of this Approval

As part of the inspection the Inspecting Officer reviewed the district file, requested confirmation, and was provided documents to confirm compliance with the above condition. Upon reviewing the information, the Inspecting Officer noted the above documentation was available with the exception of the 2014 Written Summary.

Please see Section 5.0 of this Report

The Ottawa District Office and the Facility did not receive any environmental complaints for the 2014 operating year. In July 2015, the ministry was made aware of an incident involving a small fire located in Tunnel 8 of the building. The Ottawa Fire Department responded to the incident and the material was extinguished. No complaints or concerns were reported to the Ministry of the Environment and Climate Change nor to the Facility as a result of the fire. No fires have been reported since July 2015.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was deemed acceptable.

No spills were reported to the ministry for the 2014 and 2015 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

No

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

No

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

● Yes ○ No

Specifics:

1. Modifications were completed in September 2015 after the expire date associated with Section 20.6 (1) of the Environmental Protection Act and Condition 2.1 of Environmental Compliance Approval Number 7021-7HQNDE and prior to receiving the new Environmental Compliance Approval Number 1631-A2ELCQ, revoking and replacing Environmental Compliance Approval Number 7021-7HQNDE, renewing the Limited Operational Flexibility conditions.

2. The 2014 Written Summary was not provided to the District Manager by May 31, 2015 as required by Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the Air Facility Inspection the following actions are required to be addressed:

1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.

2. By May 31, 2016, the Facility must submit the 2014 Written Summary to the undersigned Inspecting Officer

1. 1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.
2. 2. By May 31, 2016, the Facility must submit the 2014 Written Summary to the undersigned Inspecting Officer

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

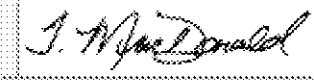
● Applicable ○ Not Applicable
8383-A7MRXR

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2016/03/17
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2016/03/30
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Michael Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(519) 663-4446 **ext**104	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (the "Facility") is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing, through aerobic composting, of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The purpose of the inspection is to assess compliance with the Facility's Environmental Compliance Approval Number 2766-7HEPSZ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 347 under the above referenced *Act*. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Nick Pora, Plant Manager.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions to promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and processed organic waste. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The processed organic waste size material is placed in the compost curing area where it is required to cure for 21 days and subsequently tested to ensure it meets all requirements under Environmental Compliance Approval Number 2766-7HEPSZ and the Ontario Compost Quality Standards. Upon achieving the requirements of the approval and the standards, the material is deemed

finished compost and removed from the site for use in accordance with the Ontario Compost Quality Standards. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

The Facility started accepting organic material at the Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa Source Separated Organics collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the source separated organic waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the source separated organics and sending it to Orgaworld in April 2010. The Facility receives additional source separated organics from the industrial, commercial and institutional sector, in plastics, which started in February 2015. Environmental Compliance Approval Number 2766-7HEPSZ allows for the receipt of source separate organics in plastic as a result of an Environmental Review Tribunal decision which was reflected in an notice to Environmental Compliance Approval Number 2766-7HEPSZ on February 6, 2015.

It should be noted that the Facility met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the *Environmental Protection Act*) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, the Facility ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed the Facility to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-Agricultural Source Material Plans. As of mid 2013, the Facility has worked with their clients in obtaining Non-Agricultural Source Material Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the *Environmental Protection Act* for the transportation of the 12-20 material.

On July 1, 2015 the Ministry of the Environmental and Climate Change implemented the entire Ontario Compost Quality Standards for the remaining standards for foreign matter content, compost maturity and compost labelling. In 2013 the Facility implemented Phase I of the Ontario Compost Quality Standards for metals in compost, quality of feedstock and pathogens. It was known through discussion with the Facility that the implementation of Phase II Ontario Compost Quality Standards would pose challenges for the production of AA compost given the requirements of the Ontario Compost Quality Standards. The challenges included compost technology and operations at the Site, capacity for the storage and curing of processed organic waste, and duration of time needed to meet the new requirements. As a result, the Ottawa District provided the Facility an opportunity to submit a Voluntary Abatement Plan to address the challenges and provide an abatement program to demonstrate the Facility's commitment to comply with the Ontario Compost Quality Standards and a strategy to land apply processed organic waste to reduce risk to human health and the environment. The Voluntary Abatement Plan submitted provided a program in which previously deemed unrestricted compost (pre-July 2015) to be land applied to agricultural operations within the legislative framework of the *Nutrient Management Act* and Non-agricultural Source Material. The Voluntary Abatement Plan outlined the Facility would enter into an agreement with the agricultural operators to submit a Non-agricultural Source Material Plan for land application of processed organic waste generated at the Site to the Ministry of Agriculture, Food and Rural Affairs and in the meantime, submit the supporting documentation to the Ottawa District Office to allow for land application prior to receiving approval under the Non-agricultural Source Material process. In addition to the Voluntary Abatement Plan, the Facility was required to retain the services of approval waste management systems to transport processed organic waste from the point of generation to the application site. The Ministry of the Environment and Climate Change reviewed and accepted the Voluntary Abatement Plan for period of six (6) months ending on December 31, 2015. To date, no off-site or environmental impacts were reported to the ministry during the duration of the Voluntary Abatement Plan which is now expired. Any further land application of processed organic waste is subject to the approval process outlined in the *Nutrient Management Act* .

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Facility staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice 3 - Issued on February 6, 2015
Details - The amendment was issued to reflect the decision of the Environmental Review Tribunal descision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The descision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

2.1 SITE OPERATION:

Specifics:

SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2014 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined in Environmental Compliance Approval Number 2766-7HEPSZ. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2014 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional

sector after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2014 Annual Report provided the monthly and annual tonnages for the 2014 operating year As part of the inspection the Inspecting Officer requested the mass balance for the 2015 operating year to further determine compliance with conditions outlined in Environmental Compliance Approval Number 2766-7HEPSZ which included the above referenced condition. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in Environmental Compliance Approval Number 2766-7HEPSZ.

No issues identified.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2014 Annual Report states that in the 2014 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in Environmental Compliance Approval Number 2766-7HEPSZ was also confirmed by the Facility staff during the inspection.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the composting process were located inside the confines of the Processing Building.

No issues identified.

(6) Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.
(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2014 Annual Report states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the Inspecting Officer was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment and Climate Change did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2014 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice, previously referred to as Notice #3, to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector. Since the inclusion of the new source of organic waste no complaints or issues were reported to the ministry. The Inspecting Officer reviewed the sample analysis for the new source of organic waste which was deemed compliant with the

Ontario Compost Quality Standards for quality of feedstock.

3. SIGNS

(1) **Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:**

(a) **name of the Owner;**
(b) **this Certificate number;**
(c) **hours during which the Site is open;**
(d) **waste types that are approved to be accepted at the Site;**
(e) **Owner's telephone number (a hotline) to which complaints may be directed;**
(f) **Owner's twenty-four hour emergency telephone number (if different from above);**
(g) **a warning against unauthorized access;**
(h) **a warning against dumping at the Site.**

(2) **The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.**

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued Environmental Compliance Approval Number 2766-7HEPSZ by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) **All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.**

(2) **The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.**

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) **Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:**

(a) **loading/unloading area of the leaf & yard waste storage pad;**
(b) **parking lot area for evidence of run-off from the leaf & yard waste storage pad;**
(c) **Processing Building and the air pollution control equipment;**
(d) **security fence and property line;**
(e) **on-site roads for presence of leaks and drips from the waste delivery trucks;**
(f) **presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;**
(g) **on and off-site litter;**
(h) **presence of vector and vermin.**

At the time of the inspection the Inspecting Officer requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The Inspecting Officer also reviewed procedures provided by the Facility located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system. The Facility must ensure that the equipment and site inspections & maintenance requirements are updated promptly to reflect the inclusion of new equipment associated with the processing of organic waste. It was noted during the inspection that the Site acquired a new diesel powered shredder to replace the existing electrical shredder. The Facility must ensure the equipment and site inspections & maintenance requirements of Condition 6 of Environmental Compliance Approval Number 2766-7HEPSZ is updated to reflect this new equipment.

**** Please see Section 5.0 of this Report****

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also requested during the inspection and was provided to the Inspecting Officer for review. No issues identified during the review of the document except to note the requirements to keep updated to reflect the inclusion of new equipment associated with waste processing and new sources of organic waste (i.e. diesel powered shredder).

****Please see Section 5.0 of this Report****

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste. No issues identified.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the Inspecting Officer inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that new sources/streams of incoming organic waste began in February 2015 from the Industrial, Commercial and Institutional Sector. Sample analysis documentation was provided and determined to be compliant with the Ontario Compost Quality Standards. In February of 2015 Orgaworld requested and received approval from the ministry to start accepting the new source of organic waste received in plastic bags. No issues identified.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the Inspecting Officer requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The Inspecting Officer confirmed incoming feedstock complied with the Ontario Compost Quality Standards through information requested following the inspection.
No issues identified.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the Inspecting Officer requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of Environmental Compliance Approval Number 2766-7HEPSZ *and the Ontario Compost Quality Standards. The Inspecting Officer was provided sample analysis for the finished compost. Observations made during the review are as follows:*

- *Finished compost was sampled and collected as per the frequency outlined in* Environmental Compliance Approval Number 2766-7HEPSZ
- *Finished compost was tested at the frequency and for the parameters outlined in the Ontario Compost Quality Standards and in accordance with Schedule B of* Environmental Compliance Approval Number 2766-7HEPSZ

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the Inspecting Officer requested information on how the Facility complies with the above condition. The Inspecting Officer was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. Inspecting Officer was able to verify this information by being provided screenshots of the SCADA system for the above process monitoring parameters.

No issues were identified.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, the Facility provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2014 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2014 Annual Report, the

Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2014 Annual Report confirms that during the 2014 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2014 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. It was noted in the review of the Site Inspections that on and off-site litter was deemed "Not OK" and follow-up action is to be taken as indicated on the form which was not indicated to be complete on the daily inspection checklist.

- 2015 - April 1st, 7th, 9th & 15ths
- 2015 - November 11th, 25,th, 27th & 30th

Please see Section 5.0 of this Report*

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts (inspection occurred in the winter therefore dust was not an issue. Inspecting Officer attends quarterly meetings at the Site and has not observed dust to be an issued on-site. The Facility retains a company to clean of the asphalt parking and on-site road areas if and when it is required. The Facility further provided

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the Inspecting Officer observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The Inspecting Officer confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the

fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) **The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:**

(a) **outline the responsibilities of the Site personnel;**
(b) **personnel training protocols;**
(c) **waste receiving and screening procedures;**
(d) **unloading, handling and storage procedures;**
(e) **waste processing procedures;**
(f) **sampling and testing procedures;**
(g) **Site inspections and recording procedures;**
(h) **the emergency response procedures;**
(i) **procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.**

At the time of the inspection the Inspecting Officer requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition with the exception of the inclusion of the diesel powered shredder that was installed as a replacement to the electric powered shredder.

See Section 5.0 of this Report*

(2) **A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.**

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) **Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:**

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. As part of the inspection the Inspecting Officer requested a copy. A revised copy (January 2016) of the document was provided and reviewed. No issues identified.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2014 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2014.

2.2 FINANCIAL ASSURANCE:

Specifics:

At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry. The last submission and ministry review of financial assurance was completed in 2015.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:
1. Daily Inspection Checklist reviewed indicated issues with on and off-site litter with no indication of corrective actions taken.

2. Revisions not completed for Operation & Maintenance Manual and Preventative Maintenance Inspection Program for the inclusion of the new diesel powered shredder.

5.0 ACTION(S) REQUIRED

The following actions are to be taken by Orgaworld Canada Ltd. to address observations noted in the above inspection report:

1. By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report.

2. By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Applicable
0321-A85RET

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2016/03/17
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2016/03/31

Signature:

File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 630-6324 **ext**	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and

information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on January 29th, 2015.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval # 7021-7HQNDE ("ECA") and applicable environmental legislation such as the Environmental Protection Act ("EPA") and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance and Tanya Minarik, Site Supervisor.

An Industrial Sewage Works Inspection and Waste Disposal (Processing) Inspection were also carried out at the site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with the issued ECA which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements.

The Facility was issued a Limited Flexibility Environmental Compliance Approval (ECA # 7021-7HQNDE) on September 16, 2009. The inspection is focused on information and data collected during the 2013 operating year.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Orgaworld staff provided a tour to the IO which incorporated a detailed overview of the air pollution control devices that treat the emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure proper treatment of emissions. The system is described below:

1.) Fans are located throughout the building, these fans suck air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and

stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the Facility operates in a water negative environment in the summer and as such leachate generated in the operation of the Facility gets re-circulated within the process. If the Facility needs to bring in extra water they take it from the stormwater management pond on-site.

There are several odour ports throughout the Facility.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced September of 201. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns detected.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear recently cleaned and the trucks on-site were not generating dust. No concerns observed.

Odour: Prior to arriving at the Site to conduct the inspection, the IO observed the stack and wind direction to determine if emission from the stack (odours) could be detected downwind of the Facility. After completing the inspection the IO completed a second odour survey downwind of the Facility. No odours were detected during both separate odour surveys. Wind direction was from the SE and odour survey

locations were located on Somme Street & Sappers Ridge.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection nor experienced when completing odour surveys in the surround area.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

On September 16, 2009, the Facility was issued a Comprehensive Environmental Compliance Approval No. 7021-7HQNDE for the operation of the equipment that emits contaminants into the natural environment. The equipment approved under the ECA does not meet the requirements of the Environmental Activity Sector Registry.

The comprehensive environmental compliance approvals allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

In 2014 Orgaworld submitted an application to renew the limited operational flexibility of their Environmental Compliance Approval (Basic Comprehensive) and is currently being reviewed by the ministry.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

During the district file review prior to completing the inspection, no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:
June 2010
December 2010
July 2011
December 2011
November 2012
November 2013
November 2014

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements. The last source test was completed in November of 2014.

A report on the outcome of the source testing was provided to the ministry in January of 2015 and will be reviewed by the ministry's Standards Development Branch. Comments will be provided to the Facility once complete.

The next source testing is scheduled for November 2015.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Annual Report:

Condition 5 of the ECA requires the Facility to submit a Written Summary Report of activities undertaken in the previous calendar year by May 31 of each year. On April 28, 2014 the Written Summary Report for the 2013 operating year was submitted to the ministry. The following observations were made during the review of the report:

- No modifications were made during the 2013 operating year that would change the previously calculated concentrations at the Point of Impingement (POI) for any Compounds of Concerns (COC) or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception (POR)
- The Facility was not required to submit a Maximum Concentration Level Assessment to the MOECC during the 2013 operating year
- No changes were made to the MOECC's POI limits that impacted the Facility
- No changes in emission rates in 2013

- Emission Summary Table illustrates contaminants were below the MOECC POIs
- Acoustic Summary Table illustrates noise levels were below the performance limits
- The Facility provided a signed statement acknowledging compliance with the ECA for the 2013 operating year

No issues were identified in the review of the 2013 Written Summary Report.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

The ESDM Report does not show an exceedance of a MOECC standards, guidelines, upper risk thresholds, or limit in the ECA.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer (IO) requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

The IO was informed that the above referenced documents are current and no changes have been made requiring revisions.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Maintenance:

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

Environmental Complaints:

The Facility has developed a document to address any complaint received as a result of the Site's operation. The document outlines the keystone information needed to record details of the complaint as well as follow-up actions taken to address the problem. The Facility records these complaints in a binder located at the Site. A copy of the procedure for recording environmental complaints was provided to the IO at the time of the inspection.

The Facility has not received a complaint as a result of the operations at the Site for the 2013 operating year,

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was reviewed during the inspection process.

No spills were reported to the ministry for the 2013 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completing the Air Facility Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld at this time.

6.0 OTHER INSPECTION FINDINGS

None

7.0 INCIDENT REPORT

○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2015/02/12
Signature:	

REVIEWED BY:

District Supervisor:	

Name:	Jena Leavoy
District Office:	Ottawa District Office
Date:	2015/02/13
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 663 4446 **ext**104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on January 29, 2015 which incorporated paper work review and a tour of the operations at the

Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA) and applicable environmental legislation such as the Ontario Water Resources Act (OWRA).

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat)

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA) for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

As part of the inspection process the IO reviewed the information provided in the 2013 Annual Report (AR) which outlines the
sampling program completed for the 2013 operating year (date, parameters, analysis). The AR stated that the stormwater
management pond did not have a discharge event which would require the effluent to meet the Table 2 -

Trigger Parameters.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2013	Year 2 2014	Year 3 2015
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2013 operating year. The review noted that the SWMP was inspected and the associated records were available for review during the inspection period.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works,* carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the IO reviewed the 2013 Annual Report. Sampling data collected during the 2013 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison comply with Table 1 outlined above. Please note, Orgaworld was directed during a previous ministry inspection that the monthly sampling of the SWMP was not required during months where ice cover occurs due to health & safety reasons. Sampling events did not occur during December, January, February and March of 2013. As part of the previous inspection Orgaworld was also to include temperature as it was not completed in 2012. The IO confirmed that the field parameter temperature was collecting in the 2013 operating year.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

Summary: The Facility has completed the groundwater monitoring for the 2013 operating year. A copy of both the 2013 report and Groundwater Assessment and Work Plan was provided to the Ottawa District Office in March of 2014 and was reviewed by the ministry's Technical Support Section. Groundwater and surface water comments were provided to the Facility and the Facility is currently implementing the actions identified in the Groundwater Assessment and Work Plan as well as ministry recommendations.

- In July of 2014 Orgaworld submitted a Groundwater Assessment and Work Plan to address elevated levels of contaminants (ammonia, iron, manganese, dissolved organic carbon, sulfate, total dissolved solids) and to continue working towards compliance with Condition 9(8) of ECA Number 7251-8GKRPD which requires Orgaworld to establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Monitoring Program is to be submitted to the MOECC along with an application to amend the ECA. Currently, Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by historic conditions, off-site operations and conditions relating to composting operations. The scope of the report is to provide results of the pre & post monitoring data and to outline a path forward to address the groundwater quality concerns.
- Groundwater and Surface Water reviews were completed and submitted to Orgaworld in 2014. Both Technical Support Review Memorandums support the Groundwater Assessment and Work Plan proposed by Orgaworld with the addition of recommendations to immediately begin surface water quality monitoring to be collected at upgradient and downgradient locations for specific parameters outlined in the memorandum.
- Orgaworld has reviewed the TSS memorandums and is in the process of implementing the items outlined in the Groundwater Assessment and Work Plan.
- At the time of the inspection Orgaworld Staff informed the IO the company is in the process of retaining qualified licensed well drillers to install the monitoring well.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

In March 2014, the Company submitted the 2013 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2013 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011) as stated in previous reports. No addition operating problems were encountered requiring corrective actions to be taken. Berm inspections were completed in 2013 which did not note any additional remediation work required.

- Orgaworld did not encounter any operating issues or problems during the 2013 year.
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works.
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2013 operating year.
- No calibration or maintenance of effluent monitoring equipment was completed in the 2013 operating year as the pond level reading device does not require calibration.
- The groundwater/surface water monitoring and compliance report, prepared by Conestoga-Rovers & Associates (CRA), was submitted in March of 2013. IO submitted the report to the ministry's Technical Support Section for surface water and groundwater review.
- Surface water and Groundwater comments were received and provided to the Facility on September 13, 2013 via email. IO was informed during the inspection that the review comments were provided to their consultant (CRA) and will implement the recommendations outlined in the review.

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or the Facility)
- No discharge events occurred at the SWMP in the 2013 operating year

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
No effluent discharge at the time of the inspection

2.8 FINANCIAL ASSURANCE

The Facility is not required to submit financial assurance for the operation of the approved industrial sewage works.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?

No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The IO confirmed this information during the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

Previous non-compliance issues have been addressed. The Company is currently in the process of addressing groundwater and surface water impacts.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:
Non-Compliance with Condition 9(8) of ECA Number 7251-8GKRPD which requires Orgaworld to establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations.
- The Company is currently in the process of addressing groundwater and surface water impacts. Additional information pertaining to the Groundwater Monitoring Program is outlined in Section 2.4 of this Report.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following action is required to be addressed by Orgaworld as a result of the above completed Industrial Sewage Works Inspection:

Condition 9(8) - Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.
(8) After **two (2) years** of operation of the *Works,* the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

1. Environmental Compliance Approval No. 7251-8GKRPD Condition 9(8) - As a result of the Groundwater Assessment and Work Plan submitted to the ministry, Orgaworld is required to implement the Work Plan as described in the report as well as implement the recommendations provided by the ministry's Technical Support Section (Groundwater & Surface Water Memorandums). It has been reported that Orgaworld is in the process of implementing the Groundwater Assessment and Work Plan as well as the recommendations provided by the ministry.

1. Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

6.0 OTHER INSPECTION FINDINGS

There are no other inspection findings to report at this time.

7.0 INCIDENT REPORT

Applicable
8087-9TVQL9

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2015/02/19**
Signature

REVIEWED BY:
District Supervisor:
Name: **Jena Leavoy**
District Office: **Ottawa District Office**
Date: **2015/02/25**

Signature:



File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 630-6324 **ext**	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (referred to Orgaworld Ottawa) is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (aerobic composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

It should be noted that Orgaworld Ottawa met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the Environmental Protection Act) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste

generated from organic processing facilities (i.e. composting facilities). As a result, Orgaworld Ottawa ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed Orgaworld Ottawa to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-agricultural Source Material (NASM) Plans. As of mid 2013, Orgaworld Ottawa has worked with their clients in obtaining NASM Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the Environmental Protection Act for the transportation of the 12-20 material.

Orgaworld Ottawa first started accepting organic material at their Site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa Source Separated Organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the Site's compliance with their waste ECA and applicable environmental legislation such as the Environmental Protection Act (EPA) and Ontario Regulation 347 under that same act. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Tanya Minarik, Supervisor.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld Ottawa staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

2.1 SITE OPERATION:

Specifics:

2. <u>SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE</u>

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2013 Annual Report (2013 AR) states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

Note: Orgaworld Ottawa is currently in discussions with the Ministry of the Environment and Climate Change for the acceptance of a new source of Organic Waste collected in plastic from the IC&I Sector.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2013 AR states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2013 AR provided the monthly and annual tonnages for the 2013 operating year. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2013 AR states that in the 2013 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and

phases of compost were located inside the confines of the Processing Building.

(6) Organic Waste storage duration is limited to the following:

(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.

(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2013 AR states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the IO was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2013 AR stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of the issued ECA by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program, the Facility to train staff on conditions outlined in the environmental compliance approvals for the Site. Of the training records reviewed, no issues were identified.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that the Site has installed a fence with a lockable gate to restrict access to the Site The IO confirmed with Orgaworld staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin.

At the time of the inspection the IO requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The IO also reviewed procedures provided by Orgaworld Ottawa located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system.

(2) The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO and were observed to be sufficient. The IO also requested copies of the inspection reports from the inspection program. The IO observed the inspection reports to be sufficient in determining the equipment is operating in good working order at all times and that no off Site impacts are occurring. It should also be noted that no environment complaints have been received by the company or the ministry during the inspection period for the operations at the Orgaworld Ottawa Site.

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also

requested during the inspection and was provided to the IO for review. No issues identified during the review of the document. No changes were made to the preventative maintenance program.

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

At the time of the inspection the IO observed incoming organic waste and the equipment used in handling of the incoming organic waste. The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the IO inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that no new sources/streams of incoming organic waste has been accepted since operation at this time.

Note: Orgaworld Ottawa is currently in discussions with the Ministry of the Environment and Climate Change for the acceptance of a new source of Organic Waste collected in plastic from the IC&I Sector.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the IO requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The IO requested a copy of the month of January, February, March, May, July, September, November & December to compare against Schedule B of the ECA. Analytical results were provided to the IO which confirmed compliance.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the IO requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of the ECA and the Ontario Compost Quality Standards. The IO was provided sample analysis for the finished compost. Observations made during the review are as follows:

- *Finished compost was sampled and collected as per the frequency outlined in the ECA*
- *Finished compost was tested for the parameters outlined in Schedule B of the ECA with the exception of polychlorinated biphenols (PCBs) which did not appear to be analyzed for the sample results provided during the inspection*
- *Finished compost was tested for maturity using the Dewar Method for temperature variance. The results of the Dewar Method were observed to be in compliance with maturity criteria.*

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the IO requested information on how Orgaworld complies with the above condition. The IO was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. IO was able to verify this information by observing the SCADA system at the time of the inspection. The Facility provided screen shots of the SCADA system after the inspection as a request by the IO.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, Orgaworld Ottawa provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2013 AR, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Orgaworld staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. The City of Ottawa vehicle appear to be recently cleaned and odours could not be detected. As stated in the 2013 AR, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2013 AR confirms that during the 2013 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on

the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2013 AR states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the IO walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

Orgaworld retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts (inspection occurred in the winter therefore dust was not an issue. IO attends quarterly meetings at Orgaworld and has not observed dust to be an issued on-site. The Facility retains a company to clean of the asphalt parking area if and when it is required.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the IO observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The IO confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. <u>OPERATIONS MANUAL & STAFF TRAINING</u>

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;

(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition. A copy of the manual was also available during the district file review.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO reviewed a training program for one of the staff at the Facility. The training program reviewed addresses the requirements of this condition. All training programs for staff are kept electronically as well as a hard copy.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

At the time of the file review prior to the inspection, the IO reviewed the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. A copy of the procedure will remain on file at the

district office. A copy of the document was also available on-site at the time of the inspection.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the AR was found to be complete as required. The AR was submitted to the Ottawa District Office in March of 2013.

2.2 FINANCIAL ASSURANCE:

Specifics:
At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry.

2.3 SITE SERVICE AREA:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

As a result of the file review completed prior to conducting the inspection at Orgaworld Ottawa, no ongoing non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld at this time.

6.0 OTHER INSPECTION FINDINGS

None

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2015/02/09
Signature	

REVIEWED BY:

District Supervisor:
Name: Jena Leavoy
District Office: Ottawa District Office
Date: 2015/02/13

Signature:



File Storage Number: SI OT GL HA

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 663 4446 **ext** 104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on December 19th, 2012.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval # 7021-7HQNDE ("ECA") and applicable environmental legislation such as the Environmental Protection Act ("EPA") and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Acting Site Operations Manager and Tanya Minarik, Site Supervisor.

An Industrial Sewage Works Inspection and Waste Disposal (Processing) Inspection were also carried out at the site. See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with the issued ECA which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements.

The Facility was issued a Limited Flexibility Environmental Compliance Approval (ECA # 7021-7HQNDE) on September 16, 2009. The inspection is focused on information and data collected during the 2012 operating year.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Orgaworld staff provided a tour to the IO which incorporated a detailed overview of the air pollution control devices that treat the emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure proper treatment of emissions. The system is described below:

1.) Fans are located throughout the building, these fans suck air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the Facility operates in a water negative environment in the summer and as such leachate generated in the operation of the Facility gets re-circulated within the process. If the Facility needs to bring in extra water they take it from the stormwater management pond on-site.

There are several odour ports throughout the Facility.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced November 25, 2012. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns detected.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear recently cleaned and the trucks on-site were not generating dust. No concerns observed.

Odour: Prior to arriving at the Site to conduct the inspection, the IO observed the stack and wind direction to determine if emission from the stack (odours) could be detected downwind of the Facility. After completing the inspection the IO completed a second odour survey downwind of the Facility. No odours were detected during both separate odour surveys. Wind direction was from the SE and odour survey locations were located on Somme Street & Sappers Ridge.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration

issues were detected during the inspection nor experienced when completing odour surveys in the surround area.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16	Yes	

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

On September 16, 2009, the Facility was issued a Comprehensive Environmental Compliance Approval No. 7021-7HQNDE for the operation of the equipment that emits contaminants into the natural environment. The equipment approved under the ECA does not meet the requirements of the Environmental Activity Sector Registry.

The comprehensive environmental compliance approvals allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

During the district file review prior to completing the inspection, no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:
June 2010
December 2010
July 2011
December 2011
November 2012
November 2013

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements. The last source test was completed in November of 2012.

A report on the outcome of the source testing will be provided to the ministry in January of 2014 and will be reviewed by the ministry's Standards Development Branch. Comments will be provided to the Facility once complete.

The next source testing is scheduled for November 2014.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Annual Report:

Condition 5 of the ECA requires the Facility to submit a Written Summary Report of activities undertaken in the previous calendar year by May 31 of each year. On April 28, 2013 the Written Summary Report for the 2012 operating year was submitted to the ministry. The following observations were made during the review of the report:

- No modifications were made during the 2012 operating year that would change the previously calculated concentrations at the Point of Impingement (POI) for any Compounds of Concerns (COC) or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception (POR)
- The Facility was not required to submit a Maximum Concentration Level Assessment to the MOE during the 2012 operating year
- No changes were made to the MOE's POI limits that impacted the Facility
- No changes in emission rates in 2012
- Emission Summary Table illustrates contaminants were below the MOE POIs
- Acoustic Summary Table illustrates noise levels were below the performance limits
- The Facility provided a signed statement acknowledging compliance with the ECA for the 2012 operating year

No issues were identified in the review of the 2012 Written Summary Report.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

The ESDM Report does not show an exceedance of a MOE standard, guideline, upper risk threshold, or limit in the ECA.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer (IO) requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Maintenance:

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

Environmental Complaints:

The Facility has developed a document to address any complaint received as a result of the Site's operation. The document outlines the keystone information needed to record details of the complaint as well as follow-up actions taken to address the problem. The Facility records these complaints in a binder located at the Site. A copy of the procedure for recording environmental complaints was provided to the IO at the time of the inspection.

The Facility has not received a complaint as a result of the operations at the Site for the 2012 operating year,.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was reviewed during the inspection process.

No spills were reported to the ministry for the 2012 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous or ongoing non-compliance items to address.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

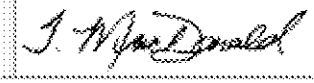
○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2013/12/09
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2013/12/10
Signature:	

File Storage Number:	SI OT GL HA 210

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 630 6324 **ext**104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on November 21, 2013 which incorporated paper work review and a tour of the operations at the Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA) and applicable environmental legislation such as the Ontario Water Resources Act (OWRA).

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA -ISW) for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high

channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ?C

As part of the inspection process the IO reviewed the information provided in the 2012 Annual Report (AR) which outlines the
sampling program completed for the 2012 operating year (date, parameters, analysis). The AR stated that the stormwater
management pond did not have a discharge event which would require the effluent to meet the Table 2 - Trigger Parameters.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2010	Year 2 2011	Year 3 2012
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2012 operating year. The review noted that the soil berm was completed as outlined in the previous Industrial Sewage Works Inspection Report and the SWMP inspections, completed by the Facility, and were recorded and available for review at the time of the inspection.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
No

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the

IO reviewed the 2011 Annual Report. Sampling data collected during the 2011 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison is outlined below:

- Monthly samples were not collected for the months of January, February, and December 2012. The IO was informed that monthly samples were not collected for the above noted months due to health and safety concerns.

- The field parameter temperature did not appear to be measured during sample collection as the data provided to the IO did not include temperature. Temperature was also not measured and reported during the previous inspection.

****Please see Section 5.0 of this Report****

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2012 operating year. A copy of the 2012 report was provided to the Ottawa District in March 2013 and is currently under review by the ministry's Technical Support Section and comments will be provided to the Facility once complete (anticipated completion date January 2014)..

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus,

mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

In March 2013, the Company submitted the 2012 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2012 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011) as stated in previous reports. No addition operating problems were encountered requiring corrective actions to be taken
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2012 operating year
- No calibration or maintenance of effluent monitoring equipment was completed in the 2011 operating year as the pond level reading device does not require calibration
- The groundwater/surface water monitoring and compliance report, prepared by Conestoga-Rovers & Associates (CRA), was submitted in March of 2013. IO submitted the report to the ministry's Technical Support Section for surface water and groundwater review
- Surface water comments were received and provided to the Facility on September 13, 2013 via email. IO was informed during the inspection that the review comments were provided to their consultant (CRA) and will implement the recommendations outlined in the review
- Effluent Monitoring Results - Appendix 1 - the results from the effluent monitoring comparison is outlined in Section 2.4 of this Report
- Groundwater review is still ongoing and will be provided to the Facility once received

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or the Facility)
- No discharge events occurred at the SWMP in the 2012 operating year

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
No effluent discharge at the time of the inspection

N/A

2.8 FINANCIAL ASSURANCE

The Facility is not required to submit financial assurance for the operation of the approved industrial sewage works.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The IO confirmed this information during the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

The field Parameter temperature was not collected nor reported during the 2012 operating year. The 2012 Annual Report Appendix 1 provided analytical results which did not include temperature results. Temperature was not measured and reported during the previous inspection period.

Was there any indication of a potential for environmental impairment during the inspection and/or the review

of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following action item is required to be address, **by no later than January 3, 2014**, by Orgaworld Ottawa and submitted to the undersigned:

1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

1. 1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

6.0 OTHER INSPECTION FINDINGS

In March of 2013 the Facility submitted the 2012 Annual Report which was sent to the Ministry of the Environment's Technical Support Section (Surface Water & Groundwater) for review and comment. On September 13, 2013 Surface Water comments were provided to the Facility for implementation of the recommendations made by B.W. Metcalfe, Senior Environmental Officer, Water Resources Unit, Surface Water Group. The IO was informed at the time of the inspection that the memorandum was sent to the Facility's consultant (CRA) to implement the recommendations outlined in the memorandum.

Groundwater review is anticipated to be completed in early January 2014. Once received the IO will provide the Facility with the comments and recommendations made by the Groundwater Unit, Technical Support Section of the Ministry of the Environment.

7.0 INCIDENT REPORT

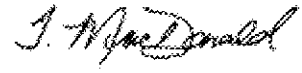
Applicable
2746-9E3LUL

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**

District Office: Ottawa District Office
Date: 2013/12/04
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2013/12/06

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 663-4446 **ext**104	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (referred to Orgaworld Ottawa) is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (aerobic composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

It should be noted that Orgaworld Ottawa met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the Environmental Protection Act) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, Orgaworld Ottawa ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed Orgaworld Ottawa to continue

providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-agricultural Source Material (NASM) Plans. As of mid 2013, Orgaworld Ottawa has worked with their clients in obtaining NASM Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the Environmental Protection Act for the transportation of the 12-20 material.

Orgaworld Ottawa first started accepting organic material at their Site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the Site's compliance with their waste ECA and applicable environmental legislation such as the Environmental Protection Act (EPA) and Ontario Regulation 347 under that same act. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer, acting Plant Manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld Ottawa staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval No. 2766-7HEPSZ

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

2.1 SITE OPERATION:

Specifics:

2. <u>SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE</u>

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;

(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2012 Annual Report (2012 AR) states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2012 AR states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347. Orgaworld, required by specific conditions in the ECA, inspects incoming organic waste to ensure the above noted waste types are not accepted.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2012 AR provided the monthly and annual tonnages for the 2012 operating year. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2012 AR states that in the 2012 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of compost were located inside the confines of the Processing Building.

(6)Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.

(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2012 AR states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the IO was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2012 AR stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of the issued ECA by

posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program, the Facility to train staff on conditions outlined in the environmental compliance approvals for the Site. Of the training records reviewed, no issues were identified.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that the Site has installed a fence with a lockable gate to restrict access to the Site The IO confirmed with Orgaworld staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin.

At the time of the inspection the IO requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The IO also reviewed procedures located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system.

(2) The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO and were observed to be sufficient. The IO also requested copies of the inspection reports from the inspection program. The IO observed the inspection reports to be sufficient in determining the equipment is operating in good working order at all times and that no off Site impacts are occurring. It should also be noted that no environment complaints have been received by the company or the ministry during the inspection period.

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also requested during the inspection and was provided to the IO for review. No issues identified during the review of the document.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

At the time of the inspection the IO observed incoming organic waste and the equipment used in handling of the incoming organic waste. The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the IO inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that no new sources/streams of incoming organic waste has been accepted since operation at this time. The Facility has been approached by a federal entity for the composting of shredded paper. The Facility has yet to accept this new waste stream however are aware of the requirements of the above condition to ensure the waste is characterized in accordance with the ministry's regulatory requirements for sampling and testing prior to accepting this new waste source.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the IO requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The IO requested a copy of the month of September to compare against Schedule B of the ECA and was provide analytical results from samples collected on September 30th, 2013. The following observations were made during the review:

- *Sample collection of incoming organic waste occurred on September 30th, 2013 and was sent to Caduceon Environmental Laboratories for analysis*
- *Incoming organic waste sample was analyzed for Trace Elements and sample results were in compliance with the concentration limits in Schedule B*
- *Incoming organic waste is required to be analyzed for Organic Chemicals polychlorinated biphenols (PCBs) however sample results indicate the incoming organic waste was not analyzed for PCBs.*

****Please see section 5.0 of this Report for actions required by Orgaworld****

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or

(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or

(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the IO requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of the ECA and the Ontario Compost Quality Standards. The IO was provided sample analysis for the finished compost. Observations made during the review are as follows:

- *Finished compost was sampled and collected as per the frequency outlined in the ECA*
- *Finished compost was tested for the parameters outlined in Schedule B of the ECA with the exception of polychlorinated biphenols (PCBs) which did not appear to be analyzed for the sample results provided during the inspection*
- *Finished compost was tested for maturity using the Dewar Method for temperature variance. The results of the Dewar Method were observed to be in compliance with maturity criteria.*

****Please see Section 5.0 of this Report for actions required by Orgaworld Ottawa****

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the IO requested information on how Orgaworld complies with the above condition. The IO was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. IO was able to verify this information by observing the SCADA system at the time of the inspection. The Facility provided screen shots of the SCADA system after the inspection as a request by the IO.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, Orgaworld Ottawa provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2012 AR, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Orgaworld staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. The City of Ottawa vehicle appear to be recently cleaned and odours could not be detected. As stated in the 2012 AR, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site

boundary. The 2012 AR confirms that during the 2012 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2012 AR states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the IO walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

At the time of the inspection the IO requested procedures and records of vermin and vector control. The IO was informed that the Facility retains the services of Holistech and conducts monthly site visits so the Facility can control vermin and vector.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts. The Facility retains a company to clean of the asphalt parking area if and when it is required.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the IO observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The IO confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. <u>OPERATIONS MANUAL & STAFF TRAINING</u>

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;

(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition. A copy of the manual was also available during the district file review.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO reviewed a training program for one (3) of the staff at the Facility. The training program reviewed addresses the requirements of this condition. All training programs for staff are kept electronically.

10. <u>EMERGENCY RESPONSE AND CONTINGENCY PLAN</u>

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

At the time of the file review prior to the inspection, the IO reviewed the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. A copy of the procedure will remain on file at the

district office. A copy of the document was also available on-site at the time of the inspection.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the AR was found to be complete as required. The AR was submitted to the Ottawa District Office in March of 2013.

2.2 FINANCIAL ASSURANCE:

Specifics:

At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes

per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

As a result of the file review completed prior to conducting the inspection at Orgaworld Canada, no ongoing non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
Yes

Specifics:

Incoming Organic Waste & Finished Compost - Sample results indicate Orgaworld did not complete the required analysis as required by the ECA. Sample parameter polychlorinated biphenols (PCBs), as outlined in Schedule B of the ECA, were not observed to be completed in the samples results provided to the IO as part of the inspection.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following actions are required to be completed by Orgaworld Ottawa to ensure compliance with issued Environmental Compliance Approval No. 2766-7HEPSZ:

1. Effective immediately upon receiving the inspection, ensure all incoming organic waste and finished compost samples are analyzed for parameters outlined in Schedule B of the ECA.

2. By no later than December 12, 2013, provide the IO with copies of sample results from incoming organic waste and final compost for the months of March, June and October of 2013 to determine if sample results indicate further lack of sampling for polychlorinated biphenols (PCBs) parameter.

1. 1. Incoming Organic Waste - incoming organic waste is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter polychlorinated biphenols (PCBs).

2. 2. By no later than December 12, 2013, provide the IO with copies of sample results from incoming organic waste and final compost for the months of March, June and October of 2013 to determine if sample results indicate further lack of sampling for polychlorinated biphenols (PCBs) parameter

6.0 OTHER INSPECTION FINDINGS

None at this time

7.0 INCIDENT REPORT

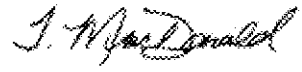
Applicable
0053-9DZLKX

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2013/12/03**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**
Date: **2013/12/06**

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: , Longitude:		
Contact Name:	Greg Mariotti	**Title:**	Site Manager
Contact Telephone:	(613) 822-2056 **ext**	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2011/09/19		
Inspection Start Date:	2012/12/19	**Inspection Finish Date:**	2012/12/19
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on December 19, 2012 which incorporated paper work review and a tour of the operations at the Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works ECA and applicable environmental legislation such as the Ontario Water Resources Act ("OWRA").

An Air Facility Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
Yes

Select the most important type of sensitive receptor.
None of the above

cold water stream

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT - issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA - issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD - issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA - ISW) for the following Industrial Sewage Works System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels,
discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay

at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and

appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	**Trigger Level (mg/L if not specified)**
Ammonia (uniozized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ?C

At the time of the inspection the IO reviewed the comparison data for the 2011 operating year to ensure discharges were in compliance with Table 2 - Trigger Parameters. It was noted during the file review and inspection that the Site did not discharge the SWMP to the natural environment therefore sampling as per Table 2 - Trigger Parameters were not required.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2011 operating year. The review noted that the soil berm was completed as outlined in the previous Industrial Sewage Works Inspection Report and the SWMP inspections, completed by the Facility, and were recorded and available for review at the time of the inspection.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?

Certificate of Approval/Permit

Does the facility meet sampling requirements?

No

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the IO reviewed the 2011 Annual Report. Sampling data collected during the 2011 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison is outlined below:

- Samples were not collected during the months of January and February
- Nitrites were not analysed for the month of April, May, August, September, October and December
- Nitrates were not analysed for the month of May and October
- BOD5 was not sampled for the months of November & December
- Chemical oxygen Demand was not analysed for the month of May and October
- Conductivity was not analysed for the months of March, April, May, June, July, August and October
- pH was not analysed for the months of April and May.
- Temperature was not analysed for the sampling program in 2011.
- Dissolved oxygen was not analysed for the months of March, April, May, June, July, August, September, October and November
- The parameter "Oil & Grease" was not analysed as a total but rather only for vegetable and animal products during the months of March, April, May, June, August, September, October, November and December

Please see Section 5.0 of this Report**

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the

monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has currently completed the groundwater monitoring for the 2011 & 2012 operating year. A copy of the 2012 report will be provided to the Ottawa District in March 2013 and will be reviewed by the ministry's Technical Support Section for comments.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

In March 2012, the Company submitted the 2011 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2011 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011). No addition operating problems were encountered requiring corrective actions to be taken.
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works (not including the remediation of the berm)
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2011 operating year.
- No calibration or maintenance of effluent monitoring equipment was completed in the 2011 operating year as the

pond level reading device does not require calibration.
- The groundwater/surface water monitoring and compliance report will be submitted in March of 2013 (being prepared by Conestoga-Rovers & Associates)
- Effluent Monitoring Results - Appendix 1 - the results from the effluent monitoring comparison is outlined in Section 2.4 of this Report

---

As part of the reporting requirements for the Facility, the Site must also comply with Condition 6 & 7 of the ECA-ISW regarding Operating and Maintenance of the industrial sewage works systems.

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public.

Note: At the time of the inspection the IO requested records of any environmental complaint received as a result of the operations at the Site. Facility representative stated that no complaints were received.

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
At the time of the inspection no Ministry of the Environment samples were collected as the industrial sewage works system was not discharging to the natural environment.

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste ECA #2766-7HEPSZ.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office or the Spills Action Centre.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No remaining non-compliance issues were identified during the file review prior to the completion of this inspection report.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

1.) The Site has failed to ensure all parameters outlined in Table 1 - Effluent Monitoring SWM Pond were sampled for each month.

2.) The Site has failed to ensure all monthly samples were collected for the 2011 operating year.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:

5.0 ACTION(S) REQUIRED

The following action items require addressing by the Facility and must be implemented upon receiving this Report:

1.) Ensure samples are collected on a monthly basis as required by ***Condition 5 - Surface Water Monitoring and Recording***

2.) Ensure monthly samples are analysed for the parameters outlined in ***Table 1 - Effluent Monitoring SWM Pond***

1. 1.) Ensure samples are collected on a monthly basis as required by Condition 5 - Surface Water Monitoring and Recording
2. 2.) Ensure monthly samples are analysed for the parameters outlined in Table 1 - Effluent Monitoring SWM Pond

6.0 OTHER INSPECTION FINDINGS

None at this time.

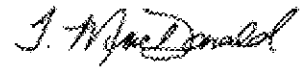
7.0 INCIDENT REPORT

Applicable
0153-93HL97

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2013/02/19
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2013/02/27

Signature: 

File Storage Number: SI OT OT HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: , Longitude:		
Contact Name:	Greg Mariotti	**Title:**	Site Manager
Contact Telephone:	(613) 822-2056 **ext**	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2011/09/19		
Inspection Start Date:	2012/12/19	**Inspection Finish Date:**	2012/12/19
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (the "Facility") is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste Environmental Compliance Approval No. 2766-7HEPSZ (ECA), for the production of compost. The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

Orgaworld Canada Ltd. first started accepting organic material at their Site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the Site's compliance with their waste ECA and applicable environmental legislation such as the Environmental Protection Act (EPA) and Ontario Regulation 347 under that same act. The inspection consisted of a district file review, site visit and discussions with Greg Mariotti, Site Manager and Michael

Rooke, Compliance Officer.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff throughout the year.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

ECA No. 2766-7HEPSZ - Issued on September 16, 2009

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

2.1 SITE OPERATION:

Specifics:

2. SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:
(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;
(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;
(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.
(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2011 Annual Report (2011 AR) states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2011 AR states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:

(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2011 AR provided the monthly and annual tonnages for the 2011 operating year. The data provided in the report confirms the Facility is in compliance with tonnage limits.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2011 AR states that in the 2011 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of compost were located inside the confines of the Processing Building.

(6)Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.
(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2011 AR states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the IO was informed that no environmental impacts or complaints were received as result of the composting operation at the Site.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2011 AR stated compliance with the above reference condition.

(10) All waste removed from the Site for final disposal shall only be disposed of at a site for which a Provisional Certificate of Approval has been issued by the Ministry and the site is approved to receive this type and quantity of waste.

The 2011 AR stated that all outgoing waste was sent to ministry approved waste disposal sites. The following are the waste disposal sites where waste was sent to in the 2011 operating year:
- Lacombe Environmental Services operating under ECA No. A461303
- City of Ottawa Trail Road Landfill operating under ECA No. A460716

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility has complied with Condition 3 of the issued ECA by posting a sign at the entrance of the Site outlining the above required information from a-h. No issues were identified with this information.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program at the Facility it is required that staff be trained on conditions outlined in the environmental compliance approvals for the Site.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that the Site has installed a fence with a lockable gate to restrict access to

the Site.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) **Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:**

(a) **loading/unloading area of the leaf & yard waste storage pad;**
(b) **parking lot area for evidence of run-off from the leaf & yard waste storage pad;**
(c) **Processing Building and the air pollution control equipment;**
(d) **security fence and property line;**
(e) **on-site roads for presence of leaks and drips from the waste delivery trucks;**
(f) **presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;**
(g) **on and off-site litter;**
(h) **presence of vector and vermin.**

At the time of the inspection the IO requested documents and procedures which speaks to the Facility's inspection program. The Facility provided the procedures which address the above condition. The IO also reviewed procedures located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system.

(2) **The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.**

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program at the Facility it is required that staff be trained on conditions outlined in the environmental compliance approvals for the Site.

The Facility also noted in the 2011 AR that no deficiencies were encountered in that operating year.

(3) **The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.**

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) **The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.**

At the time of the inspection a City of Ottawa collection vehicle arrived at the Site. The vehicle appeared not to be leaking nor dripping waste. Upon leaving the Site, no evidence of waste was observed at the exit gate of the Site.

(2) **The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.**

At the time of the inspection no truck washing operations were occurring. The City of Ottawa vehicle appear to be recently cleaned and odours could not be detected.

(3) **The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.**

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the IO walked a portion of the property and observed no litter issues.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

At the time of the inspection the IO requested procedures and records of vermin and vector control. The IO was informed that the Facility retains the services of Holistech and conducts monthly site visits so the Facility can control vermin and vector.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts. The Facility retains a company to clean of the asphalt parking area if and when it is required.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the IO observed compost to be stored within the confines of the Processing Building.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. <u>OPERATIONS MANUAL & STAFF TRAINING</u>

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;

(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition. A copy of the manual was also available during the district file review.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO reviewed a training program for one (1) of the staff at the Facility. The training program reviewed addresses the requirements of this condition. All training programs for staff are kept electronically.

10. <u>EMERGENCY RESPONSE AND CONTINGENCY PLAN</u>

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

At the time of the file review prior to the inspection, the IO reviewed the "Contingency Plan for Odours, Spills,

Fires, Power Failures and Labour Disruptions" procedure. A copy of the procedure will remain on file at the district office.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the AR was found to be complete as required. The AR was submitted to the Ottawa District Office in March of 2012.

2.2 FINANCIAL ASSURANCE:

Specifics:

Financial assurance has been submitted by the Facility.

2.3 SITE SERVICE AREA:

Specifics:

In accordance with Condition 2(1) the Site may only accept solid non -hazardous domestic, commercial, institutional or industrial Organic waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

The Facility is currently only accepting organic waste and leaf and yard waste for the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Specifics:

The Site is approved for the following:

" a 10.12-hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste..."

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No ongoing non-compliance issues were identified during the file review process.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld Canada Inc.

6.0 OTHER INSPECTION FINDINGS

None at this time

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2013/02/19
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2013/02/27

Signature: 

File Storage Number: SI OT OT HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: , Longitude:		
Contact Name:	Greg Mariotti	**Title:**	Site Manager
Contact Telephone:	(613) 822-2056 **ext**	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2011/09/19		
Inspection Start Date:	2012/12/19	**Inspection Finish Date:**	2012/12/19
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on December 19th, 2012.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval # 7021-7HQNDE (" ECA") and applicable environmental legislation such as the Environmental Protection Act ("EPA") and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Greg Mariotti, site operations manager and Michael Rooke, Compliance Officer.

An Industrial Sewage Works inspection and non -hazardous waste transfer processing inspection were also carried out at the site. See respective reports for details

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with the issued ECA which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements.

The Facility was issued a Limited Flexibility Environmental Compliance Approval (ECA # 7021-7HQNDE) on September 16, 2009. The inspection will be focused on information and data collected during the 2011 operating year.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Orgaworld staff provided a tour to the IO which incorporated a detailed overview of the air pollution control devices that treat the emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure proper treatment of emissions. The system is described below:

1.) Fans are located throughout the building, these fans suck air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the Facility operates in a water negative environment in the summer and as such leachate generated in the operation of the Facility gets re-circulated within the process. If the Facility needs to bring in extra water they take it from the stormwater management pond on-site.

There are several odour ports throughout the Facility.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced November 25, 2012. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted during the inspection that noise levels, both inside and out, did not pose an impact off-site.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing impacts off-site. It was noted during the inspection that dust did not appear to be generated resulting in no potential off-site impacts.

Odour: Prior to arriving at the Site to conduct this inspection, the IO observed the stack and wind direction to determine if emission from the stack (odours) could be detected downwind of the Facility. Several survey points were visited however no odours were detected downwind.

Odours were also revisited when the IO was completing the Site visit with Facility staff. No odours generated inside the Facility migrated out of the building. This could be due to the Facility operating in a negative pressure system.

After completing the inspection the IO completed a second odour survey downwind of the Facility. It was

noted that odours did not seem to be migrating off-site.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. It was noted during the inspection that vibration levels, both inside and out, did not pose a risk to surrounding properties.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

On September 16, 2009, the Facility was issued a Comprehensive Environmental Compliance Approval No. 7021-7HQNDE for the operation of the equipment that emits contaminants into the natural environment. The equipment approved under the ECA does not meet the requirements of the Environmental Activity Sector Registry.

The comprehensive environmental compliance approvals allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:
June 2010
December 2010
July 2011
December 2011
November 2012

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements. The last source test was completed in November of 2012.

A report on the outcome of the source testing was provided to the ministry on January 3, 2013 and is currently under review. Comments will be provided to the Facility once complete.

The next source testing is scheduled for November 2013.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

On May 28, 2012 the Facility submitted the Written Summary Report for the 2011 operating year (electronic submission)

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

Annual Report:

Condition 5 of the ECA requires the Facility to submit a Written Summary Report of activities undertaken in the previous calendar year by May 31 of each year. On May 28, 2012 the Written Summary Report for the 2011 operating years was submitted electronically to the ministry.

The report states that no modifications were made in the 2011 operating year.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer (IO) requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Maintenance:

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

Environmental Complaints:

The Facility has developed a document to address any complaint received as a result of the Site's operation. The document outlines the keystone information needed to record details of the complaint as well as follow-up actions taken to address the problem. The Facility records these complaints in a binder located at the Site. A copy of the procedure for recording environmental complaints was provided to the IO at the time of the inspection.

The Facility has not received a complaint as a result of the operations at the Site.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

● Yes ○ No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was reviewed during the inspection process.

No spills were reported to the ministry for the 2011 operating year.

Is a SPCP developed which includes an analysis of spills to all media – air, land and water?

● Yes ○ No

Specifics:

The procedure in place at the Facility speaks to spills to land, water (which would enter the Facility's Stormwater Management Pond - Industrial Sewage Works), and air.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

N/A

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous or ongoing non-compliance items to address.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by the Facility at this time.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

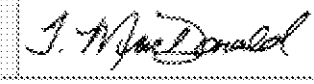
○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2013/02/19
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2013/02/27
Signature:	

File Storage Number:	SI OT OT HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site Operations Manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/10/21	**Inspection Finish Date:**	2010/11/30
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste certificate of approval, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Inside the tunnels, air is blown into the material through the floor and recirculated inside the tunnel then exhausted to the air pollution control equipment. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All composting activity is undertaken inside the process building. The building is operated under negative pressure, as such all process air and air from the building is directed through the pollution control equipment.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa Source Separated Organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste co-mingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The purpose of this inspection is to assess the sites compliance with the Air Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protections Act (EPA) and Reg 419 under the EPA. The inspection consisted of a district file review, site visits and discussions with Greg Mariotti, site operations manager and Henk Van Den Boomen, Orgaworld compost specialist.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the inspection date is listed as starting on October 21st, 2010, the information in this report is also based on site visits done at the facility throughout the year.

A non-hazardous waste transfer processing inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

1.1 TARGET SECTOR IN ONTARIO REGULATION 419/05

Is the facility in a target sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:
The pollution control equipment currently being used at the facility can be described as follows;

Fans are located throughout the building, these fans suck air from the building to the pollution control equipment, this creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The company is continuously monitoring it's process by a SCADA system. This system is remotely accessed to allow the staff in the Netherlands to tweak the system as needed. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When levels being monitored go outside of pre-programmed acceptable range then an alarm is triggered and a message is sent to the phones of staff personnel who have the ability to monitor the situation off site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and stack.

Upon entering the building it was apparent that the building was under negative pressure as I could feel air rushing from outside the building.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. At the time of inspection the company has not had to add more sulphuric acid to the tank since it started production. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia form the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets put in one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the plant operates in a water negative environment and as such, at this time, leachate generated in the operation of the plant gets re-circulated within the plant. The plant needs to bring in extra water and gets it from the stormwater management pond on site.

There are several odour ports throughout the facility. There is an odour port that allows you to sniff the air that is leaving the ammonia scrubber and entering the biofilter.

Biofilter:

At the time of inspection the company was operating two biofilters. The biofilter media is from a local source and comprises of wood roots and trunks. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. At the time of inspection it was indicated that

one of the biofilter tunnel's media was ready to get replaced. The waste media gets brought back inside to get composted.

Since my site visit on October 21st, the company has changed the media of one of the biofilters. The other biofilter media also needs to be replaces, fresh media is on site but the company is waiting for the source test to be finished. The source test is scheduled for December 8th, 2010.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm. The bioscrubber has not been cleaned out since it's commissioning, according to staff there should be no need to clean it out.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Specifics:

No offsite odours were noted at the time of inspection.

2.2 AUTHORIZING AND CONTROL DOCUMENTATION

Does the facility have authorizing or control documentation in place such as a Certificate of Approval (CofA) ?

Yes

Type of Document	Number	Issue Date	Limit*	Notes
CofA (Air)	7021-7HQNDE	2009/09/16	Yes	

*** Limit in Document**

Specifics:

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Certificate(s) of Approval?

- ○ **The facility does not have any required Certificate(s) of Approval (Air).**
- ○ **The facility requires an amendment or additional Certificate(s) of Approval (Air).**
- ○ **The facility requires an amendment or additional Certificate(s) of Approval (other than Air).**
- ● **The facility has the required Certificate(s) of Approval (or is not required to obtain them).**

Specifics:

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

Not Required

Specifics:

2.5 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

No

Specifics:

*** Type of Exceedance**

2.6 MONITORING AND REPORTING

Has the facility met its assessment requirements?

No

Specifics:
The company is required as per Condition 10.1 to conduct source testing within six (6) months after the start-up date. Source testing was conducted on June 15th, 2010 and the source test report was received at the District Office on August 13th, 2010.
The report indicates that the facility meets the 1 OU requirement.

As per condition 10.1 of the CofA, the facility is required to perform Source Testing every six (6) months thereafter. The next source test should occur before December 15th, 2010. The ministry has accepted the pre-test plan submitted on behalf of the company and the next source test is scheduled for December 8th, 2010.

Has the facility met its reporting requirements?

Not Required

Specifics:

As per condition 5.1 in the CofA the company is required to submit a written summary of activities undertaken in the previous calendar year. This facility has not yet been operating for a full calendar year. **The first report will need to be received by May 31st, 2011 for the 2010 operating year.**

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

No

Specifics:

In accordance with Condition 6.2 of the CofA the company is required to keep all doors in the enclosed building of the facility fully closed at all times, except when used for necessary personnel or vehicle entrance and exit. At the time of inspection the doors were closed. It should be noted, however, that previous site visits have shown doors being kept open or partly opened. This has been brought up with the company and a marked improvement has been noted on subsequent visits.

Condition 6.1 of the CofA requires the company to create a manual outlining the operating procedures and maintenance programs for all Processes with Significant Environmental Aspects. The required information can be found in the Operations Manual and in the Odour Monitoring Program. **It would not appear, however, that the company has implemented the monitoring program. See action items listed in Section 5.0.**

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

No

Specifics:

Condition 7 of the CofA details the complaint recording procedures. The company currently logs any complaints received electronically and also prints out a hard copy and leaves it in a binder on site. As of October 21st, 2010 the company has logged 3 complaints for the 2010 operating year. All 3 complaints were regarding odour.

The company is currently working on getting together maintenance plans as well as lists of spare parts for their equipment. There are Operations Manuals for the air pollution control equipment on site, but **a maintenance schedule based on the manuals needs to be created**. **See action items listed in Section 5.0**

2.9 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

No

Specifics:

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:
- maintenance schedule log not being kept

5.0 ACTION(S) REQUIRED

1- Create and implement a maintenance schedule as discussed in Section 2.8 of this report.
2- Create, implement and maintain as spare parts list and inventory.

3- Submit a report of compliance with actions items 1 and 2 listed above to the undersigned officer.
Due: February 4th, 2010.

6.0 OTHER INSPECTION FINDINGS

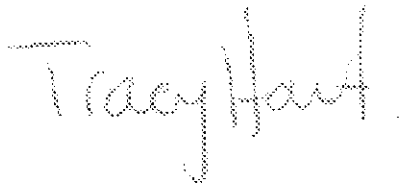
7.0 INCIDENT REPORT

Applicable
5327-8CCR48 ☒

8.0 ATTACHMENTS

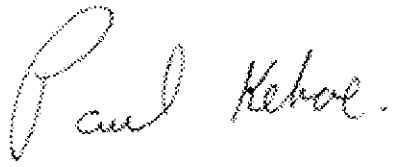
PREPARED BY:
Environmental Officer:
Name: **Tracy Hart**

District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:
Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site Operations Manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:	2010/12/21		
Inspection Start Date:	2011/09/19	**Inspection Finish Date:**	2011/09/30
Region:	Eastern		

1.0 INTRODUCTION

For Clarity within this report it should be noted that the Ministry of the Environment has restructured their approvals process. AS of October 31st, 2011, all Certificates of Approval will be referred to as Environmental Compliance Approvals (ECA).

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste ECA, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling

their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the sites compliance with their Waste Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protection Act (EPA) and Reg 347 under that same act. The inspection consisted of a District file review, site visit and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff throughout the year.

An air facility inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
#2766-7HEPSZ issued September 16, 2009
2766-7HEPSZ Notice No. 1 issued October 21, 2010 to allow for a mobile grinding unit to temporarily operate on site

The company currently has an application with the Ministry to request a change in operating hours and for ability to host household hazardous waste days.

2.1 SITE OPERATION:

Specifics:

Throughout the inspection report, the names allocated to the different areas within the processing building as described in Figure 5.1 from the document titled: "Application for a Provisional Certificate of Approval for a Waste Disposal Site" dated June 2008.

General site observations from September 19th, 2011:

Fresh waste was seen piled in the Truck Hall. At the time of inspection there were several trucks depositing waste; waste gets pushed to the side until traffic slows down and then it is moved into the Receiving and Sorting Hall. Fresh material appeared to be mostly leaf and yard waste. It should be noted that the original design plans indicated that waste would be deposited directly into the Receiving Hall, no waste was to be deposited in the Truck Hall. Should odour issues arise the issue will need to be re-assessed.

A shredder is placed at the side of the Receiving and Sorting Hall and is used to shred incoming waste , shredded waste is then mixed with 12-20 inoculate and placed directly in one of the compost tunnels or placed in the mixing hall. At the time of inspection, there was mixed waste and 12-20 material in the Mixing Hall, there was also 12-20 material piled in the Receiving and Sorting Hall.

Compost tunnels #1, 3, 4 and 5 were full and in different stages of composting. Tunnel #2 was getting screened.

Tunnels #7 and 8 are being used to store 12-20 material.

The Compost Curing Hall has been divided into bunkers with the use of concrete blocks; this better ensures there is no cross contamination between piles of compost in different stages of curing.
Finished compost is still being stored at the Tomlinson site located in back of 3200 Rideau Rd. but the company is no longer planning on adding more compost to this site, they have an arrangement with a farmer in St-Isidore to store compost at his site.

Negative pressure is maintained inside the building by the use of fans sucking air into the ventilation system that leads to the pollution control equipment. Sensors are placed by the fans to measure air pressure and the SCADA system monitors and controls fan speed. During a site visit it was noted that the fan in the receiving Hall had an actual pressure set point of 1 Pa even thought the system had a programmed setpoint of -20Pa. The fan 02 screening hall

had an actual pressure point of -1Pa but a programmed setpoint of -20Pa. It should be noted that the sensors are placed to monitor the difference in negative pressure between two sections of the building but not between the inside and outside of the building. Although I have not noted an absence in negative pressure in the building during my site visits as outdoor air is felt rushing into the building when the doors are open, the current monitoring system does not seems be able to accurately reflect and monitor for negative pressure inside the building.
See action items in Section 5.0

Observations regarding some conditions in the ECA:

Condition 2. Service are, approved waste types, rates & storage
- Tonnage records were reviewed, no non compliances were noted. It should be noted, however, that there seem to be discrepancies between the 2010 annual summary mass balance listed in the 2010 annual report and the 2010 mass balance calculated from the excel spreadsheet supplied by the company. **Please see action items listed in Section 5.0 of this report.**

Condition 7 Quality criteria, testing & monitoring
- the company tests incoming waste on a monthly basis.
- monitoring of the composting material inside the tunnels is done electronically through a SCADA system.
- The Ottawa District Office has not received any odour complaints from the site since those documented in the previous inspection report.
- The company samples their compost. Some sample results were submitted and verified, the following issues were noted:

- Tunnel 8 compost collected Dec 10th, 2010	Exceedence in Molybdenum
- Bunker #1 compost collected Feb 25, 2011	Exceedence in Fecal Coliform
- Biofilter #3 compost collected April 18th, 2011	Not tested for PCB's
- Bunker #2 compost collected July 27th, 2011	Exceedence in Chromium, Nickel, Selenium

See action items listed in Section 5.0 of this report.

The company has submitted an Odour Monitoring Program in accordance with condition 7(13) of the approval. Pages 7- 11 of the monitoring plan make reference to monitoring requirements for the pollution control equipment. At the time of inspection it was not confirmed whether or not the company is performing the maintenance and monitoring requirements as outlined in the Odour Monitoring Program. Daily, weekly and monthly maintenance inspection sheets were supplied but they dealt with operational equipment, not the pollution control equipment. The Odour Monitoring Program indicates that all results of the monitoring program are to be entered into the "odour system monitoring report" spreadsheet.
See Section 5.0 Action Items

Condition 8 Nuisance impact control & housekeeping
- The company calls in a sweeping company to clean of the asphalt parking area if and when it gets dirty.
- The company has an agreement with Holistech to handle vermin an vector, they come in once a month.

Condition 12 Records keeping
- The company has submitted their 2010 annual report. which includes a condition by condition assessment of conditions in the certificate of approval.

2.2 FINANCIAL ASSURANCE:

Specifics:

Financial assurance has been received by the company.
According to Condition 1(20) the company is required to have Financial Assurance of $727,700. Should the company increase their Maximum Approval Waste Processing Capacity to 150,000 tonnes they will need to increase their financial assurance to $1,018,000.

2.3 SITE SERVICE AREA:

Specifics:

In accordance with Condition 2(1) the site may only accept solid non -hazardous domestic, commercial, institutional or

industrial Organic waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

The facility is currently only accepting organic waste and leaf and yard waste for the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Specifics:

Tonnage record shave been reviewed from September 2010 to July 14th 2011. No exceedences were noted.

Tonnages received is measured by a scale located on site.
The site has not had to reject a load of waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No on-going previous issues of non-compliance.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
Yes

Specifics:
Exceedences in finished compost criteria.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:
Discrepancy in tonnage amounts.
Monitoring and maintenance of pollution control equipment.

5.0 ACTION(S) REQUIRED

1. Review and provide an update on the methods used to monitor negative pressure inside the building.

2. Submit a detailed explanation as to how the finished compost is sampled. The explanation should include how the company handled the exceedences noted in Section 2.1 of this report.

3. Explain discrepency in tonnage amounts between the excell spreadsheet and the 2010 annual report.

4. Submit confirmation that monitoring and maintenance of the pollution control equipment is being conducted in accordance with the Odour Monitoring Program dated October 2009. Include odour system monitoring report spreadsheets for the month of June, 2011 for the ammonium scrubber, the biofilter and the bioscrubber.

Submit all information required above to

Tracy Hart
Ministry of the Environment
2430 Don Reid Dr.
Ottawa, K1H 1E1
tracy.hart@ontario.ca
fax: 613 521-5437

DUE: January 16th, 2012

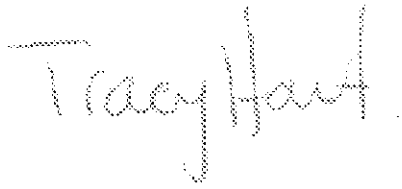
6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Applicable
2520-8PCSV3

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Tracy Hart**
District Office: **Ottawa District Office**
Date: **2011/12/08**
Signature



REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**
Date: **2011/12/09**

Signature:



File Storage Number: SI OC OT HAW 630

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:	2010/11/30		
Inspection Start Date:	2011/09/19	**Inspection Finish Date:**	2011/09/30
Region:	Eastern		

1.0 INTRODUCTION

For Clarity within this report it should be noted that the Ministry of the Environment has restructured their approvals process. As of October 31st, 2011, all Certificates of Approval will be referred to as Environmental Compliance Approvals (ECA).

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste ECA, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Inside the tunnels, air is blown into the material through the floor and recirculated inside the tunnel then exhausted to the air pollution control equipment. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste ECA and then removed from the site as finished compost. All composting activity is undertaken inside the process building. The building is operated under negative pressure, as such all process air and air from the building is directed through the pollution control equipment.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa Source Separated Organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The purpose of this inspection is to assess the sites compliance with the Air ECA and applicable environmental legislation such as the Environmental Protections Act (EPA) and Reg 419 under the EPA. The inspection consisted of a district file review, site visits and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff throughout the year. The visual site inspection was conducted on Sept 19th and a review of paperwork was conducted on the 30th of September.

A non-hazardous waste transfer processing inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

1.1 TARGET SECTOR IN ONTARIO REGULATION 419/05

Is the facility in a target sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

The pollution control equipment currently being used at the facility can be described as follows;

Fans are located throughout the building, these fans suck air from the building to the pollution control equipment, this creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The company is continuously monitoring it's process by a SCADA system. This system is remotely accessed to allow to remotely tweak the system as needed. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When levels being monitored go outside of preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of staff personnel who have the ability to monitor the situation off site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets put in one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the plant operates in a water negative environment in the summer and as such leachate generated in the operation of the plant gets re-circulated within the plant. If the plant needs to bring in extra water they take it from the stormwater management pond on site.

There are several odour ports throughout the facility.

Biofilter:

At the time of inspection the company was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced around November 2010 and is scheduled to be replaced around November 2011. The waste media gets brought back inside to get composted.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Specifics:

No offsite odours were noted at the time of inspection.

2.2 AUTHORIZING AND CONTROL DOCUMENTATION

Does the facility have authorizing or control documentation in place such as a Certificate of Approval (CofA) ?

Yes

Type of Document	Number	Issue Date	Limit*	Notes
CofA (Air)	7021-7HQNDE	2009/09/16	Yes	

*** Limit in Document**

Specifics:

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Certificate(s) of Approval?

- ○ **The facility does not have any required Certificate(s) of Approval (Air).**
- ○ **The facility requires an amendment or additional Certificate(s) of Approval (Air).**
- ○ **The facility requires an amendment or additional Certificate(s) of Approval (other than Air).**
- ● **The facility has the required Certificate(s) of Approval (or is not required to obtain them).**

Specifics:

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

Yes

Specifics:

2.5 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

No

Specifics:

The Company has submitted a Written Summary for Reporting Year 2010 dated May 27, 2011. The report includes an updated Emission Summary Table that indicates that contaminants remain bellow their respective POIs.

*** Type of Exceedance**

2.6 MONITORING AND REPORTING

Has the facility met its assessment requirements?

Yes

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Source testing was conducted on:
June 15th 2010
December 8th, 2010
July 6th, 2011

The next source testing has been scheduled for December 6th, 2011.

Has the facility met its reporting requirements?

Yes

Specifics:

As per condition 5.1 of the ECA, the company is required to submit a written summary of activities undertaken in the previous calendar year. The report needs to be provided to the Ministry by **March 31st of each year**.

The 2010 written summary is dated May 27th, 2011 and was received by the Ottawa District Office on May 30th, 2011. It should be noted that the written summary for 2010 was submitted late.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

Yes

Specifics:

Condition 6 of the ECA details the operational and maintenance requirements for the plant.

At the time of inspection the Site Supervisor conducts daily checks in accordance with a daily check list. A blank copy of this check list was supplied at the time of inspection, filled out check lists are kept on site and were reviewed at the time of inspection.

Several other check lists and inspection sheets are being filled out, all to do with operating equipment on site.

Monitoring of building negative pressure and the operation and maintenance requirements for the pollution control requirement are addressed under Section 2.1 of the non-hazardous waste transfer processing inspection.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

Yes

Specifics:

The company logs complaints and places a copies of the complaints in a binder on site. There have not been any complaints logged by the ministry or the company since the previous inspection.

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

2.9 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

No

Specifics:

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No on-going issues of non-compliance related to air.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions required at this time.

6.0 OTHER INSPECTION FINDINGS

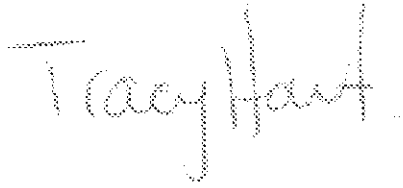
No other inspection findings at this time.

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2011/12/14
Signature



REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2011/12/19

Signature:



File Storage Number: SI OC OT HAW 210

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site Operations Manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/11/25	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste certificate of approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Parameters being monitored include humidity levels. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste co-mingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the inspection date is listed as starting November 25th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works Certificate of approval and applicable environmental legislation such as the Ontario Water Resources Act (OWRA). The inspection consisted of a d
district file review, site visit and discussions with Greg Mariotti, site operations manager.

An air facility inspection and non -hazardous waste transfer processing inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not applicable

Sector Type:
Other

Specify Other:
Composting facility

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s): 7032-88XPRA issued September 7, 2010.

The original CofA was #9465-7NVRWT issued September 16, 2009. This CofA was amended to reflect changes in the monitoring wells.

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has been contacting Lacombe to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the facility is operating in a water negative environment, however, as a result of several fires at the facility the leachate tanks have filled up and needed to get pumped our on several occasions.

It was noted that the company has altered their stormwater system as a result of the accumulation of compost and ground-water infiltration along the ditch across from the compost curing area loading doors. The company has altered their sewage works by lining the ditch with clay and stones and installing a chamber with a pump directing some of the stormwater back to the leachate storage tanks.
Section 53 (1) of the OWRA states that no person shall establish, alter, extend or replace new or existing sewage works except under and in accordance with an approval granted by a Director.
See Section 5.0 Actions required

The company also has a sump pump pumping groundwater infiltration from their pumping station to the parking lot. The maximum pumping capacity for the system will need to be verified, should the pumping capacity of the system exceed 50,000 Liters of water a day a Permit to Take Water from the Ministry of the Environment will be needed. This discharge water should also be noted in the S53 approval amendment application required above.
See Section 5.0 Actions required

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
None

Does the facility comply with its limits?
Yes

The Certificate of Approval does not refer to any exceedance limits but refers to trigger parameters. Should the stormwater exceed any of the trigger parameters it would be considered leachate contaminated stormwater and would not be allowed to be discharged from the stormwater management pond.The stormwater management pond can only be discharged when sampling shows that the water does not exceed trigger levels listed in Table 2 of the Certificate.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

The company is required to take monthly samples of stormwater pond. Monthly sample results were reviewed from March to October 2010. It was noted that twice the sample results exceeded the trigger limits for E-coli and twice the sample results exceed the trigger limit for Total Suspended Solids.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The Certificate of approval does not require flow measurement nor list any design capacity. In accordance to condition 6(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

At the time of inspection it was noted that the southern part of the berm had breached and water had

overflowed outside of the pond. This was brought to the attention of the company. It is unclear when the breach occurred as the company was not aware of the breach and had no records of previous site inspections. The berm has since been fixed.

The pond needed to be discharged in December to give enough freeboard for the spring thaw. Sample results for December indicated exceedences of the TSS trigger parameters. The company has indicated that they need to discharge and have submitted a report, dated December 15, 2010, in accordance with Condition 6(10) of their CofA.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Table 1 - Effluent Monitoring
SWM Pond

General Parameters	Inorganic	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

The company has been sampling the pond once a month as well as prior to any discharge.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

In accordance with Condition 6(10) Orgaworld is required to notify the District Manger orally, as soon as

possible, and in witting within seven (7) days of the discharge to receiving surface water of leachate contaminated sewage. The breach of the pond is considered a discharge, the company had not sampled prior to the breach and therefore was not able to determine if the spilled water was leachate contaminated. Concern is also raised as the previous sampling results indicated that the sewage water exceeded the E-coli trigger parameter.

Pond water that breached and pooled on site was sampled. Sample results indicate an exceedence in the TSS trigger parameters listed in the certificate of approval as well as the E-coli parameter. Mitigative action has been described by the company in the report dated December 15, 2010

Condition 4 of the certificate requires the Owner to submit to the District manager a set of as constructed drawings within one year of the Substantial Completion of the Work. These drawing have not yet been submitted, the drawings submitted should reflect the alterations made to the system noted in Section 2.1 of this report.
See Action Items listed in Section 5.0

2.6 FLOW MEASUREMENT

Flow measurements are not a requirement in the Certificate of Approval

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection??
No

Reason:
Facility was not discharging at the time of inspection.

The facility was not discharging at the time of inspection therefore no samples were taken. Sample results were reviewed of their monthly samples.

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste Certificate of Approval #2766-7HEPSZ

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
Yes

Were all the spills reported to the ministry?
Yes

Does the facility's operations or spill history suggest that a SPCP be developed?
No

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

Alteration of sewage works without approval.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
Yes

Specifics:

Breach of the berm

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

1- Submit to the Ministry of the Environment a complete application for an amendment to the Sewage Works Certificate of Approval # 7032-88XPRAto reflect the alterations made to the system.
Due by March 18th, 2010.

2- Submit to the undersigned, a report detailing the maximum pumping capacity of the sump pump at the site.
Due by January 21st, 2010

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Applicable
1327-8CCQJX

8.0 ATTACHMENTS

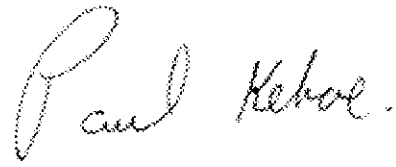
PREPARED BY:
Environmental Officer:
Name: **Tracy Hart**

District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:
Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site Operations Manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/11/25	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste certificate of approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Parameters being monitored include humidity levels. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste co-mingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the inspection date is listed as starting November 25th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works Certificate of approval and applicable environmental legislation such as the Ontario Water Resources Act (OWRA). The inspection consisted of a d
district file review, site visit and discussions with Greg Mariotti, site operations manager.

An air facility inspection and non -hazardous waste transfer processing inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not applicable

Sector Type:
Other

Specify Other:
Composting facility

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s): 7032-88XPRA issued September 7, 2010.

The original CofA was #9465-7NVRWT issued September 16, 2009. This CofA was amended to reflect changes in the monitoring wells.

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has been contacting Lacombe to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the facility is operating in a water negative environment, however, as a result of several fires at the facility the leachate tanks have filled up and needed to get pumped our on several occasions.

It was noted that the company has altered their stormwater system as a result of the accumulation of compost and ground-water infiltration along the ditch across from the compost curing area loading doors. The company has altered their sewage works by lining the ditch with clay and stones and installing a chamber with a pump directing some of the stormwater back to the leachate storage tanks.
Section 53 (1) of the OWRA states that no person shall establish, alter, extend or replace new or existing sewage works except under and in accordance with an approval granted by a Director.
See Section 5.0 Actions required

The company also has a sump pump pumping groundwater infiltration from their pumping station to the parking lot. The maximum pumping capacity for the system will need to be verified, should the pumping capacity of the system exceed 50,000 Liters of water a day a Permit to Take Water from the Ministry of the Environment will be needed. This discharge water should also be noted in the S53 approval amendment application required above.
See Section 5.0 Actions required

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
None

Does the facility comply with its limits?
Yes

The Certificate of Approval does not refer to any exceedance limits but refers to trigger parameters. Should the stormwater exceed any of the trigger parameters it would be considered leachate contaminated stormwater and would not be allowed to be discharged from the stormwater management pond.The stormwater management pond can only be discharged when sampling shows that the water does not exceed trigger levels listed in Table 2 of the Certificate.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

The company is required to take monthly samples of stormwater pond. Monthly sample results were reviewed from March to October 2010. It was noted that twice the sample results exceeded the trigger limits for E-coli and twice the sample results exceed the trigger limit for Total Suspended Solids.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The Certificate of approval does not require flow measurement nor list any design capacity. In accordance to condition 6(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

At the time of inspection it was noted that the southern part of the berm had breached and water had

overflowed outside of the pond. This was brought to the attention of the company. It is unclear when the breach occurred as the company was not aware of the breach and had no records of previous site inspections. The berm has since been fixed.

The pond needed to be discharged in December to give enough freeboard for the spring thaw. Sample results for December indicated exceedences of the TSS trigger parameters. The company has indicated that they need to discharge and have submitted a report, dated December 15, 2010, in accordance with Condition 6(10) of their CofA.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

The company has been sampling the pond once a month as well as prior to any discharge.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

In accordance with Condition 6(10) Orgaworld is required to notify the District Manger orally, as soon as

possible, and in witting within seven (7) days of the discharge to receiving surface water of leachate contaminated sewage. The breach of the pond is considered a discharge, the company had not sampled prior to the breach and therefore was not able to determine if the spilled water was leachate contaminated. Concern is also raised as the previous sampling results indicated that the sewage water exceeded the E-coli trigger parameter.

Pond water that breached and pooled on site was sampled. Sample results indicate an exceedence in the TSS trigger parameters listed in the certificate of approval as well as the E-coli parameter. Mitigative action has been described by the company in the report dated December 15, 2010

Condition 4 of the certificate requires the Owner to submit to the District manager a set of as constructed drawings within one year of the Substantial Completion of the Work. These drawing have not yet been submitted, the drawings submitted should reflect the alterations made to the system noted in Section 2.1 of this report.
See Action Items listed in Section 5.0

2.6 FLOW MEASUREMENT

Flow measurements are not a requirement in the Certificate of Approval

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection??
No

Reason:
Facility was not discharging at the time of inspection.

The facility was not discharging at the time of inspection therefore no samples were taken. Sample results were reviewed of their monthly samples.

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste Certificate of Approval #2766-7HEPSZ

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
Yes

Were all the spills reported to the ministry?
Yes

Does the facility's operations or spill history suggest that a SPCP be developed?
No

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

Alteration of sewage works without approval.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
Yes

Specifics:

Breach of the berm

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

1- Submit to the Ministry of the Environment a complete application for an amendment to the Sewage Works Certificate of Approval # 7032-88XPRAto reflect the alterations made to the system.
Due by March 18th, 2010.

2- Submit to the undersigned, a report detailing the maximum pumping capacity of the sump pump at the site.
Due by January 21st, 2010

6.0 OTHER INSPECTION FINDINGS

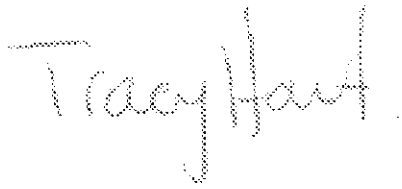
7.0 INCIDENT REPORT

Applicable
1327-8CCQJX

8.0 ATTACHMENTS

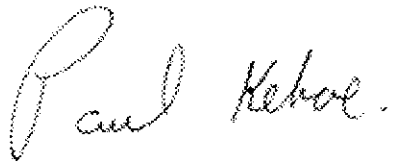
PREPARED BY:
Environmental Officer:
Name: **Tracy Hart**

District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:
Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/09/20	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste certificate of approval, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 100+ (which includes large pieces of material that have not composted -branches, large pieces of incidental plastic), 10-100 material (which is medium sized material), incidental waste, and compost. The 100+ material might get sent to landfill or sent back to the shredder and enter the compost stream at the front of the line. The 10-100 material is used as inoculate and mixed in with fresh material in the Mixing Hall. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste co-mingled with the SSO waste. It should be noted that the City of Ottawa started co-mingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the sites compliance with their Waste Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protection Act (EPA) and Reg 347 under that same act. The inspection consisted of a District file review, site visit and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the time of inspection is listed as September 20th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

An air facility inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s): 2766-7HEPSZ, issued September 16th, 2009

2.1 SITE OPERATION:

Throughout this inspection report, the names allocated to the different areas within the processing building are as described in Figure 5.1 from the document titled: "Application for a Provisional Certificate of Approval for a Waste Disposal Site" dated June 2008.

General site observations from Sept 20th, 2010 :

10-100 material was piled in the Truck Hall, there was also some "fresh" waste that had recently been dropped off. The fresh material appeared to consist mostly of leaf and yard waste, the odd plastic bag was noted. Fresh material was also seen piled in the Receiving and Sorting Hall, a small amount of 10-100 material was seen in the eastern corner of the Receiving Hall. The Mixing Hall was approximately 3/4 full of 10-100 material. Tunnel #4 was being emptied, the front end loader was taking material from tunnel 4 to the screener.

Orgaworld is currently operating 6 compost tunnels. At the time of inspection tunnel #4 was being emptied. Tunnels #7 and 8 are shells, one is being used to store 10-100 material the other is being used to store curing compost.

There are two operating biofilters at the site and a third shell of a biofilter tunnel. Orgaworld has installed doors on the biofilter tunnel shell and has connected duct work to create a negative pressure in the tunnel and plans on using this as storage for 10-100 material or curing compost. This biofilter shell is not currently being monitored by the SCADA system.

According to staff, the increase in leaf and yard waste co-mingled with SSO has caused some operational challenges for Orgaworld as the material does not break down as easily. As a result Orgaworld has been accumulating a lot more 10-100 material than was expected. Orgaworld is selling this 10-100 material to some farmers as mulch.

At the start of operations the amount of SSO received was, on average, approximately 82 tonnes per operating day. The City of Ottawa decided to collect the City's leaf and yard waste co-mingled with the SSO waste. This greatly increased the volume and tonnage of material received. As an example, the site received, on average, approximately 292 tonnes per operating day in June, 2010.

On my site visit of September 20th, 2010, compost was being removed for the compost Curing Hall and loaded onto a truck. The compost will be brought to Orgaworlds compost storage site located in back of 3200 Rideau Rd, Ottawa. It should be noted that, as of November 29th, 2010 there is approximately 7,600 tonnes of compost at the storage site. Orgaworld is leasing this site from Tomlinson to store finished compost until buyers are found and ready to accept the compost.

At the time of inspection, the bay doors to the Processing Building were closed with the exception of one door from the compost curing hall because compost was being removed from the hall.

There were three piles of 10-100 material located outside the facility, these piles were side by side on the eastern side of the building. The piles were outside as a result of three separate fires that occurred inside the building. There has also been a fourth fire but the material was never brought outside. The company has been instructed to remove the material once it is deemed safe. Since then the material has been removed

from the site and sold as mulch.

Observations regarding some conditions in the CofA:

Condition 2. Service area, approved waste types, rates & storage.
- It should be noted that the company has appealed Conditions 2(i) and 2(ii) of the certificate of approval to the ERT. The Tribunal has not yet made a decision.
- Tonnage records were reviewed, no non compliances were noted.
- There have been some issues with outside storage of waste on site. The company has stored material outside as a result of 4 fires that occurred during the summer. This material has since been removed and the company has submitted a detailing the events and measures taken to prevent reoccurrence.

Condition 3. Signs
- Orgaworld has posted a sign at their front gate that complies with the condition.

Condition 5 Site Operations
- According to company officials no waste has been rejected.

Condition 6 Equipment and site inspections & maintenance
- Daily site inspections are conducted and a record is produced.
- The company has not yet created and implemented a preventative maintenance program for all on -Site equipment. See Air Inspection report for further action to be undertaken.

Condition 7 Quality criteria, testing & monitoring
- Every quarter there is an audit done of incoming SSO waste with the City of Ottawa. The company also does their own sampling of incoming waste.
- Finished compost sample results were reviewed, no non compliance issues were noted.
- Monitoring of the composting material is done electronically through a SCADA system.
- The odour monitoring program was received on October 30th, 2009. Since the start up of the operation the Ministry has received 3 odour complaints for the company. While it was not possible to conclusively determine the source of the odours, it is believed that the source is the pile of finished compost being stored at the compost storage site on Rideau.

Condition 8 Nuisance impact control & housekeeping
- A pressure washer is available inside the Truck hall in the event the trucks need to get cleaned.
- The company calls in a sweeping company to clean off the asphalt parking area if and when it gets dirty.
- the company has an agreement with an extermination company to handle vermin and vector.

Condition 9 Operations manual & staff training
- The Operations manual was received October 30th, 2009.

Condition 10 Emergency response and contingency plan
- The contingency plan was received on October 30th, 2009
- The plan in kept at the front office in a cabinet and is accessible to all employees.

Condition 12 Records keeping
- The company keeps an active excel sheet detailing the movement of waste through the process.
- The first annual report is due March 31, 2011

2.2 FINANCIAL ASSURANCE:

Financial assurance has been received by the company.
According to Condition 1(20) the company is required to have Financial Assurance of $727, 700. Should the

company increase their Maximum Approved Waste Processing Capacity to 150, 000 tonnes they will need to increase their financial assurance to $1,018,000.

2.3 SITE SERVICE AREA:

In accordance with Condition 2(1) the site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

Site observations:

The facility is currently only accepting organic waste and leaf and yard waste from the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Tonnage records have been reviewed from January 28th, 2010 to September 18th, 2010. No exceedences were noted.

Weight of the waste received is measured by a scale located on site. The data is inputted in two computerized databases, one for Orgaworld and the other for the City of Ottawa.

The Site has never had to reject a load of waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

This is the first time this facility is inspected by the Ministry.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry 's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

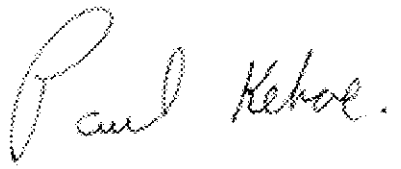
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:

Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/09/20	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste certificate of approval, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 100+ (which includes large pieces of material that have not composted -branches, large pieces of incidental plastic), 10-100 material (which is medium sized material), incidental waste, and compost. The 100+ material might get sent to landfill or sent back to the shredder and enter the compost stream at the front of the line. The 10-100 material is used as inoculate and mixed in with fresh material in the Mixing Hall. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste co-mingled with the SSO waste. It should be noted that the City of Ottawa started co-mingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the sites compliance with their Waste Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protection Act (EPA) and Reg 347 under that same act. The inspection consisted of a District file review, site visit and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the time of inspection is listed as September 20th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

An air facility inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s): 2766-7HEPSZ, issued September 16th, 2009

2.1 SITE OPERATION:

Throughout this inspection report, the names allocated to the different areas within the processing building are as described in Figure 5.1 from the document titled: "Application for a Provisional Certificate of Approval for a Waste Disposal Site" dated June 2008.

General site observations from Sept 20th, 2010 :

10-100 material was piled in the Truck Hall, there was also some "fresh" waste that had recently been dropped off. The fresh material appeared to consist mostly of leaf and yard waste, the odd plastic bag was noted. Fresh material was also seen piled in the Receiving and Sorting Hall, a small amount of 10-100 material was seen in the eastern corner of the Receiving Hall. The Mixing Hall was approximately 3/4 full of 10-100 material. Tunnel #4 was being emptied, the front end loader was taking material from tunnel 4 to the screener.

Orgaworld is currently operating 6 compost tunnels. At the time of inspection tunnel #4 was being emptied. Tunnels #7 and 8 are shells, one is being used to store 10-100 material the other is being used to store curing compost.

There are two operating biofilters at the site and a third shell of a biofilter tunnel. Orgaworld has installed doors on the biofilter tunnel shell and has connected duct work to create a negative pressure in the tunnel and plans on using this as storage for 10-100 material or curing compost. This biofilter shell is not currently being monitored by the SCADA system.

According to staff, the increase in leaf and yard waste co-mingled with SSO has caused some operational challenges for Orgaworld as the material does not break down as easily. As a result Orgaworld has been accumulating a lot more 10-100 material than was expected. Orgaworld is selling this 10-100 material to some farmers as mulch.

At the start of operations the amount of SSO received was, on average, approximately 82 tonnes per operating day. The City of Ottawa decided to collect the City's leaf and yard waste co-mingled with the SSO waste. This greatly increased the volume and tonnage of material received. As an example, the site received, on average, approximately 292 tonnes per operating day in June, 2010.

On my site visit of September 20th, 2010, compost was being removed for the compost Curing Hall and loaded onto a truck. The compost will be brought to Orgaworlds compost storage site located in back of 3200 Rideau Rd, Ottawa. It should be noted that, as of November 29th, 2010 there is approximately 7,600 tonnes of compost at the storage site. Orgaworld is leasing this site from Tomlinson to store finished compost until buyers are found and ready to accept the compost.

At the time of inspection, the bay doors to the Processing Building were closed with the exception of one door from the compost curing hall because compost was being removed from the hall.

There were three piles of 10-100 material located outside the facility, these piles were side by side on the eastern side of the building. The piles were outside as a result of three separate fires that occurred inside the building. There has also been a fourth fire but the material was never brought outside. The company has been instructed to remove the material once it is deemed safe. Since then the material has been removed

from the site and sold as mulch.

Observations regarding some conditions in the CofA:

Condition 2. Service area, approved waste types, rates & storage.
- It should be noted that the company has appealed Conditions 2(i) and 2(ii) of the certificate of approval to the ERT. The Tribunal has not yet made a decision.
- Tonnage records were reviewed, no non compliances were noted.
- There have been some issues with outside storage of waste on site. The company has stored material outside as a result of 4 fires that occurred during the summer. This material has since been removed and the company has submitted a detailing the events and measures taken to prevent reoccurrence.

Condition 3. Signs
- Orgaworld has posted a sign at their front gate that complies with the condition.

Condition 5 Site Operations
- According to company officials no waste has been rejected.

Condition 6 Equipment and site inspections & maintenance
- Daily site inspections are conducted and a record is produced.
- The company has not yet created and implemented a preventative maintenance program for all on -Site equipment. See Air Inspection report for further action to be undertaken.

Condition 7 Quality criteria, testing & monitoring
- Every quarter there is an audit done of incoming SSO waste with the City of Ottawa. The company also does their own sampling of incoming waste.
- Finished compost sample results were reviewed, no non compliance issues were noted.
- Monitoring of the composting material is done electronically through a SCADA system.
- The odour monitoring program was received on October 30th, 2009. Since the start up of the operation the Ministry has received 3 odour complaints for the company. While it was not possible to conclusively determine the source of the odours, it is believed that the source is the pile of finished compost being stored at the compost storage site on Rideau.

Condition 8 Nuisance impact control & housekeeping
- A pressure washer is available inside the Truck hall in the event the trucks need to get cleaned.
- The company calls in a sweeping company to clean off the asphalt parking area if and when it gets dirty.
- the company has an agreement with an extermination company to handle vermin and vector.

Condition 9 Operations manual & staff training
- The Operations manual was received October 30th, 2009.

Condition 10 Emergency response and contingency plan
- The contingency plan was received on October 30th, 2009
- The plan in kept at the front office in a cabinet and is accessible to all employees.

Condition 12 Records keeping
- The company keeps an active excel sheet detailing the movement of waste through the process.
- The first annual report is due March 31, 2011

2.2 FINANCIAL ASSURANCE:

Financial assurance has been received by the company.
According to Condition 1(20) the company is required to have Financial Assurance of $727, 700. Should the

company increase their Maximum Approved Waste Processing Capacity to 150, 000 tonnes they will need to increase their financial assurance to $1,018,000.

2.3 SITE SERVICE AREA:

In accordance with Condition 2(1) the site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

Site observations:

The facility is currently only accepting organic waste and leaf and yard waste from the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Tonnage records have been reviewed from January 28th, 2010 to September 18th, 2010. No exceedences were noted.

Weight of the waste received is measured by a scale located on site. The data is inputted in two computerized databases, one for Orgaworld and the other for the City of Ottawa.

The Site has never had to reject a load of waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

This is the first time this facility is inspected by the Ministry.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry 's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

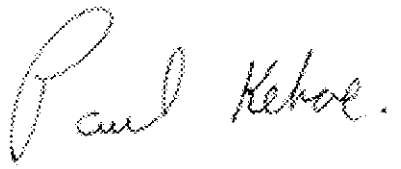
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:

Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:	2010/11/25		
Inspection Start Date:	2011/09/19	**Inspection Finish Date:**	2011/09/30
Region:	Eastern		

1.0 INTRODUCTION

For Clarity within this report it should be noted that the Ministry of the Environment has restructured their approvals process. As of October 31st, 2011, all Certificates of Approval will be referred to as Environmental Compliance Approvals (ECA).

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste ECA for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was

conducted on September 19th and a follow visit was conducted on September 30th to review paperwork requirements.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works ECA and applicable environmental legislation such as the Ontario Water Resources Act (OWRA). The inspection consisted of a district file review, site visit and discussions with Greg Mariotti, site operations manager.

An air facility inspection and non -hazardous waste transfer processing inspection were also carried out at the site. See respective reports for details

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
N/A

Sector Type:
Other

Specify Other:
Composting facility

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
Yes

Select the most important type of sensitive receptor.
Receiving Water

Certificate of Approval Number(s):
Yes
C of A Number(s): 7251-8GKRPD issued May 30th, 2011

The current certificate was issued to include alterations to the outdoor stormwater drainage including the addition of a submersible pump, storage tanks and aerators on the pond.

Previous ECA's:

1- # 9465-7NVRWT issued September 16th, 2009
2- # 7032-88XPRA issued September 7th, 2010 - was issued to reflect changes in the on site monitoring wells.

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the

composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has been contacting Lacombe to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit, None

Does the facility comply with its limits?
Yes

The ECA does not refer to any exceedance limits but refers to trigger parameters. Should the stormwater exceed any of the trigger parameters it would be considered leachate contaminated stormwater and would not be allowed to be discharged from the stormwater management pond.The stormwater management pond can only be discharged when sampling shows that the water does not exceed trigger levels listed in Table 2 of the Certificate.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

Condition 5(1) of the ECA requires the company to sample the effluent on a monthly basis for the parameters listed in Table 1. Results from sampling done from March to September 2011 were submitted. The following issues were noted:

- April sampling: exceedence of Total Suspended Solids
  no pH reading
- May sampling: not tested for ammonia
  not tested for nitrates
  no pH reading
- June sampling: no pH reading
- July sampling: exceedence of Ecoli

- September sampling: exceedence of Total Suspended Solids

According to file review the pond was discharged in March and April of 2011. The Ministry was contacted prior to discharge in April as the TSS trigger parameters was exceeded by 1mg/L. At the time of inspection, Greg also indicated that he plans on discharging this fall in order to ensure adequate storage space during the following spring snow melt.
See Section 5.0 Action Items

The ECA was amended on May 30th, 2011 to include the installation of aerators in the pond. These aerators were not installed at the time of inspection.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor list any design capacity. In accordance to condition 6(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

Daily site inspection records were reviewed at the time of inspection and were found to include pond site inspection findings.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature

Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

As per condition 10(3) of the ECA the facility submitted a performance report for 2010.

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
Facility was not discharging at the time of inspection

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste ECA #2766-7HEPSZ.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
The facility has spill kits on site and has submitted a contingency plan for odours, spills, fires, power failures and labour disruptions.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The company has received an amendment to their ECA reflecting the alterations seen during the previous inspections. The Company has also disconnected their sump pump therefore no longer potentially requiring a permit to take water.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?

No

Specifics:

Was there any indication of minor administrative non-compliance?

Yes

Specifics:

Insufficient stormwater effluent monitoring.

5.0 ACTION(S) REQUIRED

1. Submit a report on the effluent monitoring explaining why the parameters noted in Section 2.2 of this report were not sampled for.

Submit all information required above to

Tracy Hart
Ministry of the Environment
2430 Don Reid Dr.
Ottawa, K1H 1E1
tracy.hart@ontario.ca
fax: 613 521-5437

DUE: January 16th, 2012

6.0 OTHER INSPECTION FINDINGS

No other inspection findings at this time.

7.0 INCIDENT REPORT

Applicable
2228-8PCTN7

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Tracy Hart**
District Office:	**Ottawa District Office**
Date:	**2011/12/20**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2011/12/20**
Signature:	

File Storage Number: SI OC OT HAW 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ministry of the Environment and Climate Change

[illegible]220[illegible]2
[illegible]h, [illegible]n ar[illegible]
[illegible]7M 8[illegible]5
[illegible]1[illegible]5[illegible]000 [illegible]r 1 800 2[illegible]7 0[illegible]7[illegible]
[illegible]a[illegible]1[illegible]5[illegible]8[illegible]08

Ministère de l'Environnement et de l'Action en matière de changement climatique

[illegible]220[illegible]2
[illegible]h[illegible]n ar[illegible]
[illegible]7M 8[illegible]5
[illegible]1[illegible]5[illegible]000 [illegible]u 1 800 2[illegible]7 0[illegible]7[illegible]
[illegible]a[illegible]1[illegible]5[illegible]8[illegible]08

M[illegible]M[illegible]M

[illegible]r 17, 201[illegible]

[illegible] [illegible]y[illegible]ra[illegible]r[illegible]r
[illegible]n[illegible]r [illegible]n[illegible]n[illegible]n [illegible]na[illegible]
[illegible]r[illegible]r u[illegible] [illegible]n[illegible]
[illegible]a[illegible]rn [illegible]n

[illegible]M[illegible] [illegible]and
[illegible]ydr[illegible]
[illegible]a[illegible]r [illegible]ur[illegible]n[illegible]
[illegible]n[illegible]a[illegible]u[illegible]r[illegible]n
[illegible]a[illegible]rn [illegible]n

[illegible] [illegible]r[illegible]r d [illegible]r an[illegible]a[illegible]y
[illegible]r und[illegible]a[illegible]r [illegible]n and [illegible]r[illegible]an
512[illegible]a[illegible]rn[illegible]ad
[illegible]y[illegible]a[illegible]a
[illegible]ydr[illegible]n[illegible]

[illegible]a[illegible]r[illegible]d [illegible]n[illegible]a[illegible]r[illegible] [illegible]randu[illegible] Ju[illegible]y 1[illegible], 201[illegible]rn[illegible]n[illegible]a[illegible]n[illegible]r und[illegible]a[illegible]r[illegible]and [illegible]d[illegible]r[illegible]ra[illegible]a[illegible]r[illegible]r d [illegible]r an[illegible]a[illegible]y n[illegible]a[illegible]

[illegible]randu[illegible]d n[illegible]n[illegible]a[illegible]nan[illegible]n[illegible]rn[illegible]a[illegible]n a, n n, [illegible]an[illegible]an[illegible], d[illegible]d[illegible] [illegible]r an[illegible]ar n, u[illegible], and [illegible]a d[illegible]d [illegible]r und[illegible]a[illegible]r[illegible]n and [illegible]a[illegible]n[illegible]a[illegible]n[illegible]a[illegible]n[illegible]a, [illegible], n and [illegible]an[illegible]an[illegible]n[illegible]a[illegible]nd n[illegible]r[illegible]a[illegible]ard [illegible]r[illegible]na[illegible]n and ar und [illegible]n[illegible]a[illegible]rn[illegible]r[illegible]an[illegible]n[illegible]a[illegible]y[illegible]a[illegible]r und[illegible]a[illegible]r[illegible]n und[illegible]a[illegible]ry[illegible]a[illegible]n a[illegible]a[illegible]n[illegible]a[illegible]r[illegible]a[illegible]ur[illegible]a[illegible]a[illegible]r du[illegible]un[illegible]n[illegible]d a[illegible]n a[illegible]y[illegible]

n[illegible]rd[illegible]r[illegible]ur[illegible]r a[illegible]n[illegible]a[illegible]r[illegible]a[illegible]n add[illegible]na[illegible]a[illegible]r und[illegible]a[illegible]r[illegible]n[illegible]r n[illegible]a[illegible]d M 10[illegible]n[illegible]n[illegible]n[illegible]u[illegible]d a[illegible]n[illegible]n[illegible]r[illegible] und[illegible]ary[illegible]M 5 0[illegible], a[illegible]n[illegible]n[illegible]ur 1, [illegible]ur[illegible]r d[illegible]n a[illegible]n[illegible]n[illegible]rn d[illegible]n[illegible]n[illegible]u[illegible]ur[illegible]a[illegible]au[illegible]ar[illegible]n[illegible]n[illegible]a[illegible]d n d[illegible]n[illegible]a run[illegible]a[illegible]n[illegible]n[illegible]r[illegible] und[illegible]ary[illegible]ydrau[illegible]n[illegible]n[illegible]n[illegible]n[illegible]ndu[illegible]d[illegible] r d[illegible]r[illegible]n[illegible]n ydrau[illegible]ara[illegible]r[illegible]n[illegible]n[illegible]a[illegible]n[illegible]r urd[illegible]n and [illegible]dr[illegible]a[illegible]u[illegible]r[illegible] [illegible]ra[illegible]ur[illegible]y[illegible]n[illegible]n[illegible]d[illegible]a[illegible]n d[illegible]r[illegible]n n[illegible]a[illegible]r und[illegible]a[illegible]r ur[illegible]a[illegible]a[illegible]r[illegible]n[illegible]n[illegible]ra[illegible], [illegible]r, **ditch water sampling should begin immediately** [illegible]n[illegible]a[illegible]n[illegible]n[illegible]a[illegible]n[illegible]d[illegible]n[illegible]n[illegible]n[illegible]a[illegible]n a[illegible]n[illegible]a und n[illegible]r und[illegible]a[illegible]r[illegible]n[illegible]ur[illegible]a[illegible]n[illegible]a[illegible]r[illegible]n[illegible]u d[illegible]n[illegible]u[illegible]d[illegible]n[illegible]a[illegible]r[illegible]

15,000

Original signed by

and,

01 02
and

Proposed New Extraction Well EW108-19
Existing Extraction Well EW107-15
N
002053

Welcome
9 OF 150 REPORTS VIEWED

SEARCH BY: ADDRESS | ADDRESS RANGE | NAME | INSTRUMENT/PLAN | LOT&CONCESSION

FEEDBACK
HELP CENTRE

POSTAL CODE/MUNICIPALITY/PROVINCE | PIN # | 145539032 | Search

Property Details | Neighbourhood Stats | Demographics | Plan List By PIN

N/A
OTTAWA | N/A
Search By Block | Enhanced Report | GeoWarehouse Store

ACTIVE | PIN 145539032

Land Registry Information - PIN: 145539032

Print Parcel Register

Address:	N/A				
Municipality:	OTTAWA	LRO:	04	Area:	467.340 sq
Land Registry Status:	ACTIVE	Registration Type:	LT	Perimeter:	3251 m
Description:	PT LT 27 CON 8 CUMBERLAND; PT LT 28 CON 8 CUMBERLAND AS IN RB85543; CUMBERLAND				
Party To:	WELSHART FARMS INC.				

Sales History Information

DATE:	TYPE:	AMOUNT:
04/12/2019	T	$950,000
PARTY TO:	WELSHART FARMS INC.	
06/15/2006	T	$[illegible],000
PARTY TO:	CAMPHALG, RUTH	
07/08/1999	T	$[illegible],000
PARTY TO:	PETERSON, CLARICE WILHELMINA; CAMPHALG, RUTH;	
03/02/1977	T	$[illegible],500
PARTY TO:	PETERSON, CLARICE W.; CAMPHALG, RUTH; MCMANUS, SHERRY ANNE;	

Con 8 Lot 27 Cumberland

MAP VIEW | STREET VIEW

Satellite

Layers

Google

Ownership | Address | Block
Value Result | Subject Property | Subject Property
Plan | Subject APN | Neighbourhood Type

002054

Corporation Name

Fundamental Information (F7)

Corp. Number : 001142563 As At Date : 2019-09-10
Name . . . . . : WELSHART FARMS INC.

Incorporation/Amalgamation Date : 1995-09-27 Amalg. Indicator :
Jurisdiction : ON ONTARIO

Est. Status : 0 ACTIVE
Est. Type . : A ONTARIO BUSINESS CORP.
Share . . . : S Name Chg.Ind.: Ont.Corp.Director Min: 1 Max: 5

Cancel./Amalgamated/Inactive Date: Amalgamated Number:
Letter Date . . :
Date of Revival : Date Commenced in Ont. :
EP Licence Date : Date Ceased in Ont. . :
Date Continued : Date Transferred Out . :

Additional Information (F10)

Corporate No. . : 001142563 As At Date : 2019-09-10

H.O./Registered Office Address:
Attn/Care Of: JOE WELTON
Street . . . : 5985 FRANK KENNY DRIVE Suite :
Add'l Info :
City & Prov : VARS ONTARIO
Country . . . : CANADA Postal Code: K0A 3H0

Business/Mailing/Club/Principal Office in Ont. Address:
Attn/Care Of: JOE WELTON
Street . . . : 5985 FRANK KENNY DRIVE Suite :
Add'l Info :
City & Prov : VARS ONTARIO
Country . . : CANADA Postal Code : K0A 3H0
SIC Codes . : Lang of Pref: ENGLISH
Offering . : NO

Business Names (F17)

Corp. No.
1142563 WELSHART FARMS INC. As At Date : 2019-09-10
Type options, press Enter.
5=Display Full Business Name

?	Registration Date	Business Name	Expiry Date	Business ID Number
	2015-03-23	WELSHART FARMS	2020-03-22	250290053

Administrators (F19)

Administrator Name Corporate Number D
001142563 (CCYY-MM-DD)

Type options, press Enter.
1=Select Administrator

?	Administrator Name	1st Init.	2nd Init.	Desig.	Admin. Date Began
	WELTEN	J		D	1995-09-27
	WELTEN	J		O	1995-09-27
	WELTEN	S		O	1995-09-27
	WELTEN	J		O	1999-11-05

Corporation Name

Expanded Administrator

```
Corp. No. . . . :   001142563
 Administrator Name: WELTEN
                     JUSTINUS

 Administrator Address:
 Attn/Care Of:
 Street  . . :   5985      FRANK KENNY OFFICE                Suite  :
 Add'l Info  :
 City & Prov :   VARS                              ONTARIO
 Country . . :   CANADA                            Postal Code:   K0A 3H0
 Agent for Service Corp. No. :

 Date Began . . . :   1995-09-27      Date Ceased :
 Designation  . . :   D    DIRECTOR
 Officer Type . . :
 Resident Cdn.  . :   Y    First Director :
```

Documents (F20)

```
   Corp. No.                                        Date
     1142563                                                (CC
    WELSHART FARMS INC.

 Type options, press Enter.
 1=Select Document  F=Fundamental   E=Error Messages X=Adm

 ?  Act/  Description                 Form    Date      Mic
    Code                              Nbr.                R
    CIA   CHANGE NOTICE               1       2019-02-11
    CIA   ANNUAL RETURN 2017          1C      2018-04-15
    CIA   ANNUAL RETURN 2016          1C      2016-12-25
    CIA   ANNUAL RETURN 2015          1C      2016-02-27
    CIA   ANNUAL RETURN 2014          1C      2015-02-14
    CIA   ANNUAL RETURN 2013          1C      2014-03-01
    CIA   ANNUAL RETURN 2012          1C      2013-02-09
    CIA   CHANGE NOTICE               1       2012-09-14
```

Expanded Documents

```
Corporation  . :   001142563
                   WELSHART FARMS INC.

 Act Code . . . :   CIA    CORPORATIONS INFORMATION ACT
 Form Nbr . . . :   1      CHANGE NOTICE
 Date Received  :
 Date Effective :   2019-02-11
 Microfilm Roll :       0        Frame No . . . :

 Document Signing Officer/Signatory:
 Last Name  . . :   LAFRENIERE
 First Name . . :   ALEXANDRE
 Middle Name  . :
 Title  . . . . :   OTHER
 Notice Type  . :   CHANGE NOTICE
 Office . . . . :   SPDDM     DYE AND DURHAM SP PROD ID
 Processed By . :   SPDDMP1   TERANET ENTERPRISES INC.
```

Corporate Name History (F21)

```
     Corp No.
  001142563

    Name      Corporate Name
  Eff. Date
  1995-09-27  WELSHART FARMS INC.
```

Corporation Name

Amalgamation (F22) Establishment is not an amalgamation.

SI OTGL HA 600

Ministry of the Environment and Climate Change
Operations Division
1st Floor
135 St Clair Ave W
Toronto ON M4V 1P5
Fax: (416) 314-8452
Telephone: (416) 314-7993

Ministère de l'Environnement et de l'Action en matière de changement climatique
Division des Opérations
1er étage
135 av St Clair O
Toronto ON M4V 1P5
Télécopieur : (416) 314-8452
Téléphone : (416) 314-7993

Ontario

November 16, 2015

MINISTRY OF THE ENVIRONMENT
DEC 23 2015
OTTAWA

Michael Rooke, Compliance Officer
Orgaworld Canada Ltd.
5123 Hawthorne Rd
Ottawa, Ontario
K1G 3Y3

Dear Sir:

Re: Application for Approval
2012 Financial Assurance Re-evaluation
Ottawa City
Reference Number 2339-8SZP8K

This is to advise you that since we have received your 2015 Financial Assurance Re-evaluation, the above-noted file with the IDS Reference #2339-8SZP8K is now closed. The Director will consider your most recent submission of the financial assurance estimate currently logged in with IDS Reference #0127-9V4HMK.

If you have any questions regarding the above, please contact Margaret Wojcik, P.Eng., Senior Waste Engineer at (416) 314-5138.

Yours truly,

Dale D. Gable

Dale Gable, P.Eng.
Director
appointed for the purposes of Part II.1 of the *Environmental Protection Act*

MW/

c: District Manager, MOECC Ottawa ✓

002058

SI OT GL HA 610.

Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa Ontario
K1H 1E1
613-521-3450 or 1-800-860-2195
Fax: 613-521-5437

Ministère de l'Environnement et de l'Action en matière de changement climatique
Bureau du district d'Ottawa
2430, promenade Don Reid, Unité 103
Ottawa (Ontario)
K1H 1E1
613-521-3450 ou 1-800-860-2195
Téléc. : 613-521-5437

Ontario

March 18, 2015

Michael Rooke
Orgaworld Canada Ltd.
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

Dear Sir:

RE: Implementation of Ontario Compost Quality Standards – Maturity & Foreign Matter
Orgaworld Ottawa Facility, 5123 Hawthorne Road, Ottawa
Environmental Compliance Approval No. 2766-7HEPSZ

On July 25, 2012 the Ministry of the Environment and Climate Change (MOECC) released revised standards for aerobic composting of organic waste materials in the province of Ontario entitled *Ontario Compost Quality Standards* ("Standards"). The Standards update and replace the *Interim Guideline for the Production and Use of Aerobic Compost in Ontario*, first released in November 1991, and last updated in 2004.

The Standards outline new categories of compost (AA, A, and B) with specific requirements for metals, quality of feedstock, pathogens, foreign matter and maturity. The MOECC implemented Phase I (metals, quality of feedstock and pathogens) of the Standards on January 1, 2013 with Phase II (maturity and foreign matter) to be implemented on July 1, 2015.

In preparation of the upcoming implementation date, the MOECC would like to engage Orgaworld Canada Ltd. in how the requirements of the Standards will be met.

By **May 1, 2015**, please submit an action plan outlining how the Orgaworld Ottawa Facility will comply with the implementation of Phase II of the Standards on July 1, 2015. The action plan should include, but not necessarily be limited to, the following:

1. Process and/or operational changes to the current operations at the Orgaworld Ottawa Facility that may be necessary;
2. Environmental Compliance Approval amendments required to reflect any required process changes or modifications;
3. Options to manage processed organic waste not meeting the *Ontario Compost Quality Standards*; and
4. Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with the Phase II *Ontario Compost Quality Standards*.

Please contact me if you have any questions or concerns with the above request and the implementation of Phase II of the Standards. A meeting can be arranged in the event Orgaworld Canada Ltd. would like to discuss this subject in further detail.

Sincerely,

Kyle Straberger

Kyle Straberger
Environmental Officer

KS:jdv

File Code: SI OT GL HA 610

Soil Management in Ontario

Internal Questions and Answers

July 18, 2014

Key Messages:

- Creating opportunities to build or renew infrastructure and redevelop brownfields sites benefits Ontario's economy. Effective, sustainable soil management practices are important to maintaining a healthy economy and environment.
- The Ministry of the Environment and Climate Change encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.
- The ministry has finalized a best practices guide for how to manage excess soil on large-scale projects to help provide clarity to site owners, developers and contractors and promote a consistent approach.
- While municipalities and Conservation Authorities are the main permitting agencies for soil management activities, the ministry is helping by releasing a guidance document that outlines best management practices for managing excess soil.
- The ministry consulted extensively with the public and stakeholders and carefully considered the feedback received through the Environmental Bills of Rights Registry prior to finalizing the guide.
- The Best Management Practices provides essential guidance on many aspects of excess soil management. Going forward, we will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected.

Questions and Answers for the District/Area Offices:

Enforcement

1. How will ministry staff enforce the Management of Excess Soil – A Guide for Best Management Practices?

Currently all soil management activities brought to the ministry's attention are assessed on a. case-by-case basis, using site specific information. The applicability of the guide will also be assessed on a case-by-case basis.

If the ministry determines there is a potential environmental concern, the ministry will examine each situation to understand how the guidance was applied or how it can be applied to the specific site.

District Engineers or Regional Technical Support staff may need to be consulted to assist in determining and/or verifying (based on the information that is provided by the Qualified

Person) if there is a potential for, or a confirmed adverse effect, associated with the excess soil management activity.

If there is a confirmed or potential for an adverse effect, ministry staff will ensure the site owners take appropriate actions to mitigate the impacts using the ministry's Compliance Policy – Applying Abatement and Enforcement Tools (May 2007).

2. **What tools are available to enforce the Management of Excess Soil – A Guide for Best Management Practices?**

All current abatement tools, such as both voluntary and mandatory abatement, following the ministry's Compliance Policy and Informed Judgement Matrix are available to Environmental Officers to address non-compliance situations.

If voluntary or mandatory abatement tools, such as letters or Orders are used to follow up on, or address issues or concerns regarding excess soil management activities, Environmental Officers are encouraged to incorporate language from the guide, as appropriate.

This will ensure a consistent approach is being utilized by District/Area offices across the province.

3. **Can an Environmental Officer order someone to follow the Management of Excess Soil – A Guide for Best Management Practices, or reference the document in an Order?**

Management of Excess Soil – A Guide for Best Management Practices is a guidance document that highlights the ministry's expectations of stakeholders when they are engaging in excess soil management activities from large-scale projects. While these expectations were created to help ensure compliance with ministry legislation, the document itself is not legally enforceable.

The authority to issue an Order is still dependent upon identifying legislative contraventions based on site specific information, or the need for preventative measures. The language and concepts found in the guide can be incorporated into an Order, but only in instances where the site specific information establishes the context for incorporating the guidance into that Order.

Generally there are three legislative areas that can address concerns regarding excess soil management activities:

- Contraventions of the general prohibition clauses for the discharge or presence of contaminants in the natural environment that cause or may cause an adverse effect under the Environmental Protection Act and Ontario Water Resources Act;
- Preventative measures to ensure there is no future adverse effect (under the Environmental Protection Act); and
- Contraventions of the general waste management provisions found in O. Reg. 347, General Waste Management Regulation and the Environmental Protection Act.

District/Area Offices can consult the Central Region Program Services Unit or their

Regional Counsel for advice when taking compliance actions or referencing the guide within an Order.

4. Can the ministry order a landowner to get a Record of Site Condition if they have received soil at the site?

Records of Site Condition are only required when a property is changing to a more sensitive property use. The ministry does not order landowners to obtain a Record of Site Condition unless it is legally required under the *Environmental Protection Act*.

Managing Soil as a Waste

5. When should excess soil be managed as a waste?

The determination of whether excess soil should be managed as a waste can only be made on a case-by-case basis.

For excess soil that is being transported from a ministry-approved waste management site (such as a transfer / processing site or soil remediation facility), the Environmental Officer should refer to the site's Environmental Compliance Approval for conditions related to where the excess soil can go when it leaves the site.

If soil is found to be inappropriate for re-use at a site or the excess soil has no beneficial re-use and is destined for final disposal, the soil should be managed as a waste.

The Management of Excess Soil – A Guide for Best Management Practices provides stakeholders with the best management practices the ministry considers reasonable for managing excess soil as a resource.

If it is unclear whether a proponent is managing excess soil in accordance with the guide, your District/Area Office management team and the Central Region Program Services Unit can assist in determining if the soil from a site is being managed in an appropriate manner.

Temporary Soil Storage and Receiving Sites

6. What procedures should the District/Area Office follow related to a proponent establishing a Temporary Soil Storage Site?

Before a District/Area Office offers guidance to a proponent planning to establish a Temporary Soil Storage Site, the proponent should confirm that they have already contacted the appropriate permitting body, such as the municipality or conservation authority.

The permitting authority will advise the proponent whether the proposed site is appropriate for use as a Temporary Storage Site, and may also suggest or provide the proponent with site-specific conditions.

If the permitting authority is satisfied with the establishment of the site, the ministry should direct the proponent to follow the Management of Excess Soil – A Guide for Best

Management Practices for the operation of the site.

If appropriate, ministry staff can issue a preventative measures Order under Section 18 or 157.1 of the Environmental Protection Act to establish the conditions of the site so that they can be legally enforced. Prior to using an Order, ministry staff should consult with Regional Counsel.

7. How can the ministry establish financial assurance for Temporary Soil Storage Sites and Receiving Sites?

If the ministry determines that financial assurance is required, the District or Regional Office can issue an Order under *the Environmental Protection Act*. The Order should take into account the specific characteristics of the site to determine the amount of financial assurance required.

Risk Assessments

8. Is a risk assessment required for a proponent to assess the quality of soil being received at a site?

No, a risk assessment is not required for all sites receiving soil.

A Qualified Person is hired to make decisions for excess soil management and should be someone who can exercise professional judgment based on their experience. This is so that they can advise on appropriate reuse options for the excavated or excess soil, based on the appropriate soil analysis and characterization.

If the risk assessment is to be conducted and a Record of Site Condition is filed, the guide does not apply, and the soil management requirements highlighted under Part XII of Ontario Regulation 153/04 take precedent.

District/Area Office Training

9. Will there be any additional support and training for ministry staff related to the Excess Soil Management – A Guide for Best Management Practices?

Please contact Jonathan Fernandes, Central Region Program Services Unit at 416-326-5686 or jonathan.fernandes@ontario.ca for further assistance, clarification and interpretation of the document.

Central Region's Program Services Unit staff offer training sessions coordinated through the District/Area Office management teams. Contact your local District/Area Office for more information.

District/Area Office

1. What is included in the Excess Soil Management – A Guide for Best Management Practices?

While municipalities and Conservation Authorities are the main permitting agencies for soil

management activities, the ministry has developed a guide that highlights best practices for excess soil management activities.

The document provides guidance on how to handle excess soil generated from large-scale projects that is transported to sites where it can be reused for a beneficial purpose.

Excess soil management options in the guide include:

- direct reuse at the site where the soil was excavated
- on or offsite treatment of soil for reuse
- reusing excess soil at a construction or development site where imported soil is required for purposes such as site alteration, filing in depressions/excavations or re-grading
- managing excess soil at a ministry-approved soil recycling, processing or treatment facility
- reusing excess soil at a commercial fill site; or
- use as daily cover at a ministry-approved waste disposal site.

2. Why did the government develop the new guidance?

The guide was developed in response to concerns from stakeholders such as municipalities, conservation authorities, the construction industry, environmental consulting firms, and environmental non-governmental organizations.

While municipalities and Conservation Authorities are the main permitting agencies for soil management activities, the ministry has developed a guide that highlights best practices for excess soil management activities.

The guide will assist in establishing a consistent approach to managing excess soil for beneficial uses as well as avoid unnecessary disposal of soil in landfills.

3. What will change from what's currently being done?

The ministry provides guidance on excess soil management activities on a case-by-case basis.

The Best Management Practices guide details the ministry's expectations for those who manage excess soil to help ensure a consistent approach across the ministry.

The guide also encourages reuse for beneficial purposes to prevent excess soil from being unnecessarily disposed of in landfills.

4. Who will be affected by the proposed new soil management guidance?

Anyone engaging in excess soil management activities is responsible for ensuring excess soil is managed in an environmentally sound manner and according to all regulatory requirements. This includes municipalities, developers and owners of source and receiving sites.

5. How will the Best Management Practices help industry involved in the redevelopment of a site?

The Best Management Practices guide details the ministry's expectations for those who manage excess soil to help ensure a consistent approach across the ministry. The document can be used by site owners, developers and contractors as well as municipalities, government ministries and agencies.

The guidance document may help industry reduce trucking and disposal costs in the longer term by encouraging beneficial reuse of excess soil rather than disposal in landfill sites.

Municipalities and Conservation Authorities are encouraged to incorporate these best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

6. Why does the Excess Soil Management – A Guide for Best Management Practices focus on large-scale projects when the majority of soil management in Ontario is related to small-scale projects?

The proposed best management practices are not intended to apply to:

- small-scale construction projects, such as small parking lots, recreational paths, and playgrounds.
- maintenance and construction activities at single-dwelling residential properties such as building a swimming pool or landscaping activities; or
- activities associated with small-scale municipal road work or sewer and water main construction such as minor or localized repairs of underground utilities.

Anyone can use the Best Management Practices concepts for construction projects that generate excess soil. Homeowners are not expected to incur the cost of retaining a Qualified Person for small-scale projects. That is why the focus is on large-scale projects.

7. Why isn't the government developing a full policy to address all soil management activities in Ontario?

The Best Management Practices guide is intended to advise municipalities and others on the types of requirements to be considered when developing provisions for managing excess soil.

This guidance can be used to inform municipal by-laws, municipal site alteration permits and contracts involving the movement of excess soil.

The ministry also will review the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

Municipalities and Conservation Authorities have the authority to develop by-laws and issue permits for soil management activities.

8. How will the ministry encourage use of the best management practices?

While drafting the best management practices, the ministry consulted a broad range of stakeholder groups including municipalities, roads associations, waste associations, the engineering community and developers.

The ministry will encourage the use of these best practices by posting of our guide on our ministry website and outreach activities with anyone who is involved in soil management. We will also coordinate an implementation plan that includes compliance information and additional guidance and support.

The ministry will provide support to stakeholders to ensure the best management practices guide along with any relevant ministry legislation is being interpreted and applied appropriately. This includes the potential for ministry staff to conduct site visits at construction sites where excess soil is being generated.

9. When will a broader policy framework for soil management be developed?

We will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected.

In the meantime, the ministry encourages the use of the Best Management Practices guide for anyone involved in managing excess soil.

Any future policy development will build on the best management practices, what we heard when we consulted on it, and ongoing engagement with the public, stakeholders and other ministries.

10. Who enforces soil management?

In most cases, municipalities and conservation authorities oversee soil management by issuing permits and approvals to assist those managing excess soil in a manner consistent with the rules of the jurisdiction.

They also enforce compliance with the permits and approvals they issue.

11. How will the new Best Management Practices for soil management be enforced?

The Best Management Practices document sets out the ministry's expectations for managing excess soil generated from large-scale projects.

Where environmental concerns are identified at a site, the ministry may assess all soil management activities. This includes those occurring at the excavation site, during transportation or at sites where the soil is received. The ministry may take action as required.

Anyone handling excess soil must meet all current provincial laws as they apply, as well as any applicable bylaws and permitting requirements established by local municipalities and/or conservation authorities.

These best practices are intended to complement existing approvals under

provincial legislation and municipal bylaws.

Municipalities and Conservation Authorities are encouraged to consider the concepts set out in the guide when issuing permits or licenses, or establishing soil management by-laws or policies, and to make use of them as appropriate. Municipalities and Conservation Authorities may also initiate their own compliance activities based on their jurisdictional authority.

12. Who is responsible during the planning stage of a project?

Municipalities have the authority to determine where soil can be used in their jurisdictions.

Soil conservation and management should be integrated into all aspects of the planning and development process, from the initial concept through permitting, construction, transportation and reuse of excess soil.

The ministry encourages municipalities, conservation authorities and other regulatory bodies to address soil management activities from a planning perspective to complement these best management practices.

13. Why has the ministry accepted to undertake a review of the need for additional policy related to the management of compromised soil?

The ministry has developed the Best Management Practices guide to encourage a consistent approach to the management of excess soil. The ministry will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected. This review will build on the Best Practices, assessing the need for additional policy to support implementation of soil management in a manner consistent with the recommendations set out in the Best Practices guide.

14. Will additional guidance be available?

The ministry is coordinating an outreach and implementation plan that will include additional support and guidance for anyone involved in or responsible for managing excess soil.

The ministry is also supporting industry as they lead the development of complementary industry codes of practice for their sector.

The ministry will also be seeking opportunities to work with stakeholders to develop and promote the best management practices.

15. Does the Best Management Practices Guide consider invasive species?

The guide highlights that considerations should be given to controlling the introduction and spread of invasive species during all excess soil management activities. Please refer to the Ontario Invasive Species Strategy Plan 2012 and the Ontario Invading Species Awareness Program developed by the Ministry of Natural Resources and Forestry for more information.

16. Does the Best Management Practices Guide include compost?

Compost does not meet the definition of soil as described in the guide and is not intended to be addressed by these best management practices. The ministry has developed Compost Quality Standards and a Guideline for the Production of Compost in Ontario that includes best management practices.

17. When will the ministry address other soil management issues, including road building, pits and quarries?

These specific issues require longer-term consultation and policy development involving other ministries and jurisdictions.

For example, the Ministry of Natural Resources regulates quarries and gravel pits in Ontario. The ministry provides input to the Ministry of Natural Resources on how these materials can be managed on a case-by-case basis. Soil management activities at road construction projects may involve both the municipalities and the Ministry of Transportation. These activities will also be reviewed by the ministry on a case-by-case basis.

18. Why isn't Ontario adopting a soil mapping and soil reuse strategy to promote soil banking like the Netherlands?

The Netherlands has a regulatory framework for soil management which provides clear rules for where excess soil can be placed. The country is divided or mapped out into "soil zones" that allow soil to be moved within its zone so that the same types of soil remain within their specified zones. The Netherlands is not comparable to Ontario with respect to size or geography or the history which lead to their comprehensive soil policy.

The ministry wants to see excess soil put to beneficial uses where possible and not end up in landfill sites. That is why we are providing the Best Management Practices guide to stakeholders.

Soil banking is considered an option for soil management. Considerations for soil mapping may be discussed as part of a broader policy review related to soil management.

19. Does the proposed Best Management Practices document provide standards for receiving soil?

The Best Management Practices provide guidance for Qualified Persons to determine whether the excess soil is suitable for reuse or disposal. This is based on a site-specific evaluation of the receiving site by the Qualified Person to determine what concentration of contaminants is appropriate.

20. How will the Best Management Practices help landowners receiving excess soil such as municipalities?

The Best Management Practices guide requires a Qualified Person to oversee excess soil management activities at the source site. This will help ensure that soil going to receiving sites is of acceptable quality and will not cause an adverse effect in the local community.

Municipalities can use the Best Management Practices for their procurement activities. This includes road building and issuing approvals or permits.

21. How is "soil" defined in this guidance? Does this apply to asphalt and concrete or other aggregate products?

Soil is defined as naturally-occurring mineral particles and material resulting from the natural breakdown of rock or organic matter. The soil particles are smaller than two millimeters, or pass the U.S. Number 10 sieve.

The guide is not intended to apply to other materials such as engineered fill products, asphalt, concrete and reused or recycled aggregate products.

22. Why doesn't the ministry just refer to the existing standards? What is the difference?

Generic brownfield standards were developed using technical assumptions in order to meet specific objectives, for the filing of a Record of Site Condition.

Ontario's brownfield standards are not intended to address overall soil management activities in Ontario. They were created using scientific models and a policy framework designed for the clean-up of brownfields. There are several factors used in the development of these standards that do not apply to the management of excess soil. These standards may not be appropriate for overall soil management and would require a site specific evaluation to determine their appropriateness.

The best practices provide guidance to Qualified Persons on the considerations that must be taken into account when applying these brownfields standards to overall soil management activities, such as assessing the acceptability of the use of the standards at sites receiving excess soil.

23. How much time/effort is needed to develop soil management standards?

Developing new standards requires clear policy objectives and principles, in addition to the time required to undertake a sound scientific process. The development of standards also requires time to consult extensively with stakeholders.

The ministry will examine options for the development of standards as part of the review for the need for further policy for managing soil in ways that ensure public health and the environment are protected.

In the meantime, the ministry has developed the best practices guide for managing excess soil on large-scale projects to promote a consistent approach by site owners, developers and contractors.

24. Why doesn't the Best Management Practices make specific reference to the

assessment of soil types at receiving sites to see if they are appropriate for reuse?

The Best Management Practices guide advises that all assessment work should be conducted by a Qualified Person.

Qualified Persons have the expertise to determine when soil brought to the property is appropriate for reuse and does cause an adverse effect. The Qualified Person's assessment would also examine the compatibility of soil types as part of their standard assessment work.

The Qualified Person may need to consult with other experts to decide on the intended beneficial reuse of soil, such as an agrologist if soil is to be used for an agricultural purpose.

25. Why doesn't the guidance in the best practices reflect Ontario's brownfields regulation?

Ontario's brownfields legislation applies to sites that are being redeveloped to a more sensitive property use, such as a former industrial site being redeveloped for a new residential subdivision.

The regulatory framework and standards under the brownfields legislation were developed to ensure the site is appropriate for the intended new property use, and was not intended to apply to overall soil management activities.

Sites that are accepting excess soil and are planning to submit a Record of Site Condition for filing under the brownfields legislation must follow the soil management provisions within that legislation.

The best management practices are not legal requirements and do not apply to anything related to the filing of a Record of Site Condition.

26. Are there areas in the ministry where placing soil should be banned (e.g. Oak Ridges Moraine)?

The ministry encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.

Placing large amounts of excess soil should be done knowing where the soil came from, the quality of that soil and whether that quality of soil is appropriate for the location at which it is being placed. There should be no adverse effect on the site where the soil is placed.

The ministry will continue to work with stakeholders to advise on managing excess soil, including near environmentally sensitive areas. Decisions on where excess soil can be reused will be made on a case-by-case basis.

27. Why doesn't the ministry stipulate where soil can go?

The placement of excess soil may be subject to a number of restrictions imposed by the

ministry, a municipality, conservation authority or as a result of contractual arrangements.

Depending on the circumstances, the province's waste management provisions or regulations for the redevelopment of brownfield sites will apply.

Municipal by-laws may further restrict where and what quality of soil is placed at a property, and Conservation Authorities further regulate site alteration within their regulated areas. It is also appropriate for the receiving property owner to understand the quality of soil received and to ensure that no adverse effect results.

The ministry encourages the reuse of excess soil in a sustainable manner. The ministry has developed a Best Management Practices guide to help those who generate or receive soil decide on how best to manage that excess soil.

28. Will the government allow there to be a certain level of contamination on clean properties as part of a soil management policy?

The Best Management Practices guide advises that assessment work should be conducted for each receiving site by a Qualified Person.

Qualified Persons have the expertise to determine that the excess soil brought to the property is appropriate for reuse and will not cause an adverse effect to the property.

The Qualified Person's assessment would include soil quality and compatibility of soil type as part of their standard assessment work.

In general, those managing excess soil should seek out sites that are of compatible land-use types. Where possible, those managing excess soil should avoid the introduction of new contaminants at the receiving site and take measures to avoid increasing the concentration of an existing contaminant at a receiving site.

29. Provinces like Quebec mandate soil treatment prior to reuse. Why doesn't Ontario do the same?

The ministry encourages soil treatment if necessary to enable excess soil to be reused. The ministry will continue to promote innovative approaches to soil treatment.

30. Why doesn't the ministry ensure that municipalities use a consistent approach?

While the ministry is not developing a model by-law, the best practices are intended to complement municipal by-laws, such as site alteration, noise and traffic by-laws.

Municipalities are encouraged to consider the concepts set out in the best practices when issuing permits or licenses, or establishing by-laws or policies for soil management, and to make use of them as appropriate.

31. What's wrong with sending soil to landfill? Can't it be used as cover?

Yes – some excess soil can be used by landfill sites as cover material. The ministry is encouraging the reuse of excess soil to keep soil that can be reused from taking up space in landfill sites.

The ministry encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.

32. What's wrong with accepting a small amount of soil on my farm property if it does not cause an adverse effect?

The ministry encourages the reuse of excess soil provided that its reuse does not cause an adverse effect or impair water quality. Placing a small amount of soil on farm property is acceptable as long as the quality is appropriate and it does not cause an adverse effect.

Property owners accepting soil should consult their local municipality to determine if a permit is required.

Property owners may also consult qualified professionals to help determine the soil quality is appropriate for their property.

33. What are the next steps?

The Best Management Practices guide is available through the ministry's website. The ministry will support the guide with an implementation plan, and will work with municipalities, developers, industry associations and Qualified Persons to provide additional guidance and oversight.

In addition, the ministry will be reviewing the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

Qualified Persons

34.What is a "Qualified Person"?

Qualified Persons are defined under the ministry's brownfields legislation and are generally professional engineers and geoscientists. They are licensed under the *Professional Engineers Act*, or are members of the Association of Professional Geoscientists of Ontario.

A Qualified Person who is hired to make decisions for excess soil management should be someone who can exercise professional judgment based on their experience. This is so that they can advise on appropriate reuse options for the excavated or excess soil, based on the appropriate soil analysis and characterization.

35. What criteria are Qualified Persons using?

Qualified Persons use their professional expertise and judgment to determine the most appropriate criteria for a site on a case-by-case basis.

36. Can a Qualified Person assess a property they own or are engaged in?

Qualified Persons should not assess properties that they or their employers have a direct or indirect interest in, as this would be a conflict of interest.

37. Will the cost of ensuring that soil is tested and Qualified Persons are involved deter proponents of development projects from building in Ontario and cost Ontario jobs?

The initial short-term costs for work done at the source site may be balanced against the longer term reduced costs for trucking and shipping excess soil to landfill, especially if the excess soil can be temporarily stored or reused for beneficial purposes.

By following the best practices guide, the development community will also avoid the risk of incurring costs to address improper soil management activities.

38. What types of soil does the Best Management Practices guide address? Who determines that?

It is the responsibility of all parties who excavate, transport, receive or store excess soil to ensure that the excess soil is being managed in an environmentally sound manner in accordance with all regulatory requirements.

The guidance sets out the ministry's expectations for all those managing excess soil to support safe and sustainable soil management and reuse while promoting consistency across the province.

Fill Sites in Ontario

39. Doesn't this guidance actually encourage contamination of commercial fill sites receiving excess soil?

Commercial fill sites are permitted through local municipalities or conservation authorities.

It is the responsibility of all parties who excavate, transport, receive or store excess soil to ensure that the excess soil is being managed in an environmentally sound manner in accordance with all regulatory requirements.

The guidance sets out the ministry's expectations for all those managing excess soil to support safe and sustainable soil management and reuse while promoting consistency across the province. This includes best practices that can be applied to a commercial fill site.

Municipalities and Conservation Authorities are encouraged to incorporate the best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

40. Why isn't the ministry taking stronger action in regulating fill sites?

Many municipalities and conservation authorities have permitting requirements for fill

sites. Municipalities and Conservation Authorities are encouraged to incorporate the best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

If environmental concerns are identified at a site, the ministry may assess all activities related to excess soil management, including those occurring at a fill site and may take appropriate actions when necessary under the ministry's legislative mandate. This may include issuing orders.

41. Some municipalities are including the ministry's soil standards in their fill permits, such as Table 1 and Table 2, but it's not consistent. Why doesn't the ministry just tell municipalities what standards to use?

Some municipalities refer to Table 1 and Table 2 from the ministry's brownfields standards in their fill permits. However, the brownfields standards are not intended to address overall soil management activities in Ontario.

Rather than focus solely on standards, the ministry has developed a Best Management Practices Guide. The guide details the ministry's expectations for municipalities and others who manage excess soil. This will help ensure a consistent approach to managing large-scale construction projects. It will also encourage reuse of excess soil for beneficial purposes while providing flexibility at the local level.

The ministry will also be reviewing the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

42. The Ministry of Natural Resources requires only Table 1 soils to be used to rehabilitate former pits and quarries. Why doesn't the Ministry of the Environment and Climate Change use Table 1 standards in the Best Management Practices?

Table 1 is part of the Ministry of the Environment and Climate Change's brownfields legislation. It represents the background concentrations of metals and other substances in typical Ontario soil not affected by industry or other sources of contamination. It is intended to be applied to brownfields sites planned for redevelopment.

The Ministry of Natural Resources applies this standard as part of its legislation and policies used to rehabilitate former pits and quarries. It would be best to contact the Ministry of Natural Resources for further information on their specific legislation and policies.

The ministry supports the beneficial reuse of excess soil to help prevent the unnecessary disposal of excess soil in landfills. The use of only Table 1 for all soil management activities may limit the amount of excess soil that can be reused in an environmentally sustainable way. Discussions like this will be part of the broader review of soil management policy options.

43. Will the ministry place a moratorium on fill sites while consulting on the proposed guidance?

No. We have developed the Best Management Practices to clarify the rules and

requirements related to key excess soil management activities in Ontario.

When the ministry receives information about a site that may be causing an environmental impact, the ministry will follow up to make sure the environment is protected.

44. How can residents living near fill sites be sure their drinking water is safe?

When the ministry receives information about a site that may be causing an environmental impact, it will follow up to make sure the environment is protected. If you have concerns, contact your local ministry office.

45. What is being done to ensure soil coming into a commercial fill site is free of contaminants?

The agency that grants the permit to the site operator (such as the municipality or conservation authority) can hire a Qualified Person to determine what soil is suitable for the site.

The ministry will take action as required to make sure fill operations do not have the potential to cause an adverse effect.

46. What happens to soil that exceeds the brownfields standards?

The brownfield standards are not intended to address overall soil management activities. For example, the brownfield standards are based on assumed contaminant volumes and loadings and do not account for wide variance in soil volume and contaminant loadings which may occur with general soil management.

When considering the applicability of the brownfields standards for use at a particular site, it is important to note that elevated concentrations of contaminants when compared to the standards do not necessary imply that:

- there is a risk to human health or the environment;
- remediation is required; or
- excess soil should be considered a waste.

An elevated concentration when compared to the standards may suggest that additional site-specific studies, evaluations or assessments are warranted. These additional site-specific studies, evaluations or assessments should, at a minimum, be done in accordance with the best practices.

47. What powers do municipalities have to address soil management?

Municipalities are accountable and responsible governments and have the authority to regulate fill based on local needs.

The *Municipal Act*, 2001 provides municipalities with authority to prohibit or regulate the

placing or dumping of fill, removal of topsoil, alteration of the grade of the land and to establish fees and charges for its services and activities. Municipalities are using this authority to require studies, permits and conditions.

The *Planning Act* provides the legislative framework for municipalities to regulate the uses of land, buildings and structures. The *Planning Act* also provides municipalities with the authority to require that soil management reports be included, in certain circumstances, as part of the information and material to support an application when planning approvals are sought in respect to a development proposal.

48. What is an adverse effect?

As defined in the *Environmental Protection Act,* adverse effect refers to:

- Impairment of the quality of the natural environment for any use that can be made of it;
- injury or damage to property or to plant or animal life;
- harm or material discomfort to any person;
- an adverse effect on the health of any person;
- impairment of the safety of any person;
- rendering any property or plant or animal life unfit for human use;
- loss of enjoyment of normal use of property, and
- interference with the normal conduct of business.

49. Who will provide oversight for temporary soil storage sites?

In most cases, municipalities and Conservation Authorities would oversee Temporary Soil Storage Sites by issuing permits and approvals to assist those managing excess soil in a manner consistent with the rules of the jurisdiction.

They also enforce compliance with the permits and approvals they issue.

50. Is the government considering the development of a model by-law?

While a model by-law is not being considered at this time, municipalities are encouraged to consider the concepts set out in the guide when establishing soil management by-laws where appropriate. The ministry will also provide support to any municipality seeking to develop a by-law based on the concepts found in the guide.

51. How will the ministry ensure that anyone who establishes Temporary Soil Storage Sites won't abandon these sites and leave potentially contaminated soil piles behind?

Temporary soil storage sites must have the appropriate approvals issued by the municipality or the conservation authority. This includes ensuring the site is appropriately zoned for this use.

If environmental concerns are identified at a site, the ministry may assess all activities related to soil management, including those occurring at a commercial fill site. The ministry may take appropriate action as necessary, including issuing orders.

Inspection Follow-up Email - Information Request

Straberger, Kyle (MOECC) <Kyle.Straberger@ontario.ca>

Fri 2018-03-16 2:30 PM

To: David Veinot <dveinot@orgaworld.ca>; Brian Begg <bbegg@orgaworld.ca>; Andre Boucher <aboucher@orgaworld.ca>;

Hi Andre, David and Brian,

Thank you for your time and cooperation during the ministry's inspection of the Orgaworld Ottawa Facility. As discussed during the inspection, please provide the following information as part of the inspection:

1 - Training Protocol for employees including re-training
2 - 2017 Mass Balance
3 - Sample results for the 2017 operating year including off-site discharge
4 - Operation and Maintenance Manual records:
  - 6i ○ Copy of the Operation and Maintenance procedures for the bioscrubber and biofilters
  - 6ii ○ Inspection, repair and maintenance records for each for the following dates (date includes daily, weekly, monthly, quarterly)
    - January 18th, 2017, March 15th, May 1st, July 3rd, September 29th, November 30th
  - 6iii ○ Process data for bioscubber and biofilters for the dates outlined above
5 - Confirm copy of original ESDM report that accompanied ECA No. 1631-A2ELCQ
6 - Confirm copy of original Acoustic Assessment report that accompanied ECA No. 1631-A2ELCQ
7 - Complaint protocol for receiving and responding to complaints from the public (ECA No. 1631-A2ELCQ)
- Sampling results for the 2017 operating year, including off-site discharge, from the industrial sewage works

Let me know you if you have any questions.

Thanks,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

Please consider the environment before printing this email.

8.0 COMPLAINT RESPONSE PROTOCOL

If complaints are received in relation to the Site or Site operations, information pertaining to the complaint will be recorded and a response protocol will be initiated in three steps as per the C of A (Air) as follows:

Step 1: Record of Complaint

The information collected regarding the complaint will be:

- Contact information of the complainant
- Time, date, and location of the complaint
- Complainant's identification of the characteristics of the odour and any information indicating relative strength compared to other events
- Operational activities during the time of the complaint
- Wind direction, weather conditions, and temperature

To gather additional information regarding the characteristics of the odour source, the Site Manager will ask for permission of the complainant to send Site personnel to the location of the complaint to provide additional characterization of the odour source. This is a component of the Complaints Response Protocol developed for two reasons: to validate the odour as originating from the Facility and, if this validation is provided, to assess the likely source of the odour from the Facility. This will facilitate identification of Facility components that are potentially responsible for the odour emission. Complainants will also be invited to visit the Site to allow them to see and smell the Facility's operations and more accurately provide feedback.

When the odour issue is resolved, the Site Manager will fully investigate the situation and determine procedures to be enacted to prevent reoccurrence. All newly implemented procedures will be fully communicated to Site employees.

Step 2: Investigation and Handling of Complaint

The following outlines the procedure for notifying the MOE of odour and noise-related issues. All events in relation to odour and noise that are beyond the normal operating conditions are recorded. These records are available to the MOE upon request. The MOE District Manager will be immediately notified in case of a situation that could potentially lead to significant increases in odour and noise generated.

In case of process discrepancies, the following procedures are adhered to:

Extent of Process Aberration	*Notifying Procedure*
Aberrations which are: not influencing processing ability; and do not cause significant increase of odour and noise generated.	Event and responsive actions recorded in Site logbook or electronic file Immediately informed are: Facility Site Manager
Aberrations which may: potentially lead to significant increase of odour and noise generation	Event and responsive actions recorded in Site logbook or electronic file Immediately informed are: Facility Site Manager Senior Operations Manager MOE District Manager

Each complaint will be recorded using a computerized tracking system and will include the following information:

- Name, address, and telephone number
- Time and date of complaint
- Waste management activities undertaken at time of complaint
- Details of complaint
- Actions taken to remediate the cause of complaint
- Proposed actions to be taken to prevent reoccurrence in future

A record of all activities taken to mitigate the odour source will be recorded. All procedures developed to prevent reoccurrence will also be recorded.

The MOE Ottawa Regional Office will be notified of a complaint made by a member of the public. All appropriate steps will be taken to eliminate the cause of the complaint and to prevent reoccurrence.

As per C of A (Waste Disposal Site) requirements, a designated representative will be available to receive complaints 24 hours per day, 7 days per week. Information regarding this hotline will be displayed on signage at the entrance to the Facility. The MOE's Spill Action Centre will be notified immediately of all complaints received at the Site. Upon successful resolution of the complaint OCL will within 3 business days provide, a written

report to the District Manager identifying the source of complaint and details of what action was taken to rectify problem and prevent recurrence.

Step 3: Suspension of Operation

OCL acting on orders from the District Manager will suspend the receipt of organic wastes and/or suspend operations of the Facility in conjunction with the Emergency Response and Contingency Plan should the District Manager deem this action to be required to satisfy an occurrence of valid and substantiated odour complaints.

Part 1 Part 2

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date Wednesday Jan 18 2017

Maintenance Rep. Darryl

TASKS:

- Picked up roller That Fell off Screening Line and rebuild it went to RS for bearings
- Rip apart 3 brushes from screening Line
- Boosted 522oF with Brad & [illegible]
- Cleaned up work area open / close Door #3 X2

Regular Hours	Overtime Hours	Daily Total
10 — 6:30pm		Weekly Total

002082

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date March 15 2017

Maintenance Rep. Darryl

TASKS:

- had Morning Meeting
- check T3 probe #1
- switch Ducting pump with Process pump

Regular Hours	Overtime Hours	Daily Total
		Weekly Total

10am 6:45pm

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date MARCH 15 2017

Maintenance Rep. WILLIE MCLACHLAN

TASKS:

PLOW SNOW
CLEAN PROCESS FILTER TWICE
SHOVEL DOORS
RESEAL DRAIN PLUG ON PUMP ON BIOSCRUBBER PUMP.

Regular Hours	Overtime Hours	Daily Total
6:00AM - 2:30PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date MAY 1 2017

Maintenance Rep. WILLIE MCLACHLAN

TASKS:

- DAILY INSPECTION SHEET
- WORK ON SCREENING

Regular Hours	Overtime Hours	Daily Total
6:00AM TO 18:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date May 1rst 2017

Maintenance Rep. Darryl

TASKS:

- Worked on peterson with Tim From capital controle and Denis to set up Peterson

Regular Hours	Overtime Hours	Daily Total
		Weekly Total

10 am 6:30pm

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date July 3 2017

Maintenance Rep. Willie

TASKS:

- Daily inspection sheet
- Fix 220 wiper
- work with mechanic on 644 loader
- Trouble shoot 744 loader
- Receiving

Regular Hours	Overtime Hours	Daily Total
6:00AM-6:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date SEPT 29 2017

Maintenance Rep. WILLIE

TASKS:

- DAILY INSPECTION SHEET
- HELP WALK DOPPSTADT FOR CLEANING
- SAFETY MEETING
- FUEL DOPPSTADT AND REFUEL JOCKEY TANK
- WORK WITH BRIAN & MECHANIC ON 220 LOADER 972 LOADER AND 966K RENTAL LOADER.

Regular Hours	Overtime Hours	Daily Total
6:00AM - 5:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date NOV 30 2017

Maintenance Rep. WILLIE

TASKS:

- WORKED IN TECH HALL
- FIX PROBE IN TUNNEL #1
- WORK IN RECEIVING
- SAFETY MEETING

Regular Hours	Overtime Hours	Daily Total
8:30AM - 4:30PM		
		Weekly Total

Part 4 Bellet 2

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Jan 18 / 17 TIME : 730 AM

NAME : BBegg SIGNED : [signature]

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: _____ **Ducks** _____ **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : March 15/17 TIME : 1030 AM

NAME : Jessica SIGNED : [signature]

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 **Ducks** 0 **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : May 1 / 17 TIME : 845 AM

NAME : Jessica SIGNED : Jessica Hall

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 2 **Ducks** 1 **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : July 3/17 TIME : 630 AM

NAME : Jessica SIGNED : Jessica Black

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 Ducks 0 Geese	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Sept 30 TIME : 7:45

NAME : BB SIGNED : BBegg

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 4 **Ducks** _____ **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Nov. 30/17 TIME : 7:30 AM

NAME : Jessica SIGNED : Jessica Black

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 Ducks 0 Geese	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Pond 4 Build 2

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Jan. 17 / 17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	456.3	✓	No
Sulphuric Acid	291.4	✓	No
Recirculation	Full	✓	No
Bleeder	80 Gal	✓	No

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	No
Sigma Acid	✓	✓	No

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	✓		No
Scrubber Body	✓		No
Floor Drip Trays	✓		No
Support Structure	✓		No

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	No
Level Sensors	✓	✓	No
Pressure Transmitter	✓	✓	No

VALVES & PIPE

	Function	Condition	Leaks
Ducting Dischage	✓	✓	No
Bleeder Down Tube	✓	✓	No
Strainer & Pump	✓	✓	No
Acid Lines	✓	✓	No

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	59803	m3/h
Static Pressure	9.1	mb
Negative Pressure	-37.5	Pa
Pressure Drop	N/A	
Fan Speed	70	%
Incoming Air Temp	31.8	°C
Bio Mass Temp	33.9	°C
Average Temp	33.2	°C
Air Inlet Humidity	99.6	%
Water Pressure	0	bar
Spraying Frequency	5 min	16 hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	Loud
Fan Bearing Temp	32.3 /	26.7°C
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	40396	m3/h
Static Pressure	8.6	mb
Negative Pressure	-26.2	Pa
Pressure Drop	N/A	
Fan Speed	72	%
Incoming Air Temp	31.8	°C
Bio Mass Temp	35.2	°C
Average Temp	34.8	°C
Air Inlet Humidity	97.1	%
Water Pressure	0	bar
Spraying Frequency	5 min	16 hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	24.4 /	29.4 °C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	No	General Condition	✓

002096

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	clear
Water Odour	Slight odour

	Value	Normal
Water Level	67.1cm	✓
Water PH	N/A	✓
Air Flow	100 828 m³/h	✓
Inlet Air Temp	28.1°C	✓
Inlet Air Humidity	100.1.	✓
Scrubber Pressure	1.6 bar	✓
Scrubber O2	20.7.1.	✓
Manifold Pressure	1.6 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	Needs Replacement

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	✓ Belt Squeak
Fan Bearing Temp	44.7 / 56.0°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	32.0°C
Test Ports Operational	✓

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	44.4 / 51.9°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	32.0°C
Test Ports Operational	✓

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: March 14 / 17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	199.7cm	✓	No
Sulphuric Acid	292 4cm	✓	"
Recirculation	4 14	✓	Yes
Bleeder	80 gal	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	No
Sigma Acid	✓	✓	No

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓	=	No
Bio Filter Plenum	X	=	Yes
Scrubber Body	X ✓	=	Yes
Floor Drip Trays	✓	=	No
Support Structure	✓	=	No

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	No
Level Sensors	✓	✓	No
Pressure Transmitter	✓	✓	No

VALVES & PIPE

	Function	Condition	Leaks
Ducting Dischage	✓	✓	No
Bleeder Down Tube	✓	✓	No
Strainer & Pump	✓	✓	No
Acid Lines	✓	✓	No

Comments: Air leaking from connection between ductwork and ammonia scrubber (bio filter side); Water leaking from inspection door of scrubber body

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	74870	m^3/h
Static Pressure	18.5	mb
Negative Pressure	-31.7	Pa
Pressure Drop	N/A	
Fan Speed	98%	
Incoming Air Temp	25.0°C	
Bio Mass Temp	27.1°C	
Average Temp	26.4°C	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5 min 16 hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	LOUD MOTOR
Fan Bearing Temp	25.1°C	132.6°C
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	54294	m^3/h
Static Pressure	19.1 mb	
Negative Pressure	2.1	Pa
Pressure Drop	N/A	
Fan Speed	98%	
Incoming Air Temp	25.1°C	
Bio Mass Temp	26.8°C	
Average Temp	26.6°C	
Air Inlet Humidity	~~100%~~	98.2%
Water Pressure	0 bar	
Spraying Frequency	5 min 16 hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	21.0°C	136.5°C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	No	General Condition	✓

002098

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	49.0 cm	✓
Water PH	N/A	✓
Air Flow	126 174 m³/h	✓
Inlet Air Temp	21.9°C	✓
Inlet Air Humidity	100%	✓
Scrubber Pressure	1.9 bar	✓
Scrubber O2	21.1%	✓
Manifold Pressure	1.9 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	Needs replacement.

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	Okay, belt squeak
Fan Bearing Temp	45.3°C / 36.4°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	24.2°C
Test Ports Operational	✓

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	36.1°C / 62.5°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	24.2°C
Test Ports Operational	

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: MAY 4 /17 Maintenance Person: JESSICA

AMMONIA SCRUBBER

Scrubber Status:	ON ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	217.4	✓	NO
Sulphuric Acid	295.6	✓	"
Recirculation	Full	✓	"
Bleeder	60 Gal	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	NO
Arbo Strainer	✓	✓	NO
Sigma Acid	✓	✓	NO

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		NO
Bio Filter Plenum	OK		YES
Scrubber Body	✓		NO
Floor Drip Trays	✓		NO
Support Structure	✓		NO

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	NO
Flow Switch	✓	✓	NO
Level Sensors	✓	✓	NO
Pressure Transmitter	✓	✓	NO

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	NO
Bleeder Down Tube	✓	✓	NO
Strainer & Pump	✓	✓	NO
Acid Lines	✓	✓	NO

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	66235	m³/h
Static Pressure	11.9	mb
Negative Pressure	-23	Pa
Pressure Drop	N/A	
Fan Speed	64	%
Incoming Air Temp	32.9	°C
Bio Mass Temp	34.1	°C
Average Temp	32.0	°C
Air Inlet Humidity	~~95~~ 100	%
Water Pressure	0 bar	
Spraying Frequency	5 min / 6 hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.7 / 39.1 °C	
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	36665	m³/h
Static Pressure	10.7	mb
Negative Pressure	-11	Pa
Pressure Drop	N/A	
Fan Speed	65	%
Incoming Air Temp	36.2	°C
Bio Mass Temp	34.9	°C
Average Temp	32.2	°C
Air Inlet Humidity	98.1	%
Water Pressure	0 bar	
Spraying Frequency	5 min / 6 hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	29.1°C	34.2°C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	43.9 cm	✓
Water PH	N/A	✓
Air Flow	123364 m3/h	✓
Inlet Air Temp	32.3°C	✓
Inlet Air Humidity	100.1.	✓
Scrubber Pressure	1.5 bar	✓
Scrubber O2	19.6%	✓
Manifold Pressure	1.5 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	GOOD
Filter 4.3	"
Check Valve 4.2	"
Check Valve 4.3	"
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	GOOD
Pump # 3 (4.3)	"
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	34.3/27.3°C
Stack Condition	GOOD
Stack Base Condition	GOOD
Stack Temp.	33.8°C
Test Ports Operational	YES x2

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	27.4/33.7°C

COMMENTS

first leaking to Bio filter May 9

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: July 3/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	OK ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	330-60cm	✓	No
Sulphuric Acid	195cm	✓	"
Recirculation	213	✓	"
Bleeder	120 GAL	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	✓
Arbo Strainer	✓	✓	✓
Sigma Acid	✓	✓	✓

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	OK		YES
Scrubber Body	OK		No
Floor Drip Trays	✓		No
Support Structure	✓		No

Comments:

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	✓
Flow Switch	✓	✓	✓
Level Sensors	✓	✓	✓
Pressure Transmitter	✓	✓	✓

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	✓
Bleeder Down Tube	✓	✓	✓
Strainer & Pump	✓	✓	✓
Acid Lines	✓	✓	✓

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	42150	
Static Pressure	13 mb	
Negative Pressure	-21	
Pressure Drop	N/A	
Fan Speed	80	
Incoming Air Temp	39	
Bio Mass Temp	42	
Average Temp	419	
Air Inlet Humidity	98.1	
Water Pressure	0 bar	
Spraying Frequency	5min/1hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.1 / 37.2	
Humidity Tube Level	✓	
Belimo Valves		

BIO FILTER #2

	Value	Condition / Comment
Air Flow	51290	
Static Pressure	14 mb	
Negative Pressure	-12	
Pressure Drop	N/A	
Fan Speed	80	
Incoming Air Temp	39	
Bio Mass Temp	41	
Average Temp	42.2	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5min/1hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition		
Fan Bearing Temp	✓	
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	37.2	✓
Water PH	N/A	✓
Air Flow	9420	✓
Inlet Air Temp	41	✓
Inlet Air Humidity	100	✓
Scrubber Pressure	1.16 Bar	LOW
Scrubber O2	19.1	✓
Manifold Pressure	1.16 Bar	LOW

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	41.4 / 86.2

Stack Temp.	40
Test Ports Operational	YES

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	39.4 / 39.2

Stack Condition	✓
Stack Base Condition	✓

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Sept. 29/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	328.6	✓	No
Sulphuric Acid	104.9	✓	"
Recirculation	4/4	✓	"
Bleeder	Empty	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	✓
Arbo Strainer	✓	✓	✓
Sigma Acid	✓	✓	✓

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		✓ No
Bio Filter Plenum	✓		✓ "
Scrubber Body	✓		✓ "
Floor Drip Trays	✓		"
Support Structure	✓		"

Comments:

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	✓
Flow Switch	✓	✓	✓
Level Sensors	✓	✓	✓
Pressure Transmitter	✓	✓	✓

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	✓
Bleeder Down Tube	✓	✓	✓
Strainer & Pump	✓	✓	✓
Acid Lines	✓	✓	✓

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	65177	
Static Pressure	-7.3	
Negative Pressure	-28.3	
Pressure Drop	N/A	
Fan Speed	75.1	
Incoming Air Temp	37.0°C	
Bio Mass Temp	36.0°C	
Average Temp	36.1°C	
Air Inlet Humidity	100.1	
Water Pressure	0 bar	
Spraying Frequency	5 min/6hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.5/41.0°C	
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	43520	
Static Pressure	9.7	
Negative Pressure	-27.8	
Pressure Drop	N/A	
Fan Speed	75.1	
Incoming Air Temp	33.9°C	
Bio Mass Temp	36.6°C	
Average Temp	34.9°C	
Air Inlet Humidity	98.4%	
Water Pressure	4.8 bar	
Spraying Frequency	5 min/6hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	32.4/33.0°C	
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	50.0	✓
Water PH	N/A	✓
Air Flow	108/166 m³/h	✓
Inlet Air Temp	30.4°C	✓
Inlet Air Humidity	100%	✓
Scrubber Pressure	1.1 bar	low
Scrubber O2	19.9 %	✓
Manifold Pressure	1.1 bar	LOW

MECHANICAL

	Valve Setting
Sprayer # 1	1/8
Sprayer # 2	1/8
Sprayer # 3	1/8
Sprayer # 4	1/8

	Condition
Filter 4.2	GOOD
Filter 4.3	GOOD
Check Valve 4.2	GOOD
Check Valve 4.3	GOOD
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	IN SERVICE
Pump # 3 (4.3)	OK
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	34.9/32.0°C

Stack Temp.	32.8°C
Test Ports Operational	YES - INSIDE CLOSED

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	29.1/35.2

Stack Condition	GOOD
Stack Base Condition	GOOD

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Nov. 30/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	✓	Off

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	327.4	✓	No
Sulphuric Acid	106.0	✓	"
Recirculation	Low	✓	"
Bleeder	EMPTY	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	"
Sigma Acid	✓	✓	"

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	✓		"
Scrubber Body	✓		"
Floor Drip Trays	✓		"
Support Structure	✓		"

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	"
Level Sensors	✓	✓	"
Pressure Transmitter	✓	✓	"

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	No
Bleeder Down Tube	✓	✓	"
Strainer & Pump	✓	✓	"
Acid Lines	✓	✓	"

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	77250	
Static Pressure	12.5	
Negative Pressure	-18	
Pressure Drop	N/A	
Fan Speed	90%	
Incoming Air Temp	21.1	
Bio Mass Temp	23.4	
Average Temp	24.1	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 4hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	31.7	/ 42.1 ✓
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	59450	
Static Pressure	15	
Negative Pressure	-10	
Pressure Drop	N/A	
Fan Speed	90%	
Incoming Air Temp	20.8	
Bio Mass Temp	23.2	
Average Temp	23.8	
Air Inlet Humidity	98%	
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 4hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	✓	32.1/41.9
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

002106

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	CLEAR
Water Odour	SLIGHT ODOUR

	Value	Normal
Water Level	50	✓
Water PH	N/A	✓
Air Flow	132150	✓
Inlet Air Temp	21.1	✓
Inlet Air Humidity	100.1	✓
Scrubber Pressure	2.0bar	✓
Scrubber O2	20.6	✓
Manifold Pressure	2.0bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	100
Sprayer # 2	100
Sprayer # 3	100
Sprayer # 4	CLOSED

	Condition
Filter 4.2	GOOD
Filter 4.3	GOOD
Check Valve 4.2	GOOD
Check Valve 4.3	GOOD
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	GOOD
Pump # 3 (4.3)	GOOD
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	64.9/25.5

Stack Temp.	22.4
Test Ports Operational	YES

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	26.7/35.1

Stack Condition	GOOD
Stack Base Condition	GOOD

COMMENTS

Squeaking belt on Stack fan #1 fixed November 27/17

Orgaworld Canada (Ottawa)

Part of the Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET - ODOUR ABATEMENT SYSTEM

Month: JANUARY 2017

DAY	AIR FLOW m3/hr	Fan Speed %	Pressure Drop mb	Humidity In %	Humidity Out %	Air Temp In (Degrees C)	Avg Temp (Degrees C)	Rate of Irrigation
1	35800	63	6.7	100	100	35.2	34.6	5MINUTES 6 HOURS
2	31715	60	6.3	97.7	100	36.5	37.4	5MIN 6HRS
3	41792	73	9.8	98.2	100	39.6	40.1	5M 6H
4	41544	71	8.2	97.6	100	33.2	33.4	5M 6H
5	35514	65	7.6	97.3	100	26.5	28.3	5M 6H
6	37325	67	7.6	97.4	100	29.1	28.7	5M 6H
7	40373	46	4.3	96.8	100	32	34.6	5M 6H
8	33264	52	4.2	96.5	100	28.2	31.8	5M 6H
9	35902	62	6.5	98	100	21.8	26.1	5M 6H
10	40743	60	6	97.4	98.7	39.2	38.2	5M 6H
11	35794	58	5.2	98	100	33.6	35.8	5M 6H
12	33759	59	5.8	98.5	100	37.9	37.1	5M 6H
13	36766	64	7.1	97.1	100	30.8	32.6	5M 6H
14	32565	59	5.4	98	100	31.3	31.4	5M 6H
15	44811	76	10.4	97.8	100	36.9	38	5M 6H
16	34775	62	7	98.2	100	42.6	40.6	5M 6H
17	47281	80	10.8	97.3	100	36.6	35.5	5M 6H
18	39548	68	8.1	96.4	100	34	35.6	5M 6H
19	36448	63	6.8	97.2	100	34.3	33.8	5M 6H
20	42258	70	8.9	98.2	100	41.2	39.1	5M 6H
21	35063	55	5	96.7	100	32.6	34.2	5M 6H
22	34444	58	5.8	97.6	100	32.9	34.3	5M 6H
23	37537	64	7.5	97.2	100	32.8	35.2	5M 6H
24	33060	54	5	97.6	100	33.9	33.7	5M 6H
25	36273	58	5.8	97.8	100	39.9	38.1	5M 6H
26	32214	55	4.5	98.1	99.6	37	38.5	5M 6H
27	37417	62	6.2	98.2	100	41.2	42	5M 6H
28	43086	65	7.4	98.6	100	38.6	39.1	5M 6H
29	27097	44	3.4	100	100	41.8	41.9	5M 6H
30	39560	67	7.9	97.5	100	40.6	42.2	5M 6H
31	37252	62	8.1	97.3	100	36.1	34.5	5M 6H

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: **MARCH 2017**

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	58927	99	17	98.9	100	35.9	38.5	5MIN/6HRS
2	60010	100	18	97.2	100	34.1	35.3	5M/6HR
3	26833	58	5.8	97.3	100	25.8	27.2	5M6H
4	33871	60	7.4	96.2	100	24.5	26.2	5M6H
5	38251	61	7.7	97.1	100	36.7	24.9	5M6H
6	35809	66	9.7	97.4	100	29.3	29.2	5M6H
7	36074	61	6.8	98.1	100	35.9	30.8	5M6H
8	36232	64	8.6	97.5	100	39.6	37.7	5M6H
9	47726	73	12	98.1	100	38.7	37.5	5M6H
10	44775	71	9.6	98.2	100	37.9	36.9	5M6H
11	41651	65	8.1	97.2	100	34.4	30.2	5M6H
12	39971	73	10	97.1	100	32.5	31.6	5M6H
13	47321	94	14.2	98.2	100	29	31.6	5M6H
14	53781	99	19.1	97.2	100	25.2	26.6	5M6H
15	35061	65	7.8	96.8	100	19	22.6	5M6H
16	27540	51	4.4	97	100	14.9	19.2	5M6H
17	39870	65	7.7	97.7	100	25.1	21.2	5M6H
18	36472	63	8.4	96.9	100	29.6	27.5	5M6H
19	33616	65	8.9	97.6	100	22.9	24.2	5M6H
20	34016	65	8.6	96.4	100	20.1	20.5	5M6H
21	40912	76	12	97.1	100	24.5	25.1	5M6H
22	32472	59	7.3	96.7	100	17.7	21.3	5M6H
23	29674	53	5.5	96.1	100	17.8	17.4	5M6H
24	43827	80	13.6	97.6	100	33.1	26.2	5M6H
25	49715	55	10	97.1	100	31.3	30.5	5M6H
26	27604	57	19.6	96.6	100	46.7	39.7	5M6H
27	49738	89	17.2	97.7	100	35.6	36.6	5M6H
28	48988	88	15.7	98.5	100	36.7	36.6	5M6H
29	39878	75	10.4	96.9	100	34.5	34.8	5M6H
30	39723	73	10.9	97.3	100	34.9	34.3	5M6H
31	43097	76	12	98.2	100	38.4	38.7	5M6H

002109

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MAY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	36982	63	6.1	97.5	100	31.6	32.4	5MIN LARS
2	50561	85	11.9	98.8	100	32.5	33.1	5M/6MRS
3	38740	67	6.8	97.4	100	30.6	31	5M6H
4	37495	65	7.3	98.4	100	31.2	31.9	5M6H
5	43387	73	8.7	98	100	33.3	34.6	5M6H
6	45617	77	9.5	98.7	100	34	33.4	5M6H
7	42307	69	8.9	97.9	100	18.3	32.3	5M6H
8	46276	76	9.6	98.4	100	33.4	30.5	5M6H
9	49978	83	11.7	96.7	100	31.5	31.5	5M6H
10	37204	64	7	98.4	100	33.6	32.2	5M6H
11	35647	63	7.5	98.5	100	35	35.7	5M6H
12	39511	70	8.5	98.5	100	37	37	5M6H
13	34132	60	6.1	97.7	100	39.6	39	5M6H
14	28729	48	4.7	98.6	100	42.4	41.4	5M6H
15	54461	88	14	98.9	100	44.2	42.2	5M6H
16	36173	61	6.2	98.1	100	35.3	37.7	5M6H
17	48654	79	10.4	93	100	42.2	41.8	5M6H
18	33763	58	5.4	98.9	100	40.8	40.7	5M6H
19	33147	55	4.7	98.2	100	39.3	39.9	5M6H
20	43966	76	10.1	98.5	100	39.7	43.1	5M6H
21	39560	66	7	98.5	100	34.5	38.4	5M6H
22	44614	75	10	99.6	100	38.9	40.4	5M6H
23	45417	74	8.8	98.5	100	39.3	39.2	5M6H
24	45722	76	9.2	98.5	100	39.7	39.8	5M6H
25	44548	73	8.8	98.6	100	42.3	41.5	5M6H
26	37700	63	6.2	98.8	100	35.6	36.9	5M6H
27	42109	69	7.7	98.1	100	39.9	39.6	5M6H
28	35426	76	9.6	97.5	100	40.7	41.3	5M6H
29	39130	66	7	98.2	100	41.9	42.9	5M6H
30	49978	84	12.3	99	100	41.6	42.9	5M6H
31	47397	78	10.6	98.9	100	39.1	39.4	5M6H

002110

Orgaworld
Part of Stanley Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: JULY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	36249	63	6.6	97.9	100	40.9	41.8	5MIN 6HRS
2	36349	62	7.8	98.9	100	43.3	42.5	5MIN 6HRS
3	42972	73	9.4	98.6	100	42.9	43.2	5M 6H
4	40222	71	8.8	98.9	100	40	39.7	5M 6H
5	30864	54	5	99.3	100	41.1	39.4	5M 6H
6	55259	93	16.2	90	100	39.9	39	5M 6H
7	51623	85	11.8	96.8	100	40.6	40.7	5M 6H
8	51339	84	10.5	100	100	39.3	36.8	5M 6H
9	47280	76	8.5	97.5	100	40.5	41.2	5M 6H
10	54874	68	11.7	98.6	100	43.3	40.8	5M 6H
11	45700	73	7.9	98.9	100	42.3	41.7	5M 6H
12	62652	85	10.9	97.8	100	40.2	41	5M 6H
13	48998	79	9.6	98.6	100	40.2	40.5	5M 6H
14	37505	61	6	99.3	100	40	39.8	5M 6H
15	35637	58	4.7	98.2	100	42.7	41.4	5M 6H
16	42883	67	7.4	98.3	100	46.4	44.9	5M 6H
17	53337	87	12.6	99	100	45.6	45.6	5M 6H
18	49325	83	11.7	98.6	100	45.2	44.9	5M 6H
19	44787	73	7.8	99.3	100	44.9	44.8	5M 6H
20	56657	91	14	99.3	100	46.3	47.2	5M 6H
21	53056	86	43.9	99.4	100	43.9	44.6	5M 6H
22	47084	78	9.4	98	100	45.6	45.8	5M 6H
23	48204	83	11.2	99.3	100	41.6	42.6	5M 6H
24	51747	87	13.1	98.5	100	40.8	40.9	5M 6H
25	47705	84	12.7	98.6	100	39.6	40.6	5M 6H
26	54050	93	16.1	98.9	100	43.2	43.9	5M 6H
27	48277	82	12.2	97.9	100	43.6	43.5	5M 6H
28	37558	66	7.1	98.5	100	40.9	40.9	5M 6H
29	36102	64	15.5	99.6	100	39.3	41.4	5M 6H
30	59599	90	12.2	91.9	100	48.6	49.2	5M 6H
31	61725	100	16.6	98.4	99.7	44.1	48.9	5M 6H

002111

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: SEPTEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	37787	68	8.2	98.1	100	39.9	38	5M IN 6HRS
2	49815	85	12.8	98.6	100	42.9	42.8	5M 6H
3	53315	90	15.8	98.2	100	40.3	40.7	5M 6H
4	48389	83	13.3	97.7	100	36.5	37.5	5M 6H
5	54082	87	13.7	98.6	100	41	41	5M 6H
6	51747	88	14.3	99.6	100	40	40.3	5M 6H
7	45128	75	10.1	98.9	100	40.2	39.5	5M 6H
8	36297	66	7	98.2	100	39	38.3	5M 6H
9	39152	67	7.6	97.4	100	37.3	37.5	5M 6H
10	54040	89	15.7	98.2	100	44	41.9	5M 6H
11	52440	92	15.3	99.3	100	43.2	42.5	5M 6H
12	51124	84	13	98.2	100	42.3	42.1	5M 6H
13	53476	87	13.6	99	100	44.3	44.1	5M 6H
14	48277	82	11.9	98.6	100	43.3	42.6	5M 6H
15	52772	91	15.7	98.2	100	41.3	41.5	5M 6H
16	38199	68	8.5	97.1	100	45.3	43.7	5M 6H
17	51199	86	14.3	94.1	100	45.5	44.6	5M 6H
18	41792	73	10.1	99	100	43	41.8	5M 6H
19	51790	88	13.9	98.6	100	42.5	42	5M 6H
20	50886	88	14.1	99.3	100	39.7	40.7	5M 6H
21	36687	69	8.6	99.3	100	39.6	39.9	5M 6H
22	47945	82	11.8	98.1	100	38.8	39	5M 6H
23	45534	65	9.6	98.6	100	43.1	42.4	5M 6H
24	44360	73	8.8	98.7	100	47.2	44.8	5M 6H
25	54602	91	15.5	98.6	100	42.8	43.2	5M 6H
26	48867	82	45.4	96.9	98.6	45.4	44.4	5M 6H
27	50947	87	14.2	99.3	100	40	41.5	5M 6H
28	47567	81	11.1	98.8	100	36.6	37	5M 6H
29	43557	76	10.3	98.9	100	36.3	35.7	5M 6H
30	54520	91	12.8	99.6	100	45.6	38.3	
31								

002112

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: NOVEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	37921	65	7	97.8	100	28.7	28.4	5MIN6HRS
2	38961	66	7.8	98.8	100	32.2	31.9	5M6H
3	39965	66	8	98.4	100	32.5	33.2	5M6H
4	36493	61	5.6	97.5	100	29.1	31.1	5M6H
5	35170	58	5.7	97	100	25.2	25.7	5M6H
6	37514	62	7.1	98.4	100	31.6	31.3	5M6H
7	37797	62	7.2	97.7	100	36.3	32.4	5M6H
8	35274	59	5.7	97.8	100	28.7	28.9	5M6H
9	42900	71	9.1	97.8	100	28.3	29.6	5M6H
10	41822	72	9.4	96.9	100	27	25	5M6H
11	44629	79	11.6	96.9	100	24.3	25.4	5M6H
12	40865	71	9.2	97.6	100	34.2	31.5	5M6H
13	38694	67	8.2	99.1	100	29.5	29.3	5M6H
14	40217	70	8.9	97.9	100	30.8	31.9	5M6H
15	50169	87	13.8	97.4	100	29.3	30.7	5M6H
16	47743	78	9.6	98.5	100	23.9	25	5M6H
17	56456	93	14.5	98.5	100	24.5	26.4	5M6H
18	47696	80	11	97.5	100	21.2	23.4	5M6H
19	41006	71	8.5	97	100	23.1	23.3	5M6H
20	44171	79	10.2	98	100	22.9	23.9	5M6H
21	37705	67	7.8	95.7	100	23.8	25.2	5M6H
22	49217	88	14.1	98.7	100	28.3	30	5M6H
23	48644	86	12.8	97.6	100	24.9	24.3	5M6H
24	47758	82	11.7	97.9	100	29	28.5	5M6H
25	49239	96	7.4	97.6	100	23.5	24.8	5M6H
26	50424	80	13	97.4	100	20.5	22.3	5M6H
27	52363	73	15.3	98	100	22.4	23.7	5M6H
28	53652	93	16.8	97.5	100	31.8	20.6	5M6H
29	36074	61	6.7	98.5	100	22.6	24.2	5M6H
30	29776	61	7	97.4	100	19.4	21.2	5M6H
31								

002113

Orgaworld Canada (Ottawa)

Part of the Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET - ODOUR ABATEMENT SYSTEM

Month: JANUARY 2017

DAY	AIR FLOW m3/hr	Fan Speed %	Pressure Drop mb	Humidity In %	Humidity Out %	Air Temp In (Degrees C)	Avg Temp (Degrees C)	Rate of Irrigation
1	55325	63	8	98.8	100	37.5	32.5	5MINUTES 6HOURS
2	56591	60	6.3	99.6	100	36.7	35.2	5MIN 6HRS
3	62728	73	9.8	100	100	39.8	38.2	5M 6H
4	61283	71	8.4	99.2	100	33.3	32.4	5M 6H
5	51729	65	8	99.2	100	26.9	27.3	5M 6H
6	55717	67	8.5	100	100	29.2	27.4	5M 6H
7	43735	46	3.9	100	100	33.3	30	5M 6H
8	42508	52	4.8	99.1	100	28.5	29.6	5M 6H
9	50261	62	7.2	100	100	22.1	25.1	5M 6H
10	51317	60	6.6	98.9	98.7	39.7	35.2	5M 6H
11	53357	58	4.9	100	100	33.9	34.1	5M 6H
12	48867	59	6.2	100	100	38.2	35.9	5M 6H
13	50327	64	7	100	100	31	31.4	5M 6H
14	45953	59	6.8	100	100	32.1	29.6	5M 6H
15	61475	76	11.2	99.6	100	38	36.7	5M 6H
16	50094	62	7.1	98.9	100	42.8	38.3	5M 6H
17	66882	80	11.9	99.6	100	36.7	34.3	5M 6H
18	58327	68	8.4	99.2	100	33.9	34.3	5M 6H
19	50662	63	6.9	98.9	100	34.4	32.7	5M 6H
20	57676	70	9.7	100	100	41.4	36.9	5M 6H
21	33584	55	5.2	100	100	32.3	32.9	5M 6H
22	37393	58	6.6	100	100	34.3	30.9	5M 6H
23	40173	64	7.4	98.8	100	33	32.1	5M 6H
24	41701	54	4.8	100	100	33.8	30.2	5M 6H
25	47978	58	5.7	100	100	39.9	35.2	5M 6H
26	47893	55	4.9	98.9	99.6	37.3	36.1	5M 6H
27	56587	67	6	99.3	100	41.4	39.9	5M 6H
28	56262	65	6.8	98.6	100	39.1	37.2	5M 6H
29	51883	49	3.8	100	100	41.8	38.3	5M 6H
30	59797	67	7.9	98.9	100	40.2	40.3	5M 6H
31	63677	67	7.4	98.9	100	36.3	33.6	5M 6H

002114

Orgaworld
of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MARCH 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	78376	99	16.4	100	100	35.2	37.9	5MIN/6HRS
2	78713	100	18.2	100	100	33	35.1	5M/6H
3	47786	58	5.5	99	100	24	26.4	5M6H
4	46469	60	6.8	100	100	22.4	25.2	5M6H
5	47170	61	7.1	100	100	20.4	23.9	5M6H
6	52571	66	8.6	100	100	27.6	28.2	5M6H
7	49077	61	6.7	100	100	34.5	29.5	5M6H
8	52444	64	8.4	99.2	100	38.6	36.2	5M6H
9	59543	73	11.3	100	100	37.5	37.4	5M6H
10	62377	71	9.2	100	100	36.7	35.3	5M6H
11	61291	65	8	100	100	35.4	30.1	5M6H
12	68683	73	10.2	99.6	100	33	31.3	5M6H
13	75543	84	13.6	99.1	100	29.1	31.4	5M6H
14	75276	99	20	99	100	25.1	26.3	5M6H
15	50090	65	7.7	99.4	100	19	22.1	5M6H
16	39976	51	4.4	100	100	14.4	18.7	5M6H
17	51339	65	8.2	100	100	24.2	20.9	5M6H
18	48396	63	7.9	100	100	29	26.1	5M6H
19	48394	65	9.4	100	100	22.7	23.7	5M6H
20	49877	65	8.6	100	100	19.4	19.5	5M6H
21	59246	76	11.5	100	100	24	24.3	5M6H
22	45744	59	7.4	100	100	16.8	20.7	5M6H
23	39488	53	5.8	100	100	17.2	16.4	5M6H
24	61613	80	13.4	100	100	32.6	25.5	5M6H
25	52348	55	12.9	100	100	29.7	28.8	5M6H
26	74591	57	19.1	100	100	47.2	39.8	5M6H
27	67458	88	14.6	100	100	35.9	36	5M6H
28	67617	88	15.5	99.6	100	36.6	36.6	5M6H
29	58027	75	10.8	100	100	33.9	34.2	5M6H
30	57496	73	11.3	100	100	34.3	33	5M6H
31	59878	76	12.1	100	100	38.2	36.4	5M6H

002115

Orgaworld
A Division of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MAY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	58872	63	6.5	99.6	100	31.8	31.5	5MIN 6HRS
2	73276	95	12.5	100	100	32.6	32.9	5M 6H
3	57810	67	7.9	99.6	100	30.8	30.2	5M 6H
4	57344	65	7.1	100	100	31.4	30.8	5M 6H
5	64768	73	9.4	100	100	33.3	33.6	5M 6H
6	68448	77	9.8	100	100	31.3	32.5	5M 6H
7	58241	69	8.5	100	100	19.4	31.1	5M 6H
8	63706	76	9.2	100	100	33.6	29.6	5M 6H
9	70764	83	12.1	99.2	100	31.6	30.7	5M 6H
10	57229	64	7.2	98.8	100	33.9	31.1	5M 6H
11	54715	63	7.3	99.2	100	35	34.6	5M 6H
12	62251	70	9	100	100	37.7	35.9	5M 6H
13	55279	60	6.2	100	100	39.1	37.8	5M 6H
14	52778	48	4.2	100	100	42.9	38.7	5M 6H
15	70664	88	13.4	99.6	100	44.4	42	5M 6H
16	52475	61	6.4	100	100	35.4	36.5	5M 6H
17	71094	79	10.3	100	100	41.6	41	5M 6H
18	50470	58	5.6	100	100	40.6	38.7	5M 6H
19	40963	55	5.2	100	100	39.5	37	5M 6H
20	66258	76	10.9	100	100	39.9	41	5M 6H
21	61016	66	6.6	100	100	34.7	36.6	5M 6H
22	66307	75	9.4	100	100	38.9	38.5	5M 6H
23	67001	74	9.3	99.3	100	39.4	37.7	5M 6H
24	68047	76	9.4	99.6	100	39.3	39	5M 6H
25	65307	73	8.4	99.3	100	42.4	40.4	5M 6H
26	57001	63	6.6	99.3	100	35.9	35.8	5M 6H
27	64028	69	8	99.6	100	39.9	38.3	5M 6H
28	66515	76	10.7	100	100	40.7	39.9	5M 6H
29	59577	66	7.2	100	100	41.9	41.7	5M 6H
30	70370	84	12.8	100	100	41.6	42.1	5M 6H
31	69778	78	11.3	100	100	39.2	38.2	5M 6H

Orgaworld
of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: JULY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	54006	63	6.9	100	100	41.3	41.8	5MIN6HRS
2	54207	62	7.1	100	100	42.7	41.4	5MIN6HRS
3	61072	73	8.9	100	100	42.9	43	5M6HR
4	60379	71	8.8	99.6	100	40	39.5	5M6H
5	48705	54	4.8	100	100	41	38.9	5M6H
6	81723	93	15.5	90.7	100	40	39.2	5M6H
7	73979	85	10.9	100	100	40.2	40.7	5M6H
8	72296	84	9.7	100	100	40.6	39.9	5M6H
9	68415	76	8.3	100	100	39.9	39.1	5M6H
10	75435	88	10.9	100	100	43.2	40.7	5M6H
11	67783	73	7.4	100	100	42.2	41.4	5M6H
12	74371	85	10.5	98.9	100	40.2	41.4	5M6H
13	67759	79	9	100	100	40.3	40.4	5M6H
14	56449	61	5.2	100	100	39.8	39.6	5M6H
15	61328	58	4.9	100	100	42.2	41	5M6H
16	61592	67	6.9	100	100	45.2	44.2	5M6H
17	72903	87	12.1	100	100	45.7	45.6	5M6H
18	71371	83	11.4	100	100	45.1	45	5M6H
19	63280	73	8.8	100	100	44.8	44.9	5M6H
20	76755	91	13.8	100	100	46.3	47.2	5M6H
21	75173	86	12.4	100	100	43.8	44.5	5M6H
22	68573	78	9.6	100	100	44.9	45.2	5M6H
23	70558	83	11.7	100	100	41.9	42.9	5M6H
24	70732	87	11.8	100	100	40.7	40.9	5M6H
25	70107	84	12.8	100	100	39.5	40.4	5M6H
26	79267	93	15.8	100	100	43.2	43.7	5M6H
27	74652	82	11.6	100	100	43.5	42.8	5M6H
28	57735	66	7.1	100	100	41	40.4	5M6H
29	75007	64	9	100	100	43.2	41.3	5M6H
30	70907	90	13.6	100	100	48.5	47.6	5M6H
31	86061	100	15	100	99.7	49	48.4	5M6H

Orgaworld
A part of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: SEPTEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	61678	68	7.5	100	100	39.9	38.1	5MIN6HRS
2	73361	85	12.7	100	100	43.1	43	5M6H
3	74960	90	13.6	100	100	40.3	40.8	5M6H
4	69654	83	12.5	100	100	37	38.1	5M6H
5	74099	87	12.4	100	100	41	41.7	5M6H
6	74491	88	12.9	100	100	39.6	40.4	5M6H
7	65565	75	9.5	100	100	40	40.2	5M6H
8	59376	66	7.3	100	100	38.5	38.6	5M6H
9	58666	67	7.9	100	100	37.7	37.9	5M6H
10	74974	89	14.2	100	100	42.5	41.8	5M6H
11	79117	92	13.8	100	100	43.2	42.9	5M6H
12	72597	84	11.5	100	100	42.3	42.4	5M6H
13	73925	87	12.2	99.4	100	44.3	44.7	5M6H
14	73707	92	11	100	100	43.3	42.7	5M6H
15	79007	91	13.9	100	100	41.3	41.6	5M6H
16	64217	68	8.2	100	100	45.2	44.1	5M6H
17	74329	86	12.8	100	100	45.5	45	5M6H
18	64768	73	8.9	99.6	100	43.2	42.4	5M6H
19	76701	88	12.9	100	100	42.3	42.2	5M6H
20	75787	88	12.8	100	100	39.6	40.7	5M6H
21	65577	69	7.7	100	100	39.6	39.9	5M6H
22	71079	80	8.1	100	100	38.8	39.7	5M6H
23	70521	76	7.4	100	100	43.8	44.3	5M6H
24	72282	76	7.6	100	100	46.3	47	5M6H
25	79674	93	12.6	100	100	42.8	43.7	5M6H
26	76766	84	8.7	100	98.6	44.9	45.6	5M6H
27	76748	87	9.7	100	100	39.9	41.5	5M6H
28	69705	81	9	100	100	36.7	37.3	5M6H
29	71322	76	7.3	100	100	36.4	37.1	5M6H
30	50058	91	8.3	100	100	45.9	40.4	5M6H
31								

Orgaworld
A Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: NOVEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	57441	65	5.6	99.6	100	29.1	28.3	5MIN 6HRS
2	61774	66	5.8	100	100	32.4	32.2	5M 6H
3	57813	66	6.1	100	100	32.5	33.2	5M 6H
4	54037	61	5.2	100	100	30.3	30.8	5M 6H
5	60260	58	5.3	100	100	23.3	25.2	5M 6H
6	53729	62	5.4	100	100	31.7	31.6	5M 6H
7	57037	62	5.8	99.6	100	36.4	33	5M 6H
8	55932	59	4.7	100	100	28.8	28.5	5M 6H
9	64475	71	7.9	100	100	28.4	29.9	5M 6H
10	59761	72	7.2	100	100	27.2	24.4	5M 6H
11	66291	79	8	100	100	25.4	25.6	5M 6H
12	61292	71	7.3	100	100	34.2	33.1	5M 6H
13	60195	67	6.1	100	100	29.8	29.8	5M 6H
14	61792	70	6.2	100	100	30.9	31.7	5M 6H
15	76966	87	9.7	100	100	29.3	30.1	5M 6H
16	71117	78	7.5	100	100	23.9	24.2	5M 6H
17	79749	93	11.5	100	100	24.5	26.2	5M 6H
18	68152	80	9.6	100	100	21.8	22.8	5M 6H
19	58338	71	7	100	100	21.4	23.2	5M 6H
20	65373	79	9.1	100	100	22.9	23.6	5M 6H
21	56291	67	5.6	98	100	23.9	25.1	5M 6H
22	74171	88	11.1	100	100	28.3	29.8	5M 6H
23	57996	86	10.2	100	100	23.8	23.5	5M 6H
24	71479	83	9.3	100	100	29	28.8	5M 6H
25	73264	96	12.4	100	100	28.8	27.7	5M 6H
26	67639	80	9.1	100	100	30.2	29.1	5M 6H
27	68530	73	8.3	100	100	20.6	21.8	5M 6H
28	81270	93	12.8	100	100	31.8	30.8	5M 6H
29	54732	61	5.1	100	100	22.6	23.5	5M 6H
30	52794	61	5.2	100	100	19.6	20.5	5M 6H
31								

002119

002120

Point 4 Bullet 3

Log Off | Tunnels Overview | Ammonia Scrubber | Biofilters Overview | Water Overview | Batch Inventories | 9:45 | Orgaworld Port of Shanks Group

ABATEMENT OVERVIEW

A

18 JAN 17

Tunnels

35.0 °C

-151.3 Pa

20.7 %

Water

auto 0.675 kPa 68 %

auto 1.491 kPa 68 %

enabled 8.4 mb 33.9 °C

enabled 8.1 mb 34.0 °C

13.5 °C

Fan biofilter1	
68 %	40.8 Hz
23.0 KW	52.9 A

Fan biofilter 2	
68 %	40.8 Hz
22.1 KW	45.5 A

Average temperature biofilter 1	34.3 °C
Actual humidity biofilter 1	99.2 %

Average temperature biofilter 2	35.6 °C
Actual humidity biofilter 2	96.4 %

Biofilter 1	Biofilter 2	Biofilter 3
58327 m³/h	39548 m³/h	8.1 °C
34.9 °C	35.8 °C	9.8 °C
35.2 °C	35.5 °C	
32.8 °C	35.7 °C	
-47.7 Pa	-38.9 Pa	0.0 Pa

auto 54 % auto 55 %

auto 54 % auto 50 %

-414.4 Pa

20.7 % -405.1 Pa

99 % 100 %

100.0 % 29.5 °C

-1 %

Stack fan 1	
65 %	39.0 Hz
19.1 KW	40.3 A

Stack fan 2	
64 %	38.4 Hz
14.3 KW	32.9 A

auto

auto

32.8 °C

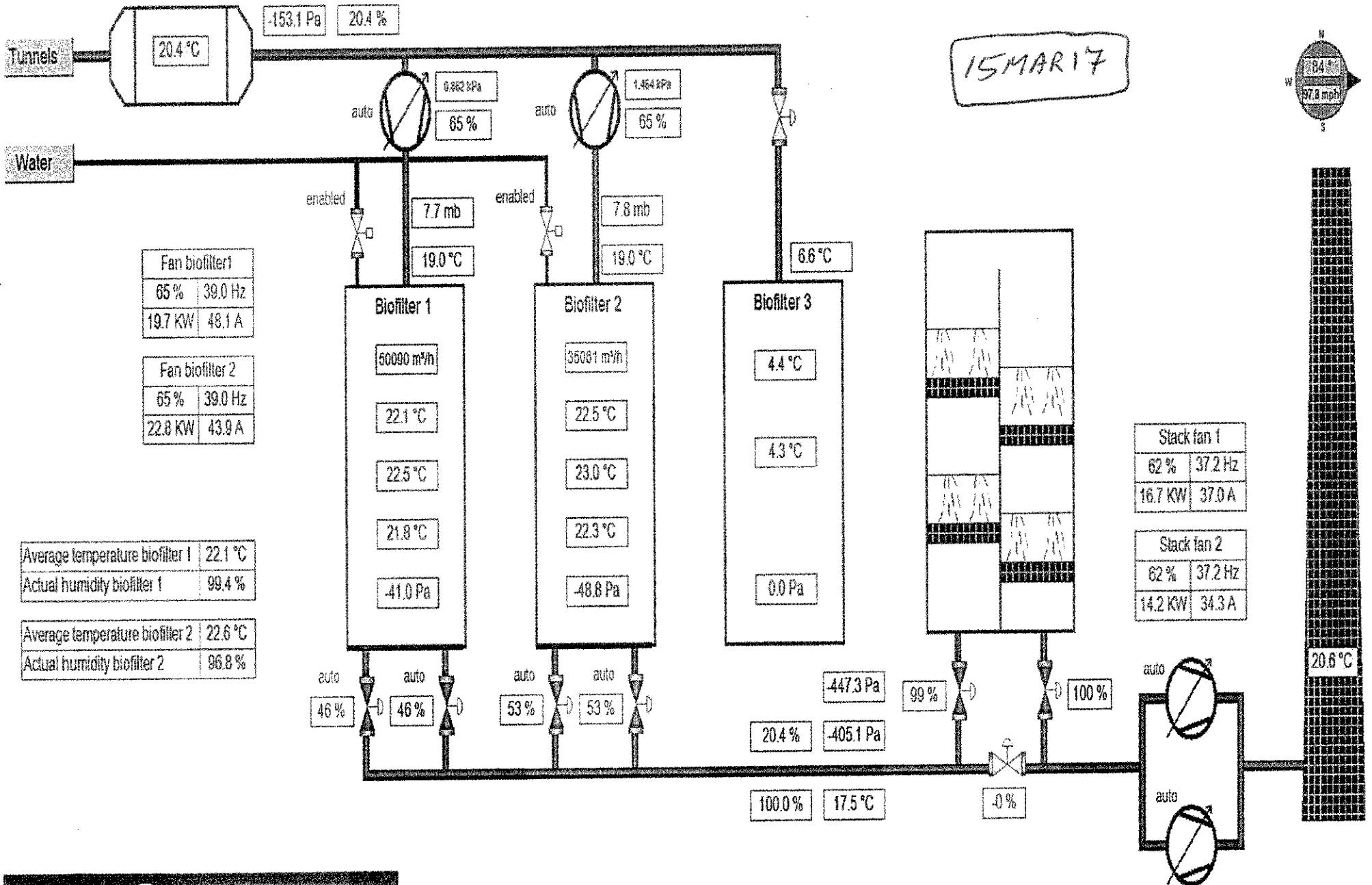
N 29 % W E 97.8 mph S

Settings B1 | Settings B2 | Settings Scrubber | Events

ABATEMENT OVERVIEW

A

15MAR17



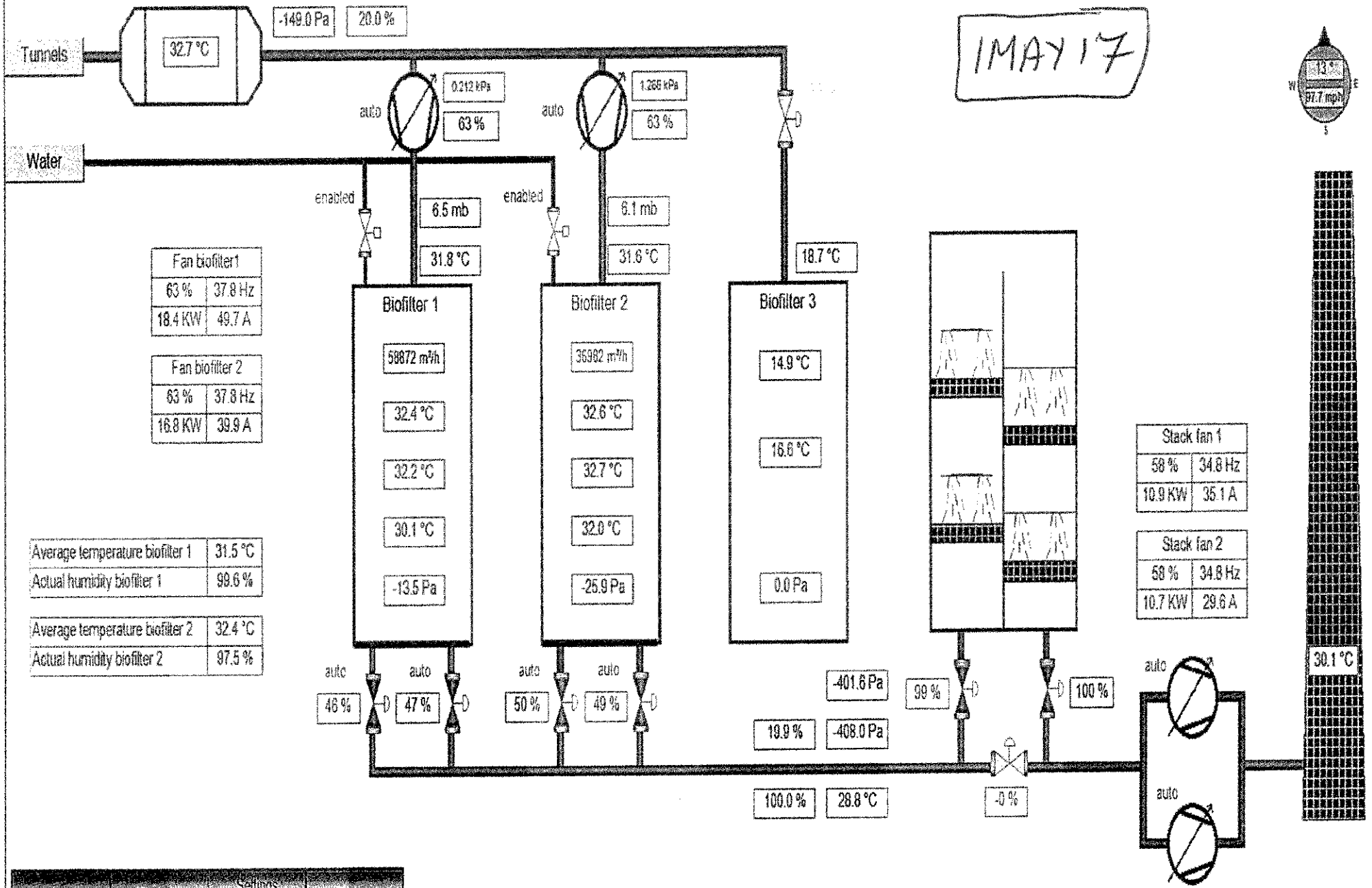
002121

002122

ABATEMENT OVERVIEW

A

1 MAY 17



002123

ABATEMENT OVERVIEW

A

3 JUL 17

Tunnels

Water

44.5 °C

-146.0 Pa

19.6 %

auto

0.782 kPa

73 %

auto

1.694 kPa

73 %

enabled

8.9 mb

42.9 °C

enabled

9.4 mb

42.9 °C

30.4 °C

Fan biofilter1	
73 %	43.8 Hz
24.0 KW	55.9 A

Fan biofilter 2	
73 %	43.8 Hz
27.4 KW	47.4 A

Biofilter 1

61072 m³/h

43.8 °C

43.6 °C

41.6 °C

-57.3 Pa

Biofilter 2

42972 m³/h

44.4 °C

43.8 °C

41.3 °C

-39.6 Pa

Biofilter 3

27.7 °C

26.3 °C

0.0 Pa

Average temperature biofilter 1	43.0 °C
Actual humidity biofilter 1	100.0 %

Average temperature biofilter 2	43.2 °C
Actual humidity biofilter 2	98.6 %

auto 51 %

auto 54 %

auto 53 %

auto 51 %

-482.6 Pa

19.9 %

-431.1 Pa

100.0 %

40.2 °C

99 %

100 %

-1 %

Stack fan 1	
68 %	40.8 Hz
18.3 KW	33.8 A

Stack fan 2	
68 %	40.8 Hz
15.8 KW	34.2 A

auto

auto

42.0 °C

N 50 ° W E 97.6 mph S

002124

ABATEMENT OVERVIEW

A

29 SEP 17

Tunnels

37.5 °C

-151.0 Pa

20.0 %

Water

auto

0.265 kPa

76 %

auto

1.892 kPa

76 %

enabled

7.3 mb

36.4 °C

enabled

10.3 mb

36.3 °C

33.3 °C

Fan biofilter1	
76 %	45.6 Hz
29.8 KW	53.2 A

Fan biofilter 2	
76 %	45.6 Hz
31.8 KW	52.1 A

Average temperature biofilter 1	37.1 °C
Actual humidity biofilter 1	100.0 %

Average temperature biofilter 2	35.7 °C
Actual humidity biofilter 2	98.9 %

Biofilter 1

71372 m³/h

37.3 °C

37.0 °C

37.0 °C

-30.6 Pa

Biofilter 2

43557 m³/h

38.2 °C

35.1 °C

33.8 °C

-34.9 Pa

Biofilter 3

26.7 °C

30.2 °C

0.0 Pa

Stack fan 1	
77 %	46.2 Hz
29.0 KW	39.2 A

Stack fan 2	
76 %	45.6 Hz
21.9 KW	38.9 A

34.9 °C

auto 54 %

auto 56 %

auto 63 %

auto 63 %

-456.9 Pa

19.9 %

-393.5 Pa

100.0 %

32.7 °C

99 %

100 %

-0 %

auto

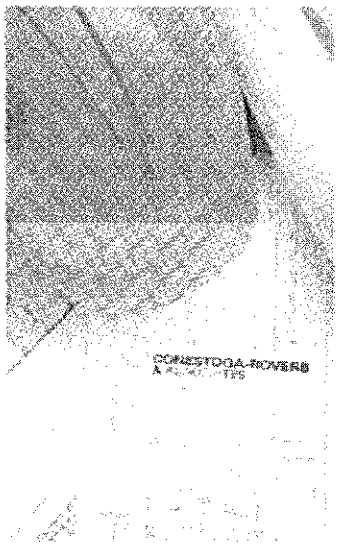
auto

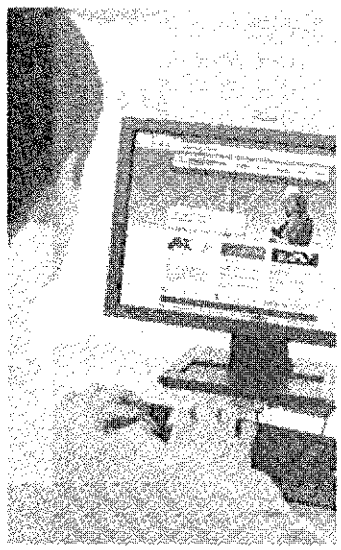
Logo
Overview
Alarms
Trends
Setup
Reports
Exit
Settings
Operator
Engineer
Supervisor
Service
Logout
Tank 1
Tank 2
Tank 3
Tank 4
Tank 5
Tank 6
Tank 7
Tank 8
Tank 9
Tank 10
Tank 11
Tank 12
Tank 13
Tank 14
Tank 15
Tank 16
Tank 17
Tank 18
Tank 19
Tank 20
Tank

Point 5

CONESTOGA-ROVERS
& ASSOCIATES

www.CRAworld.com



Acoustic Assessment Report

Orgaworld Canada Ltd.
Ottawa, Ontario

ORIGINAL 2014 ACOUSTIC ASSESSMENT
ON FILE AT FACILITY

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

May 2014 • 045804 • Report No. 52

Partners in Sustainability

Table of Contents

		Page
Section 1.0	**Introduction**	1
Section 2.0	**Noise Source Summary**	2
Section 3.0	**Point of Reception Summary**	3
Section 4.0	**Assessment Criteria**	4
Section 5.0	**Impact Assessment – Steady-State Noise Sources**	5
Section 6.0	**Conclusions and Recommendations**	6

List of Figures
(Following Text)

Figure 1	Noise Source Summay Plan
Figure 2	Point-of-Reception Locations

List of Tables
(Following Text)

Table 1	Noise Source Summary
Table 2	Point-of-Reception Noise Impact - Unattenuated Sound Levels
Table 3	Acoustic Assessment Summary – Day-Time Steady-State Sound Levels

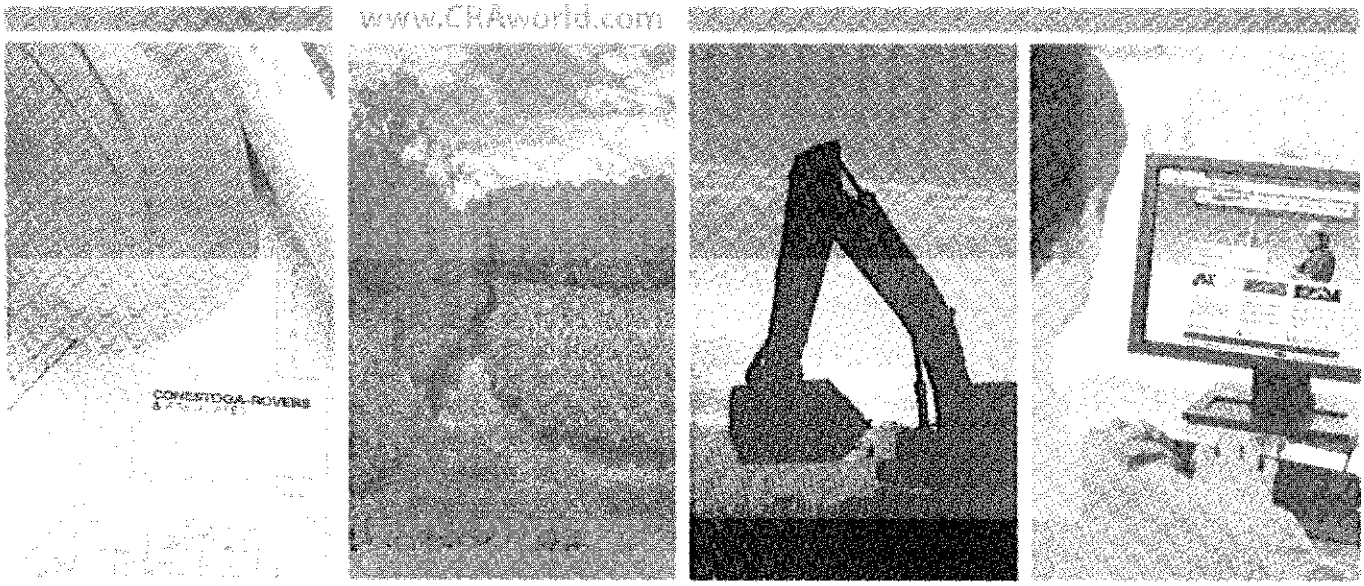
List of Appendices

Appendix A	Zoning Map and Definitions
Appendix B	Manufacturers Specifications
Appendix C	Cadna A Noise Model Outputs

Part 6

CONESTOGA-ROVERS
& ASSOCIATES

www.CRAworld.com



Emission Summary and Dispersion Modelling Report

Orgaworld Canada Ltd
Ottawa, Ontario

ORIGINAL 2014 ECDM
ON FILE AT FACILITY

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

May 2014 • 045804 • Report No. 51

Partners in Sustainability

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to support an Application for Renewal of Environmental Compliance Approval (ECA) (Air). The Facility is currently operating under ECA (Air) No. 7021-7HQNDE. The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05 to support the ECA (Air) Application. Guidance in the Ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 (ESDM Procedure Document) was followed as appropriate.

Orgaworld Canada Ltd. (OCL) operates a facility (Facility) at Lot 27, Concession 6, Gloucester in Ottawa, Ontario. The Facility will be located in an area zoned for industrial use. OCL is an aerobic composting operation that will process source separated organics (SSO), such as kitchen waste, and leaf and yard wastes into an unrestricted end product suitable for application on agricultural lands.

The Facility is subject to s.20 of O.Reg. 419/05, therefore the modelled impact of contaminant emissions can be assessed using the AERMOD dispersion model for each contaminant and applicable averaging period.

Odour-based dispersion modelling was performed at each of the sensitive receptors previously identified by the Ontario Ministry of the Environment (MOE), and for the 99.85th percentile as per the MOE proposed position paper "Proposed Approach for the Implementation of Odour-Based Standard and Guidelines" (June 2006).

The Facility is expected to emit Odour, Particulate, Ammonia, and Products of Diesel Combustion. Some of the sources and contaminants were considered negligible in accordance with s.8 of O. Reg. 419/05.

The maximum POI concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O. Reg. 419/05 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Facility was calculated based on the calculated emission rates and the output from the approved dispersion model; the results are presented in the Emission Summary Table in accordance with s.26 of O. Reg. 419/05.

The POI concentrations listed in the Emission Summary Tables were compared against criteria listed in the Ministry publication "Summary of Standards and Guidelines to Support Ontario Regulation 419: Air Pollution – Local Air Quality" dated April 2012.

Tab 1

002131

ORGAWORLD CANADA EH&S TRAINING MATRIX

REQUIREMENT	OPERATORS	MAINTENANCE STAFF	COMPOST TECH.	WEIGH SCALE
new starters orientation (incl. Right to refuse)	x	x	x	x
Operations manual / procedures	x	x	x	
Environmental Compliance Approval training	x	x	x	x
Health and Safety Policy	x	x	x	x
contingency plans / emergency response	x	x	x	x
first aid / CPR *	x	x	x	
Pedestrian Safety	x	x	x	x
WHMIS	x	x	x	x
Lockout / Tagout	x	x	x	
Respirator usage / bioaerosols	x	x	x	
Respirator fit test	x	x	x	
Hearing Protection	x	x	x	
Heat Stress	x	x	x	
Cold Stress	x	x	x	
PPE requirements	x	x	x	
Loader operation*	x	x		
Propane Handling*	x	x		
Manual Material Handling and Back Care	x	x	x	
Laboratory Safety			x	
Workplace Violence and Harassment	x	x	x	x
Accident / Incident reporting requirements	x	x	x	x
Confined Space training*	x	x		
Eyewash / Safety Shower Procedure	x	x	x	
due diligence training	x	x	x	x
Hot Work Permits		x		
proper fueling procedure for loaders	x	x		
fall protection	x	x	x	
transportation of dangerous goods			x	x
ladder safety	x	x	x	
Waste acceptance / shipment protocols	x	x	x	x
Critical injury and WSIB requirements			x	

Accident / Incident investigations	x
Work Refusal Responsibilities	x
Hazard Recognition / Inspection protocols	x
Proper incoming waste and outgoing compost sampling procedures	x
SCADA operation training	x
Pond Water Sampling	

* = if considered necessary for that employee

SUPERVISORS	REFRESHER REQUIREMENTS
x	
x	on-going
x	on-going
x	as amended
x	as amended
x	3 yrs
x	
x	annual or if chemical usage changes
x	
x	
x	
x	
x	
x	
x	as amended
x	3 years
x	3 years
x	
x	
x	
x	
x	facility dependent
x	
x	
x	
x	
x	3 years
x	
x	
x	

Tab 8

Orgaworld Canada: Ottawa 2017 Mass Balance

Intake: (Tonnes)

		January	February	March	April	May	June	July	August	September	October	November
SSO	CITY OF OTTAWA - SOURCE SEPERATED ORGANICS (SSO)	3,564	2,409	2,677	6,909	9,355	9,073	7,795	7,643	6,624	8,759	9,166
	CITY OF OTTAWA - COMMERCIAL ORGANICS				10	7						5
ICI	Kevron Recycling (19070526)	143	87									
	Progressive (19070496)	48	54	62	45	60	60	53	62	61	60	56
	Waste Management (19070547)	109	136	155	120	144	140	106	115	148	149	166
	Metro (19070648)	383	296	331	317	104						
	Tomlinson Environmental (19070570)	106	97	37		11	52	31				
	Malex (19070379)	74	68	81	72	90	92	79	79	93	94	73
	Total Intake	**4,428**	**3,146**	**3,344**	**7,472**	**9,771**	**9,417**	**8,064**	**7,900**	**6,926**	**9,061**	**9,466**
	City of Ottawa	3,564	2,409	2,677	6,919	9,362	9,073	7,795	7,643	6,624	8,759	9,170
	ICI	863	737	667	564	409	345	269	257	303	302	296

December	Total
3,510	77,484
	21
	230
58	678
103	1,592
29	1,461
	335
73	968
3,773	**82,769**
3,510	77,505
263	5,264

S1OTGLHA 610

Straberger, Kyle (MOECC)

From: McComb, Dale (OMAFRA)
Sent: May 22, 2015 4:28 PM
To: Straberger, Kyle (MOECC)
Subject: RE: NASM Sites

Follow Up Flag: Follow up
Flag Status: Completed

Got it done. See below.

Dale McComb
OMAFRA
519-826-3293

From: Straberger, Kyle (MOECC)
Sent: Friday, May 22, 2015 3:46 PM
To: McComb, Dale (OMAFRA)
Subject: NASM Sites

Hi Dale – As discussed, I have provided the list of sites in which Orgaworld will be potentially sending processed organic waste not meeting the new Phase II Ontario Compost Quality Standards for moisture. I would like to determine whether these sites already have a NASM Plan in place. Thanks again and if you have any questions please let me know.



s.21

Kyle Straberger

Page 2137

is withheld pursuant to section

est retenue en vertu de l'article

21

of the Freedom of Information and Protection of Privacy Act

de la Freedom of Information and Protection of Privacy Act

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: April 28, 2015 1:58 PM
To: Straberger, Kyle (MOECC)
Subject: Implementation of Ontario Compost Quality Standards
Attachments: Response to MOECC Ottawa District.docx

Hello Kyle:

Please find attached the Orgaworld Ottawa response to your letter dated March 18, 2015. If you have further question or concern, please let me know.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0630
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Orgaworld
Part of Shanks Group

April 28, 2015

Kyle Straberger
Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa, Ontario
K1H 1E1

Re: Response to MOECC Ottawa District
IMPLEMENTATION OF ONTARIO COMPOST QUALITY STANDARDS – MATURITY AND FOREIGN MATTER

Action plan required for the following:

1. *Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary;*
2. *Environmental Compliance Approval amendments required to reflect any required process changes or modifications;*
3. *Options to manage processed organic waste not meeting the Ontario Compost Quality Standards; and*
4. *Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with Phase II Ontario Compost Quality Standards.*

Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary

1. In order to meet the moisture requirement stated in the new compost regulations, the Ottawa facility will need to look at either installing winterized water tankage, water lines and pumps, or utilizing a water truck to spray the compost. Operational changes will include using this water truck and developing procedures in order to ensure that the spraying of the compost meets the 40% moisture target throughout the entire compost pile.
2. Additional future changes may mean the addition of increased compost storage space, since once the compost piles are sprayed with water, they must be turned, or transferred to an empty storage bunker.
3. Sharps. There has yet to be a definitive definition on what is a sharp or not. The phrase "Shall contain no material of a size or shape that can reasonably cause animal or human injury" is extremely vague. Historical analytical results have demonstrated that with the current incoming wastestream into Ottawa, there should be little difficulty for the Ottawa facility to meet the foreign matter or sharp requirements.

Environmental Compliance Approval amendments required

1) The Ottawa facility will look at utilizing the water taken from the groundwater remediation well and potentially utilize it in order to bring the finished curing compost up to the specified 40% moisture level. Orgaworld has just submitted an amendment request to the MOECC for our Stormwater ECA. It is unclear at this time if we would have to submit another amendment in order to be able to utilize this water from the remediation well.
2) If this water spray equipment was added, it is presumed that this equipment would also require an amendment to the waste ECA since it would be considered a "change or alteration" to the existing facility and the existing process.
3) If deemed that additional compost storage space is required, this will also require an amendment to the existing Waste ECA.

Options to Manage Processed Organic Waste NOT meeting the Ontario Compost Quality Standards

Orgaworld Ottawa will manage the processed organic waste that does not meet the new regulations by utilizing NASM plans which would still allow the compost to go to farmers fields and be utilized in a beneficial manner. Orgaworld has already arranged transport with haulers that are licensed to transport organic waste, and have completed NASM plan agreements with farmers who wish to take our NASM product.

Timelines associated with actions necessary for compliance

It must be noted that for over a year, Orgaworld Canada and the MOECC were in continuous negotiations regarding the new compost regulations. Until recently, Orgaworld and several other compost producers were under the impression that the MOECC was seriously considering other alternatives than the complete adoption of the entire new compost regulation package. This did not occur and the decision to fully adopt the new compost regulations was made, but not communicated to Orgaworld until very recently. With this in mind, Orgaworld Canada would like to request that we would be allowed to honour all of our compost delivery contracts through the end of the 2015 season. This would allow time to discuss with all of our current compost customers:

i) the potential for accepting the NASM product
ii) The restrictions and usage requirements set out in the plan
iii) Take the necessary soil sampling and creation of the plans

If Amendments are required for the water spraying equipment, then the timeframe to submit the application to the MOECC could be at least six months. The MOECC has mentioned that they would be willing to "fast-track" the approvals process, but it is unclear exactly how long that may take. If more compost storage space is required (a multi-million dollar investment), this process, including engineering, financing, MOECC approval and construction could take at least one to two years.

If you have further questions or concerns, please do not hesitate to contact me at your convenience.

Michael Rooke
Compliance Officer

Ontario

Ministry of the Environment and Climate Change

Ministry of the Environment
5/6/2015
10 a.m. to 12 p.m.

Meeting called by: Straberger, Kyle

Attendees:

Kyle Straberger, Senior Environmental Officer, MOECC; Jena Leavoy, District Supervisor, MOECC; Steve Burns, District Manager, MOECC; Michael Rooke, Compliance Officer, Orgaworld; ~~Dale Harley, General Manager, Orgaworld~~

Location: Ottawa District Office, 2430 Don Reid Drive, Ottawa, Ontario, K1H 1E1

Ottawa Boardroom (teleconferencing is available if requested)

Purpose: The purpose of the meeting is to discuss the upcoming implementation of the Phase II Ontario Compost Quality Standards and the impacts the standards will have on the operations at Orgaworld Ottawa Facility located at 5123 Hawthorne Road in Ottawa.

Introduction (Kyle)

1. Round table introductions
2. Review agenda items

Phase II Ontario Compost Quality Standards – MOECC Letter, March 18, 2015 – Request for Action Plan (Kyle)

Maturity & Foreign Matter:

1. Process and/or operational changes
2. Environmental Compliance Approval amendments
3. Options to managed processed organic waste not meeting the Ontario Compost Quality Standards
4. Timelines associated with actions necessary to become compliant with Phase II Ontario Compost Quality Standards

Phase II Ontario Compost Quality Standards – Orgaworld Letter, April 28, 2015 – Response to MOECC Letter (Kyle)

1. Installation of water application equipment, development of procedures and potential increase of capacity. No changes to address 'sharps'
2. Amendments to Industrial Sewage Works and Waste ECAs

3. NASM Plan for non-compliant processed organic waste
4. Request for extension to operate under previous regulatory standards until end of 2015. Environmental Compliance Approvals amendments estimated at 1 to two years

Path forward

1. Revisions to the Action Plan (Kyle)

Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa Ontario
K1H 1E1
613-521-3450 or 1-800-860-2195
Fax: 613-521-5437

Ministère de l'Environnement et de l'Action en matière de changement climatique
Bureau du district d'Ottawa
2430, promenade Don Reid, Unité 103
Ottawa (Ontario)
K1H 1E1
613-521-3450 ou 1-800-860-2195
Téléc : 613-521-5437

Ontario

March 18, 2015

Michael Rooke
Orgaworld Canada Ltd.
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

Dear Sir:

RE: Implementation of Ontario Compost Quality Standards – Maturity & Foreign Matter
Orgaworld Ottawa Facility, 5123 Hawthorne Road, Ottawa
Environmental Compliance Approval No. 2766-7HEPSZ

On July 25, 2012 the Ministry of the Environment and Climate Change (MOECC) released revised standards for aerobic composting of organic waste materials in the province of Ontario entitled *Ontario Compost Quality Standards* ("Standards"). The Standards update and replace the *Interim Guideline for the Production and Use of Aerobic Compost in Ontario*, first released in November 1991, and last updated in 2004.

The Standards outline new categories of compost (AA, A, and B) with specific requirements for metals, quality of feedstock, pathogens, foreign matter and maturity. The MOECC implemented Phase I (metals, quality of feedstock and pathogens) of the Standards on January 1, 2013 with Phase II (maturity and foreign matter) to be implemented on July 1, 2015.

In preparation of the upcoming implementation date, the MOECC would like to engage Orgaworld Canada Ltd. in how the requirements of the Standards will be met.

By **May 1, 2015**, please submit an action plan outlining how the Orgaworld Ottawa Facility will comply with the implementation of Phase II of the Standards on July 1, 2015. The action plan should include, but not necessarily be limited to, the following:

1. Process and/or operational changes to the current operations at the Orgaworld Ottawa Facility that may be necessary;
2. Environmental Compliance Approval amendments required to reflect any required process changes or modifications;
3. Options to manage processed organic waste not meeting the *Ontario Compost Quality Standards*; and
4. Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with the Phase II *Ontario Compost Quality Standards*.

Please contact me if you have any questions or concerns with the above request and the implementation of Phase II of the Standards. A meeting can be arranged in the event Orgaworld Canada Ltd. would like to discuss this subject in further detail.

Sincerely,

Kyle Straberger
Environmental Officer

KS:jdv

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: April 28, 2015 1:58 PM
To: Straberger, Kyle (MOECC)
Subject: Implementation of Ontario Compost Quality Standards
Attachments: Response to MOECC Ottawa District.docx

Hello Kyle:

Please find attached the Orgaworld Ottawa response to your letter dated March 18, 2015. If you have further question or concern, please let me know.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Orgaworld
Part of Shanks Group

April 28, 2015

Kyle Straberger
Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa, Ontario
K1H 1E1

Re: Response to MOECC Ottawa District
IMPLEMENTATION OF ONTARIO COMPOST QUALITY STANDARDS – MATURITY AND FOREIGN MATTER

Action plan required for the following:

1. *Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary;*
2. *Environmental Compliance Approval amendments required to reflect any required process changes or modifications;*
3. *Options to manage processed organic waste not meeting the Ontario Compost Quality Standards; and*
4. *Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with Phase II Ontario Compost Quality Standards.*

Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary

1. In order to meet the moisture requirement stated in the new compost regulations, the Ottawa facility will need to look at either installing winterized water tankage, water lines and pumps, or utilizing a water truck to spray the compost. Operational changes will include using this water truck and developing procedures in order to ensure that the spraying of the compost meets the 40% moisture target throughout the entire compost pile.
2. Additional future changes may mean the addition of increased compost storage space, since once the compost piles are sprayed with water, they must be turned, or transferred to an empty storage bunker.
3. Sharps. There has yet to be a definitive definition on what is a sharp or not. The phrase "Shall contain no material of a size or shape that can reasonably cause animal or human injury" is extremely vague. Historical analytical results have demonstrated that with the current incoming wastestream into Ottawa, there should be little difficulty for the Ottawa facility to meet the foreign matter or sharp requirements.

Environmental Compliance Approval amendments required

1) The Ottawa facility will look at utilizing the water taken from the groundwater remediation well and potentially utilize it in order to bring the finished curing compost up to the specified 40% moisture level. Orgaworld has just submitted an amendment request to the MOECC for our Stormwater ECA. It is unclear at this time if we would have to submit another amendment in order to be able to utilize this water from the remediation well.
2) If this water spray equipment was added, it is presumed that this equipment would also require an amendment to the waste ECA since it would be considered a "change or alteration" to the existing facility and the existing process.
3) If deemed that additional compost storage space is required, this will also require an amendment to the existing Waste ECA.

Options to Manage Processed Organic Waste NOT meeting the Ontario Compost Quality Standards

Orgaworld Ottawa will manage the processed organic waste that does not meet the new regulations by utilizing NASM plans which would still allow the compost to go to farmers fields and be utilized in a beneficial manner. Orgaworld has already arranged transport with haulers that are licensed to transport organic waste, and have completed NASM plan agreements with farmers who wish to take our NASM product.

Timelines associated with actions necessary for compliance

It must be noted that for over a year, Orgaworld Canada and the MOECC were in continuous negotiations regarding the new compost regulations. Until recently, Orgaworld and several other compost producers were under the impression that the MOECC was seriously considering other alternatives than the complete adoption of the entire new compost regulation package. This did not occur and the decision to fully adopt the new compost regulations was made, but not communicated to Orgaworld until very recently. With this in mind, Orgaworld Canada would like to request that we would be allowed to honour all of our compost delivery contracts through the end of the 2015 season. This would allow time to discuss with all of our current compost customers:

i) the potential for accepting the NASM product
ii) The restrictions and usage requirements set out in the plan
iii) Take the necessary soil sampling and creation of the plans

If Amendments are required for the water spraying equipment, then the timeframe to submit the application to the MOECC could be at least six months. The MOECC has mentioned that they would be willing to "fast-track" the approvals process, but it is unclear exactly how long that may take. If more compost storage space is required (a multi-million dollar investment), this process, including engineering, financing, MOECC approval and construction could take at least one to two years.

If you have further questions or concerns, please do not hesitate to contact me at your convenience.

Michael Rooke
Compliance Officer

Process and/or operational
- installing water tanks, new pumps or water treatment
→ what are the processes for testing water (monitoring, testing, mixing, frequency) and records
- additional capacity (hours)
→ will you be able to manage capacity for a period of time after Task 1?

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: May 11, 2015 4:59 PM
To: Straberger, Kyle (MOECC)
Subject: Fw: Addresses

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Kyle:

As per our email traffic last week, please see forwarded the addresses of the farms mentioned last week. Please let me know if you require anything else.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd. PO box 21070, London, ON N6K 0C7
* 2940 Dingman Drive, London ON N6N 1G4 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

-----Forwarded by Michael Rooke/ORG/WMN on 05/11/2015 04:57PM -----
To: Michael Rooke/ORG/WMN@WMN
From: Michele Myre/ORG/WMN
Date: 05/11/2015 03:54PM
Subject: Addresses

Martin Sieve
CLAY ALL OVER FARMS
2409 Ritchance Road
Alfred, Ont
K0B 1A0

GFL Environmental Inc.
125 Villarboit Cres., Suite B
Vaughan, Ontario
Canada L4K 4K2

Jacob Buhler
1271 rue St. Andre
Embrun, ON
K0A 1W0

Kyle O'Donahue
14455 County Road #9
Berwick, ON

K0C 1G0

Thomas Wahler
Wahler Farms
3651 Labelle Road
Bourget, ON
K0A 1E0

Kind regards,

Michele Myre
Scale Operater

Orgaworld
Part of Shanks Group

mmyre@orgaworld.ca
P: (613) 822 2056 ext. 142 | F: (613) 822 2058
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: February 4, 2015 4:26 PM
To: mrooke@orgaworld.ca
Cc: tminarik@orgaworld.ca
Subject: 2013/2014 Operating Year Inspection - Orgaworld Ottawa - Information Request

Hi Mike,

As stated during the inspection on Thursday January 29, 2015, please find the information I requested for each inspection type completed. If you have any questions please let me know.

Industrial Sewage Works – ECA# 7251-8GKRPD

- Analytical results of the 2014 surface water monitoring program outlined in Condition 5 – Surface Water Monitoring and Recording for the month of February, May, August and November
- Analytical results of the 2014 groundwater monitoring program outlined in Condition 9 – Groundwater Monitoring for the month of February, May, August and November
- **Analytical results of Table 2 Trigger Parameters for discharge events in 2013 as per Condition 6 (5) (check annual report)**
- Copy of the Operation & Maintenance Manual (Part II & Part III)
- Logbook records for routine maintenance activities, inspection findings, and repairs completed in 2014

Air – ECA# 7021-7HQNDE

- Complaints Recording Procedure – Provide copies of the complaint records for the two complaints received in December of 2014. I understand the complaints in the Cornwall area are not related to the Orgaworld site in Ottawa however it will verify compliance that the recording procedure is being complied with.
- The last date of revision of the Emission Summary and Dispersion Modelling Report and Acoustic Assessment Report (last time modifications were made to the facility requiring modelling to ensure compliance with air & noise standards outlined in Ontario Regulation 419/05)
- Records of maintenance completed of the bio filter (media replacement)
- Screen shot of SCADA illustrating the process monitoring of the pollution control equipment

Waste Disposal Site – ECA# 2766-7HEPSZ

- Analytical results of the 2014 incoming and outgoing (including 10-100) as per Condition 7(3), Condition 7(4) and Condition 7(6)
- In 2014 has Orgaworld received results of non-compliance with Quality Compost Standards?
- Screen shot of SCADA illustrating the process monitoring of the composting operations to ensure compliance with Condition 7(8)
- Temperature monitoring records for the curing stockpiles for the following dates: January 15, 2014, February 19, 2014, March 26, 2014, April 30, 2014, May 28, 2014, June 25, 2014, July 30, 2014, August 27, 2014, September 24, 2014, October 29, 2014, November 26, 2014, December 17, 2014

I am currently working on the inspections therefore I may send another email if I require additional information.

Thanks,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca



Please consider the environment before printing this email.

SLOTGLHA 211

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: April 17, 2018 8:51 AM
To: David Veinot (dveinot@orgaworld.ca)
Cc: Brian Begg (bbegg@orgaworld.ca); Andre Boucher
Subject: MOECC Inspection Reports - Orgaworld Canada Inc., 5123 Hawthorne Road, Ottawa, On
Attachments: Air Facility Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Industrial Sewage Works Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Non-Hazardous Waste Transfer Processing Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Subject Waste Generator Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf

Hello David,

Please find attached copies of the inspection reports completed at Orgaworld Ottawa, dated March 15, 2018, located at 5123 Hawthorne Road, Ottawa, On. If you have any questions after the review of the reports please contact me to discuss.

Attachments:

- Air Facility Inspection Report
- Industrial Sewage Works Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report
- Subject Waste Generator Inspection Report

The Subject Waste Generator Inspection Report outlines an action item for the confirmation of Copy 6 of Waste Manifest No. RS77263. In your email, dated March 23, 2018, the copy was provided to me therefore the action item has been addressed. The report was already completed and sent for sign-off when you provided the information therefore I couldn't make any changes at that time.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

ORGAWORLD
SLOTGL HA 211 ✓
5123 Hawthorne
#1631-A2ELCQ

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: November 2, 2016 8:36 AM
To: Nick Pora (npora@orgaworld.ca)
Cc: mrooke@orgaworld.ca
Subject: Ministry of the Environment and Climate Change Inspection Reports - September 29, 2016
Attachments: Ministry of the Environment and Climate Change - Air Facility Inspection Report (September 29, 2016).pdf; Ministry of the Environment and Climate Change - Industrial Sewage Works Inspection Report (September 29, 2016).pdf; Ministry of the Environment and Climate Change - Non-Hazardous Waste Transfer Processing Inspection Report (September 29, 2016).pdf

Good morning Nick,

As a result of the Ministry of the Environment and Climate Change's inspections at Orgaworld Ottawa on September 29, 2016, please find attached the following inspection reports:

- Air Facility Inspection Report
- Industrial Sewage Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report

Please review and contact me if you have any questions. I want to also thank yourself, Chris and Brian for your time and cooperation during the inspection process.

Regards,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

Please consider the environment before printing this email.

Hart, Tracy (ENE)

From: Wojcik, Margaret (ENE)
Sent: September 8, 2011 4:00 PM
To: Placko, Joanne (ENE); Mills, Jeff (ENE); Hart, Tracy (ENE); Armour, Lynnette (ENE)
Cc: Shah, Bijal (ENE); Benvenuti, Lisa (ENE)
Subject: FW: Negative pressure at SSO composting sites

Good Afternoon, I am writing to you all to follow up on my previous email regarding negative pressure in SSO processing buildings. Do any of you have any monitoring data that would help us at the EAAB defend the negative pressure condition?
Lisa has sent me some information on operations at Universal in Welland and it appears that Universal maintains the negative pressure at all times, even when the doors open to let trucks in and out.
Anybody else?
Thanks, Margaret (and Bijal)

From: Wojcik, Margaret (ENE)
Sent: August 31, 2011 11:52 AM
To: Placko, Joanne (ENE); Mills, Jeff (ENE); Hart, Tracy (ENE); Benvenuti, Lisa (ENE); Armour, Lynnette (ENE)
Cc: Shah, Bijal (ENE)
Subject: Negative pressure at SSO composting sites

Good morning to All,

The issue of negative pressure in the SSO receiving buildings continues to generate challenges for the EAAB reviewers dealing with the SSO composting sites. We are getting contradicting information from proponents with respect to their ability to maintain negative pressure in the SSO containing buildings especially when the doors are open. We acknowledge the fact that some of the negative pressure is lost when the doors are open, but we were under the impression that it is possible to keep the pressure on the negative side, even if it's only slightly negative.

Also, there are discrepancies regarding the maximum level of negative pressure that is physically possible to achieve. In their application, Orgaworld proposed -250 Pa to be maintained in the receiving area and the main hall. The City of Guelph said that it's physically impossible to maintain this level of negative pressure in the building without damage to the building and the doors, and instead proposed -5 to -10 Pa. That is quite a difference.

So to solve this mystery once for all, I would like to ask for the actual negative pressure monitoring data for the composting sites you are looking after. I checked the cofas and hope that the data is available:

City of Hamilton, WDS CofA #A130213, Issue Date: January 28, 2005

68. The Owner and Operator shall maintain a negative air pressure atmosphere in the unloading area at all times. In the event that negative air pressure can not be maintained, the Owner and Operator shall cease accepting additional waste and shall keep the loading bay doors closed until such time as negative pressure is re-established.

But Joanne indicated before that they do measure the magnitude.

Orgaworld Canada Ltd. (London) WDS CofA #5250-6V4HX2, Issue Date: December 20, 2006

46. The Owner shall maintain a negative air pressure atmosphere within the processing building, incompassing the receiving and traffic hall, pump room, and screening area, at all times. In the event that adequate negative air pressure can not be maintained, the Owner shall cease accepting additional waste and shall keep the loading bay doors closed until such

time that negative pressure is re-established.

Jeff, are they measuring the negative pressure?

Orgaworld Canada Ltd. (Ottawa) WDS cofa #2766-7HEPSZ, Issue Date: September 16, 2009

5.(7) Odour Control:

(a) The Owner shall maintain and monitor a negative air pressure atmosphere within the Processing Building at all times in accordance with the documents in Schedule "A". In the event that adequate negative air pressure cannot be maintained within the Processing Building, the Owner shall cease accepting additional Organic Waste and shall keep the loading bay doors and the air intake louvers closed until such time that negative pressure is re-established.

City of Guelph, WDS Cofa #A170128, Notice No. 3, Issue Date: August 11, 2010

36.(6) Odour Control:

(a) The Owner shall maintain a negative air pressure atmosphere within the Processing Building, as compared to the ambient atmospheric pressure, at all times.

Cofa AIR #1721-82YRUS, Issue Date: August 11, 2010

3. The Company shall monitor and record the following physical parameters of the Biofilter and the building, through a combination of sensors, meters and physical probes, at frequencies either as recommended by the Equipment suppliers or as determined by operational needs:

(2) Building:

(a) negative pressure

Universal Resource Recovery Inc., WDS Cofa #9855-73BJGK, Issue Date: December 9, 2010

7.(13) Processing Building Atmosphere:

(a) The Owner shall monitor the following physical parameters of the atmosphere within the Processing Building, through a combination of appropriate sensors, meters and physical probes as follows:

(i) negative pressure within the confines of the Processing Building, continuously; and

---

Thanks a lot everybody. Hope to hear from you soon.

Margaret

Witnessed July 6, 2011

Hart, Tracy (ENE)

From: Hannington, Neil (ENE)
Sent: July 19, 2011 1:51 PM
To: Hart, Tracy (ENE)
Cc: Azocar, Guillermo (ENE); Wan, Rudolf (ENE); Fani, Jason (ENE)
Subject: Orgaworld witnessing report
Attachments: 20110718-5070106-Orgaworld_Witnessing_Report.pdf

Tracy,

It was a pleasure meeting you earlier this month. As per usual I am attaching a witnessing report which outlines the portion of the testing that I witnessed. This report also documents the production information recorded during the test period.

As mentioned on-site, if this round of testing once again results in measured TRS concentrations below the method detection limit, it may be reasonable to consider relaxing the sampling requirements for these particular contaminants. Given that these are "Odour based" limits in the Regulation, future odour test results and/or odour complaints may provide an indication as to when TRS testing may be required down the road.

Obviously relaxing any source testing requirements would be to the discretion of the District and dependant on your comfort level. We can always touch base following the report submission.

Regards,

Neil Hannington
Source Assessment Specialist
Ministry of the Environment
Standards Development Branch
Tel: 416-327-0696
Fax: 416-327-9187

Ministry of the Environment
Standards Development Branch
40 St. Clair Avenue West
Toronto ON M4V 1M2
www.ene.gov.on.ca

Ministère de l'Environnement
Direction de l'élaboration des normes
40, avenue St. Clair ouest
Toronto, ON M4V 1M2
www.ene.gov.on.ca

Ontario

2011/07/18

SOURCE TESTING WITNESSING REPORT

Witnessing Report Sent to:	SDB File - AQ-02 (Orgaworld – Ottawa Facility)
Witness:	Neil Hannington, Source Assessment Specialist Technology Standards Section Standards Development Branch
Witnessing Date:	2011/07/06
Project Number:	ER:SA:108851:11
MOE Office:	Ottawa District Office
MOE Contact:	Ms. Tracy Hart - Phone: 613-521-3450 - Fax: 613-521-5437 - email: Tracy.Hart@ontario.ca

Company Background:

- Company Name: Orgaworld Canada Ltd. – Ottawa Facility
- Plant Address: 5123 Hawthorne Road
Ottawa, Ontario
- Project Coordinator: Greg Mariotti
Compost Facility Manager
Phone: (613) 822-2056
Fax: (613) 822-2058
Email: gmariotti@orgaworld.ca
- Target contaminants: Odour, Hydrogen Sulphide, Total Mercaptans
- Sampling Protocol: Approved by N. Hannington (2011/06/28).

Sampling Company Background:

- Company Name: Conestoga-Rovers & Associates
  651 Colby Drive
  Waterloo, Ontario
  N2V 1C2

- Project Coordinator: Brent Boss
  - Phone: 519-884-0510 ext. 2268
  - Fax: 519-884-0525
  - email: bboss@craworld.com

- Sampling Team: John McRae (Team Lead)
  Mike Masschaele (Technician)
  Chris Adam (Technician)

Sampling Methodologies:

- Odour – Dynamic Dilution
- Odour Analysis – Triplicate Forced Choice Olfactometry
- TRS Sampling/analysis – Environment Canada EPS 1/RM/6

The Orgaworld Canada Ltd. Ottawa facility (Orgaworld) is located at 5123 Hawthorne Road. The facility currently operates a fully enclosed composting operation which receives compost materials from the City of Ottawa's source separated organics program. The site, pictured below, operates under CofA No. 7021-7HQNDE and is limited to receiving a maximum of 150,000 tonnes per year of organic waste materials.



Currently the facility is operating at a reduced capacity based on the total tonnage of materials permitted. However due to the composition of the materials being received (mostly leaf and yard waste which has a lower density compared to household organics) the facility was near maximum storage capacity during the witnessed test period.

Process Description

Organic waste is transported to the Orgaworld facility via garbage collection trucks. As the trucks fill during their regular collection, they make their way to Orgaworld to unload. Trucks back into the enclosed facility and drop their loads on the tipping floor. Materials are quickly moved to a storage pad which comprises the majority of the buildings footprint. Piled waste sits on the storage / processing pad before being loaded into one of the 6 curing tunnels.

Between 300 and 600 tonnes of materials are loaded into each tunnel for the curing process. There are six (6) curing tunnels currently in operation. During the curing process air is continuously passed through the piled material. With properly maintained parameters (oxygen concentration, temperature, relative humidity and air flow) the organic material is fully composted and ready for market within 6 – 7 days.

Following the curing stage the tunnel is opened and the material is transported to the screening room via front-end loader. The front-end loader dumps the composted material into a screener where the fine and coarse material is separated. The material <10mm diameter is piled and prepared for sale while the 10 – 100 mm diameter material is recycled back through the process. Larger materials >100mm are shredded and pass through the process in the same manner as the 10-100mm material.

The temperature profile for the curing process is cyclical; for roughly the first three days of the curing cycle the tunnel temperature is maintained around 55 – 60 degrees Celsius. The remaining three or four days the tunnel is maintained at a temperature of approximately 40 degrees Celsius. The tunnel is allowed to reach ambient temperature before the tunnel doors are opens and the material is sent to the screening room. It is expected that the highest odour emission potential would be at the beginning of the cycle as the tunnel is being heated and the material is coming up to temperature.

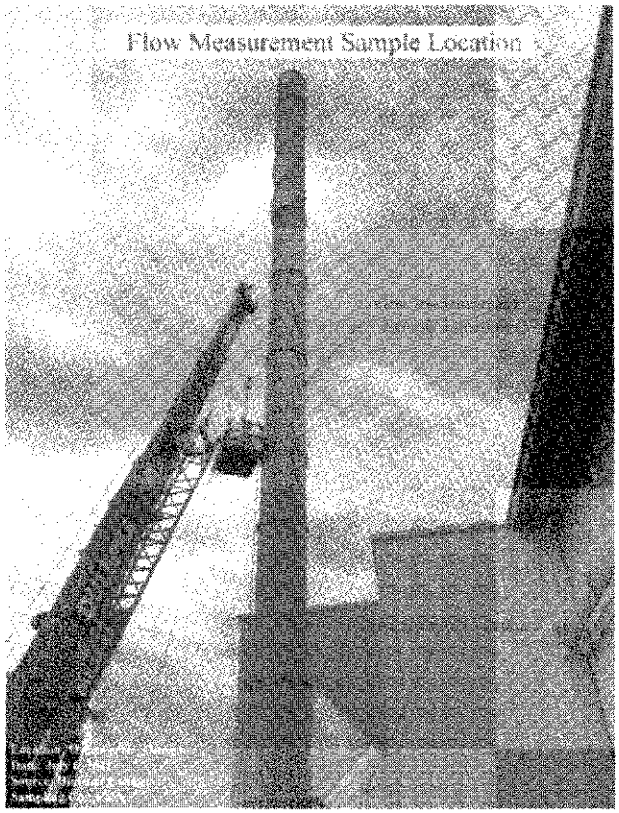
Process air is collected from the receiving area, storage pad and the curing tunnels where it is directed to the pollution control system which consists of an ammonia scrubber, two biofilters

(working in parallel) and a bioscrubber.

Sampling Locations

Odour sampling was conducted via sampling port installed on the breaching leading to the stack from the bioscrubber. Volumetric flow measurements were completed via two ports situated 90 degrees to one another approximately 4 diameters downstream of the breaching in a straight length of duct. This sample location was non-ideal

The following photos depict the main stack and the odour sampling location.



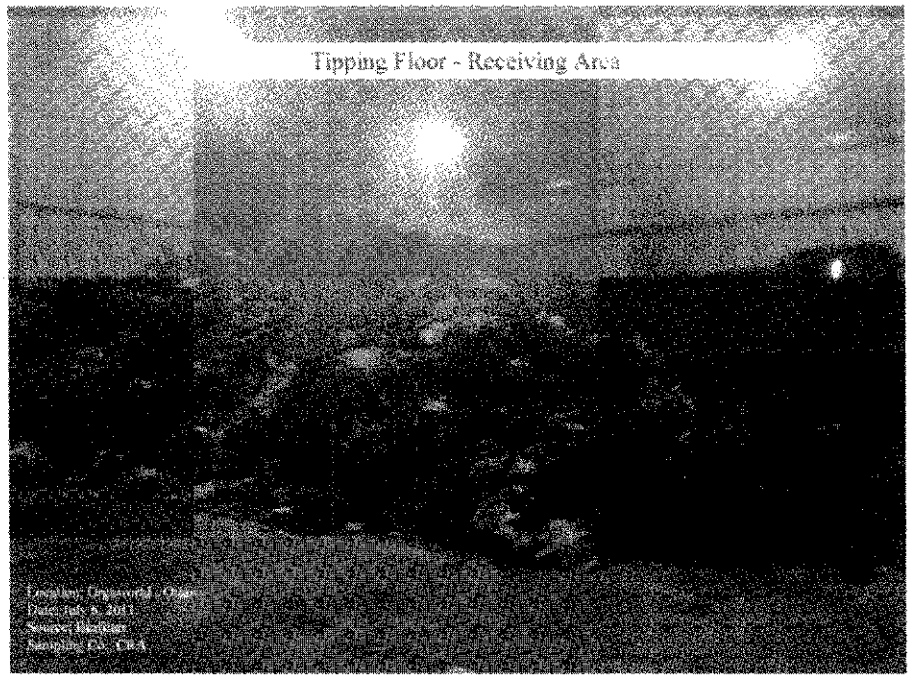
Site Observation

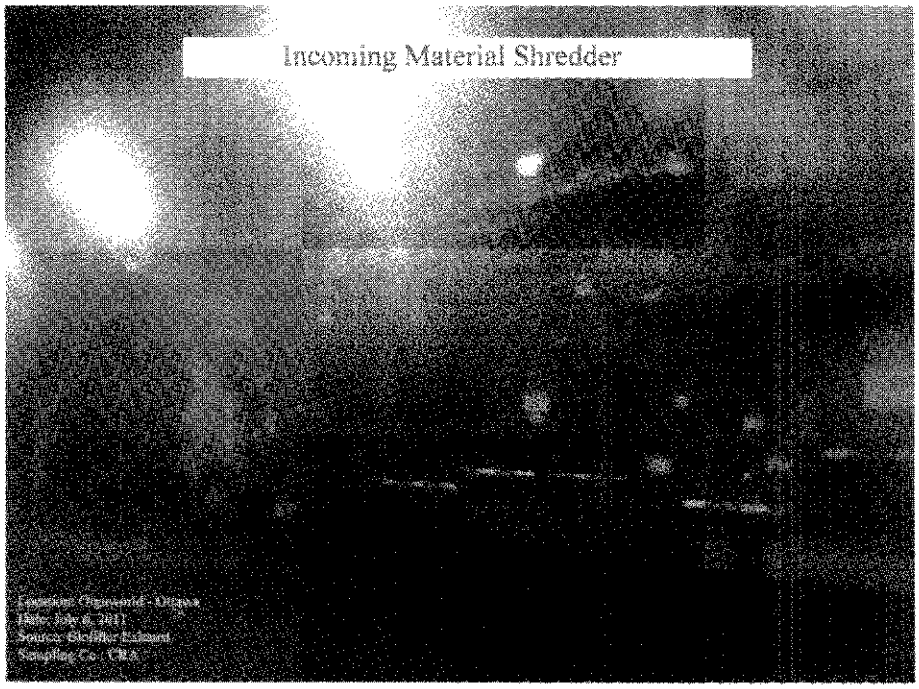
On the test date (July 6, 2011) three of the six tunnels were in the heating stage. Two other tunnels

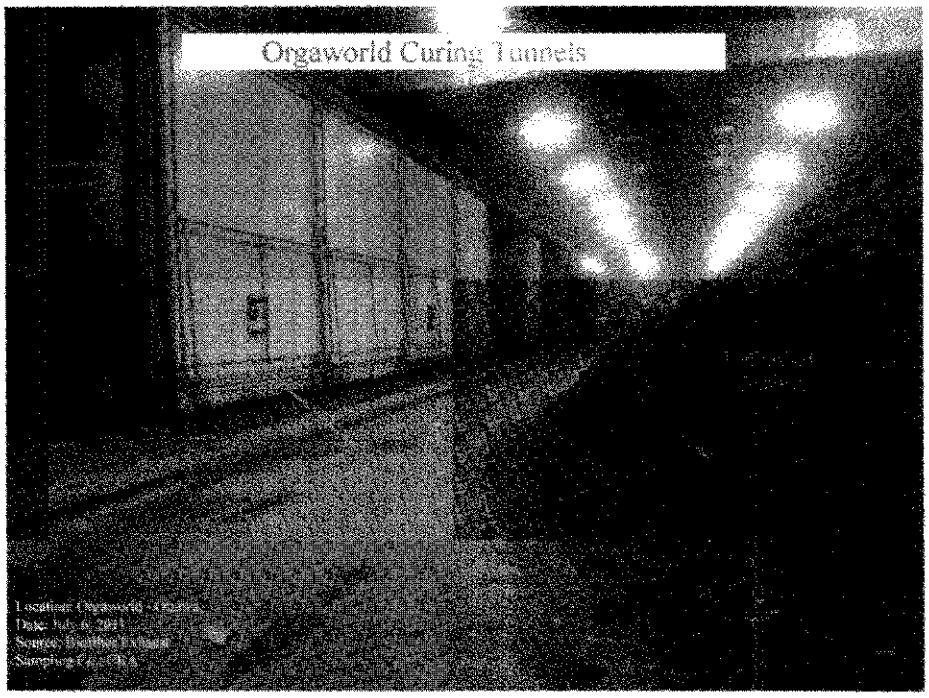
were in transition (either being filled or emptied) and one tunnel was empty. This is consistent with production typically seen at the site. It should be noted however that unlike the previous round of testing there was a significant amount of material in the building, both on the tipping floor and on the storage/processing pad. It appeared that the facility was near its volumetric capacity and process data provided by Orgaworld indicates that a significantly higher amount of materials were being received on a daily basis, for the weeks prior to testing, as compared to previous test programs. All process data, as provided by Orgaworld, has been appended to this report.

Two other notable changes at the facility since the last round of testing include the addition of an on-site shredder which is housed within the building on the processing floor between the tipping floor and the tunnels. This unit is used prior to the curing process. Materials are shredded providing a more consistent feed that can lead to shorter processing times. In addition it was stated that the reject materials which fell in the 10 – 100 mm range are now between the 10 – 20 mm range. Though not confirmed it was assumed that changes have been made in the screening process. Reasons for the changes were not discussed.

A site tour was completed with Michael Rooke (Orgaworld Compliance Officer) and Tracy Hart (MOE Ottawa District Environmental Officer). At the time of the tour (~10:00 a.m.) there was a significant amount of material in the receiving area of the plant and the processing area appeared to be near capacity. The storage pads located across from the curing tunnels (called the mixing/shredding pile by Mr. Rooke) appeared to be completely full. Mr. Rooke estimated the material to consist of approximately 1,200 tonnes. Photos of the facility's processing areas can be seen on the following pages.


Tipping Floor - Receiving Area


Incoming Material Shredder



Both tunnels 7 and 8, which have not been commissioned to-date, were being used to store what appeared to be "10 – 20" material.

A summary of the various stages of each tunnel (as of ~9:00a.m, July 6) can be seen below:

	Mode	Decription
Tunnel #1	Stage II	~80 hrs - estimated 300T material in tunnel
Tunnel #2	---	Being filled with fresh material ~1/2 full
Tunnel #3	Stage IV	~175 hrs - estimated 300T material in tunnel
Tunnel #4	Stage V	~270 hrs - estimated 300T material in tunnel
Tunnel #5	---	Being emptied ~2/3 full or 200T material in tunnel
Tunnel #6	---	Empty

Estimates of materials in tunnels provided by Michael Rooke (Compliance Officer - Orgaworld)

Unlike the previous round of testing there was a significant amount of material in the building, both on the tipping floor and in the processing floor. It appeared that the facility was near its volumetric capacity. Process data, as provided by Orgaworld, has been appended to this report.

Sampling Methodology / Observations

Sampling was completed by John McRae and Chris Adam of CRA. Flow measurements were obtained with the assistance of a crane and a basket, while odour samples were collected from ground level using a port installed on the breaching leading to the main stack.

A moisture test was completed for a period of twenty minutes following the Ontario Source Testing Code Version #2, Nov 1980 – Method 4, to obtain the stack gas moisture content. Odour sampling was completed following procedures outlined in the Draft odour sampling method ON-6 found in the Draft Ontario Source Testing Code, Version #3, July 2009.

TRS sampling was completed following Environment Canada Method EPS 1/RM/6 which utilizes an 85% solution of phosphoric acid contained within a midget impinger for the purpose of removing moisture prior to capturing the stack gas in a Tedlar® sample container. Samples were analyzed on-site using CRA's GC-FPD analyzer.

TRS sampling was completed prior to odour sampling. TRS analysis was completed on-site by CRA using a GC-FPD analyzer. In the previous program personnel from the analytical laboratory (Air Zone) came to the site with the GC analyzer to complete the TRS analysis. For this round of testing CRA had employed their own GC-FPD analyzer. Only portions of the GC-FPD calibration were witnessed prior to departure from site.

Ambient temperature and meteorological data were obtained from Environment Canada. The data originates from a weather station located at the Ottawa International Airport which is located within approximately 15 kilometers of the Orgaworld facility. This data can be seen on the following page:

Latitude: 45°19'21.000" N Longitude: 75°40'09.000 " W Elevation: 114.00 m

limate ID: 6106000 WMO ID: 71628 TC ID: YOW

Hourly Data Report for July 6, 2011

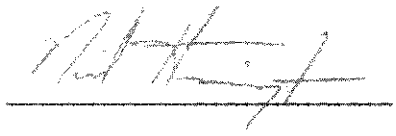
Time	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Stn Press kPa	Weather
00:00	22.0	14.4	62	23	15	99.71	Mostly Cloudy
01:00	21.6	13.5	60	22	13	99.68	Clear
02:00	20.9	13.2	61	20	9	99.63	Mainly Clear
03:00	19.6	13.9	70	19	9	99.64	Mostly Cloudy
04:00	19.3	14.3	73	25	4	99.64	Mostly Cloudy
05:00	19.0	14.7	76		0	99.63	Mostly Cloudy
06:00	19.8	15.7	77	19	7	99.57	Mostly Cloudy
07:00	21.5	17.2	77	21	9	99.61	Mostly Cloudy
08:00	20.3	18.3	88	19	15	99.55	Rain
09:00	19.8	19.0	95	24	9	99.62	Thunderstorms,Rain
10:00	21.3	19.9	92	19	7	99.58	Cloudy
11:00	21.2	20.0	93	24	15	99.62	Thunderstorms,Rain
12:00	22.5	18.6	79	26	24	99.62	Cloudy
13:00	22.9	18.9	78	28	26	99.63	Cloudy
14:00	24.1	17.6	67	28	22	99.63	Mainly Clear
15:00	24.8	18.1	66	27	20	99.63	Mainly Clear
16:00	24.8	17.6	64	30	20	99.62	Mainly Clear
17:00	24.3	17.1	64	31	22	99.60	Mainly Clear
18:00	23.3	17.9	72	34	24	99.66	Mostly Cloudy
19:00	21.3	16.0	72	33	22	99.73	Mostly Cloudy
20:00	20.7	15.8	74	33	20	99.75	Mostly Cloudy
21:00	18.8	15.5	81	30	11	99.84	Mainly Clear
22:00	19.1	15.5	80	28	6	99.88	Clear
23:00	17.9	15.8	88	27	11	99.90	Clear

Final Comments

In general, the portions of the sampling program which were witnessed were completed following the methodology outlined in the approved pre-test plan protocol. As a result of the analysis limitations in the TRS sampling method (Environment Canada EPS Method 1/RM/6) which states

that sample analysis should begin within one (1) hour of sampling, CRA opted to complete on-site analysis. It was clear that CRA was not well versed with the analytical equipment and methodology. Unfortunately as a result of previous commitments, only a portion of the time consuming calibration procedure could be witnessed.

The Orgaworld facility was operating at a much higher production level as compared to previous test programs. Though the facility appeared to be near its volumetric capacity, the low density characteristics of the waste materials (mostly leaf and yard) means they are likely operating below their annual permitted capacity.



Neil Hannington
Source Assessment Specialist
Standards Development Branch

c.c. T. Hart – Ottawa District Office (via email: Tracy.Hart@ontario.ca)
R. Wan – EA&AB (via email: Rudolf.Wan@ontario.ca)
J. Fani/G. Azocar – SDB (via email)
File AQ-02 (Orgaworld Canada Ltd. – Ottawa)

(Doc.Mgmt # 5U070106)

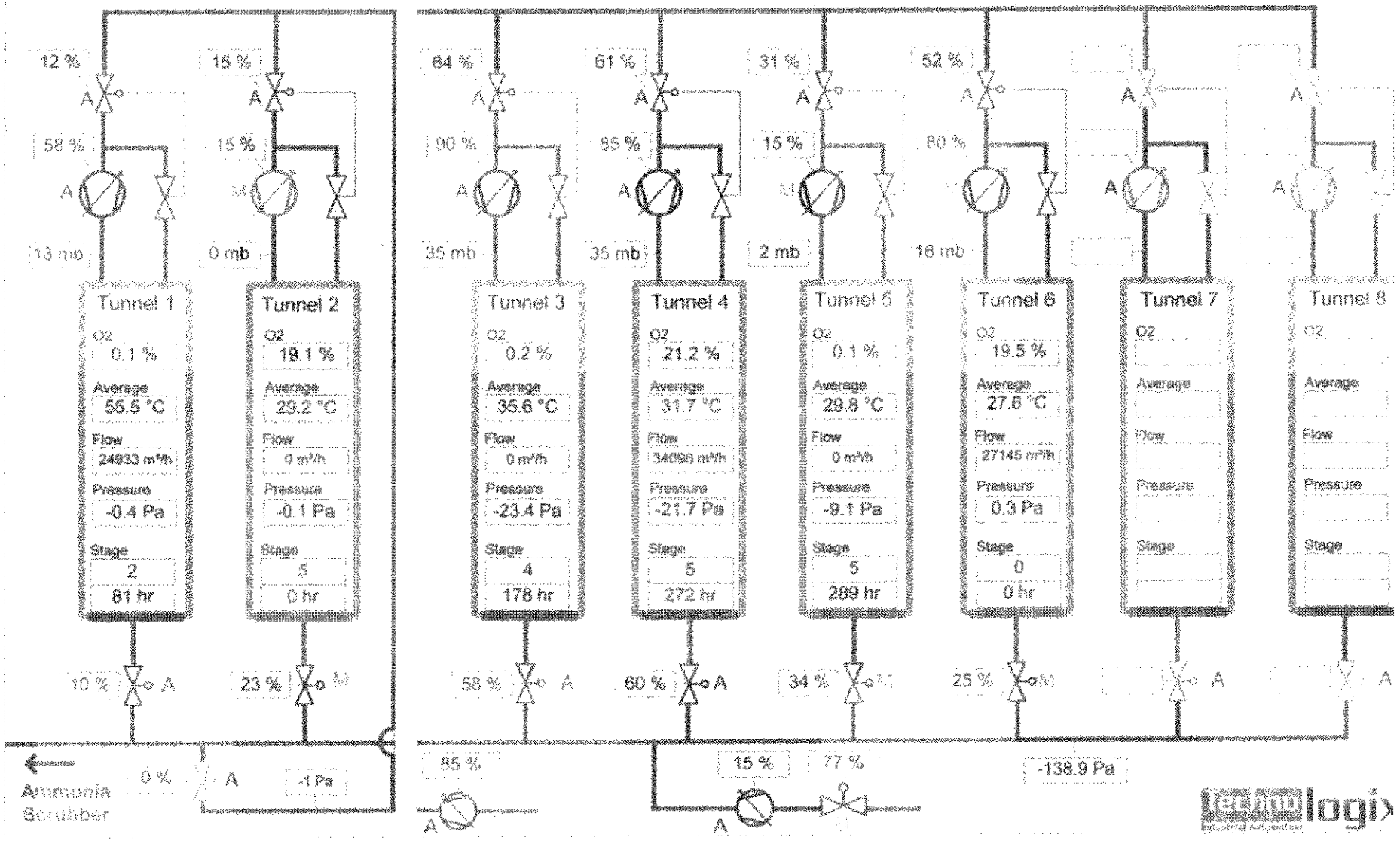
TUNNELS OVERVIEW

Outside Temperature 29.2 °C

31.5 °C -157 Pa

A

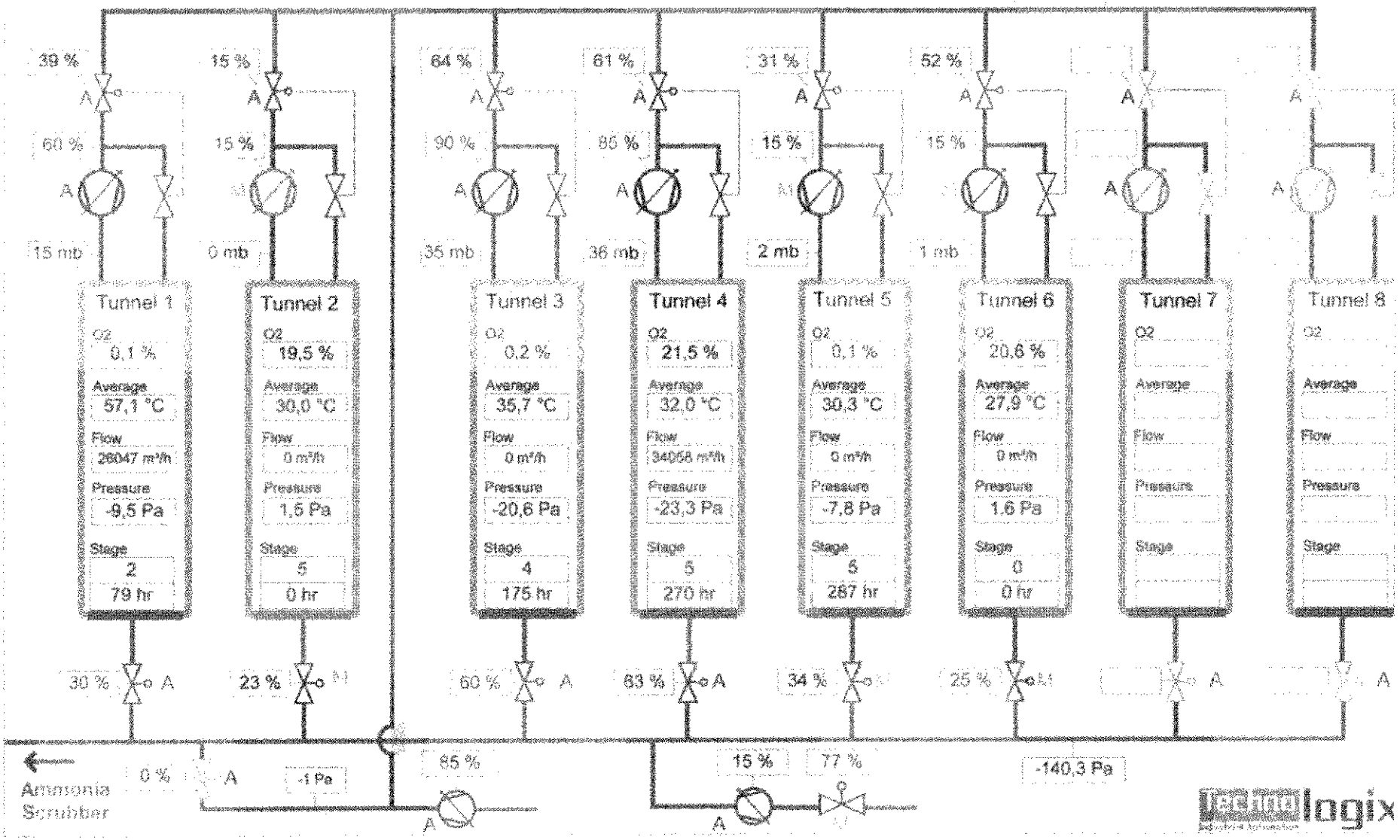
OxyGAWORLD



TUNNELS OVERVIEW

29,2 °C -139 Pa

A



TUNNELS OVERVIEW

ORGAWORLD

Outside temperature 26.7 °C

32.8 °C -164 Pa

A

	Tunnel 1	Tunnel 2	Tunnel 3	Tunnel 4	Tunnel 5	Tunnel 6	Tunnel 7	Tunnel 8
	40 %	15 %	64 %	61 %	31 %	52 %		
	A	A	A	A	A	A	A	A
	58 %	15 %	85 %	85 %	15 %	80 %		
	A	M	A	A	M	M	A	A
	14 mb	0 mb	32 mb	35 mb	2 mb	16 mb		
O2	0.1 %	19.4 %	0.2 %	21.3 %	0.1 %	20.2 %		
Average	57.4 °C	31.0 °C	36.8 °C	32.0 °C	31.0 °C	29.0 °C		
Flow	25037 m³/h	0 m³/h	0 m³/h	34366 m³/h	0 m³/h	27078 m³/h		
Pressure	-8.4 Pa	0.4 Pa	-25.9 Pa	-24.7 Pa	-8.5 Pa	1.2 Pa		
Stage	2	5	4	5	5	0		
	82 hr	0 hr	180 hr	274 hr	291 hr	0 hr		
	27 % A	23 % M	56 % A	60 % A	34 % M	25 % M	A	A

Ammonia Scrubber

0 % A -1 Pa

85 % A

15 % A

77 % M

-137.4 Pa

technologix Industrial Automation

002172

A ORGAWORLD

OVERVIEW BIOFILTERS

Ammonia Scrubber -142.7 Pa 37.6 °C 20.3 %

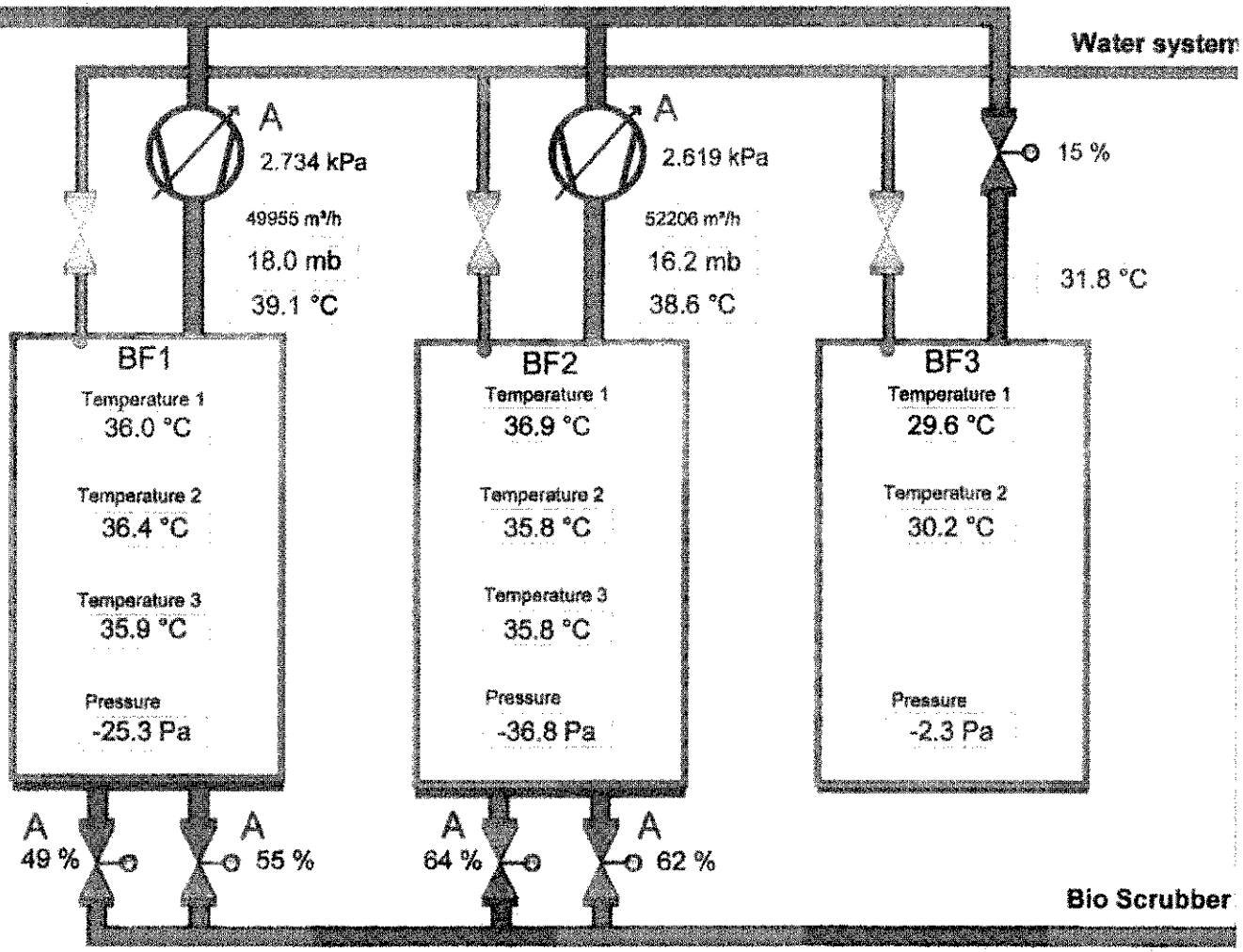
Pressure setpoint -140.0 Pa

Fan 1	
90 %	54.0 Hz
49955 m³/h	62.9 A
1119 rpm	49.1 KW

Fan 2	
90 %	54.0 Hz
52206 m³/h	67.2 A
1119 rpm	52.5 KW

Fan 3	
0 %	0.0 Hz
0 m³/h	0.0 A
0 rpm	0.0 KW

Average temperature biofilter 1	36.1 °C
Actual humidity biofilter 1	98.5 %
Average temperature biofilter 2	36.1 °C
Actual humidity biofilter 2	98.5 %
Average temperature biofilter 3	0.0 °C
Actual humidity biofilter 3	0.0 %



-452.3 Pa 18.4 %

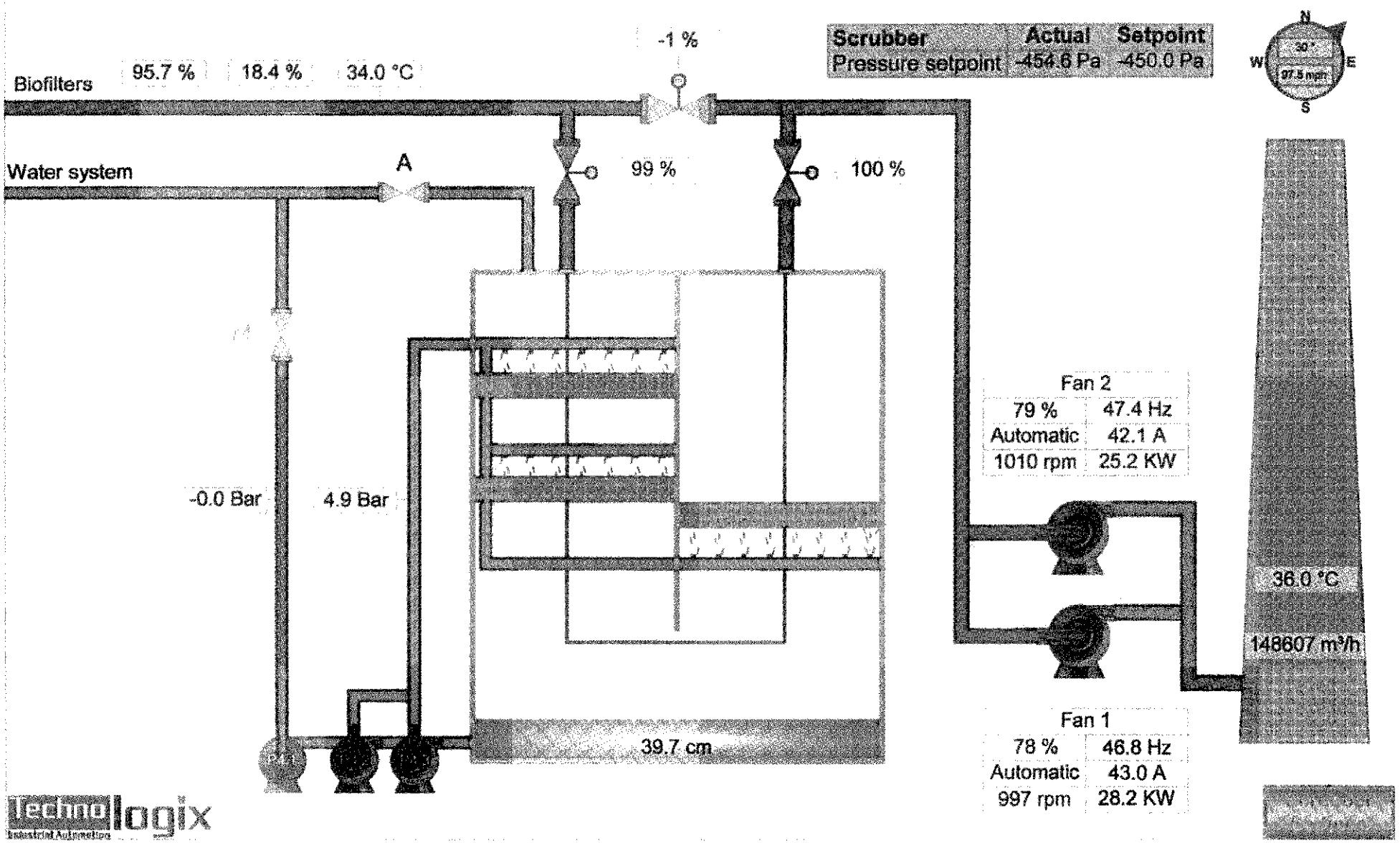
Technologix Industrial Automation

002173

SCRUBBER OVERVIEW

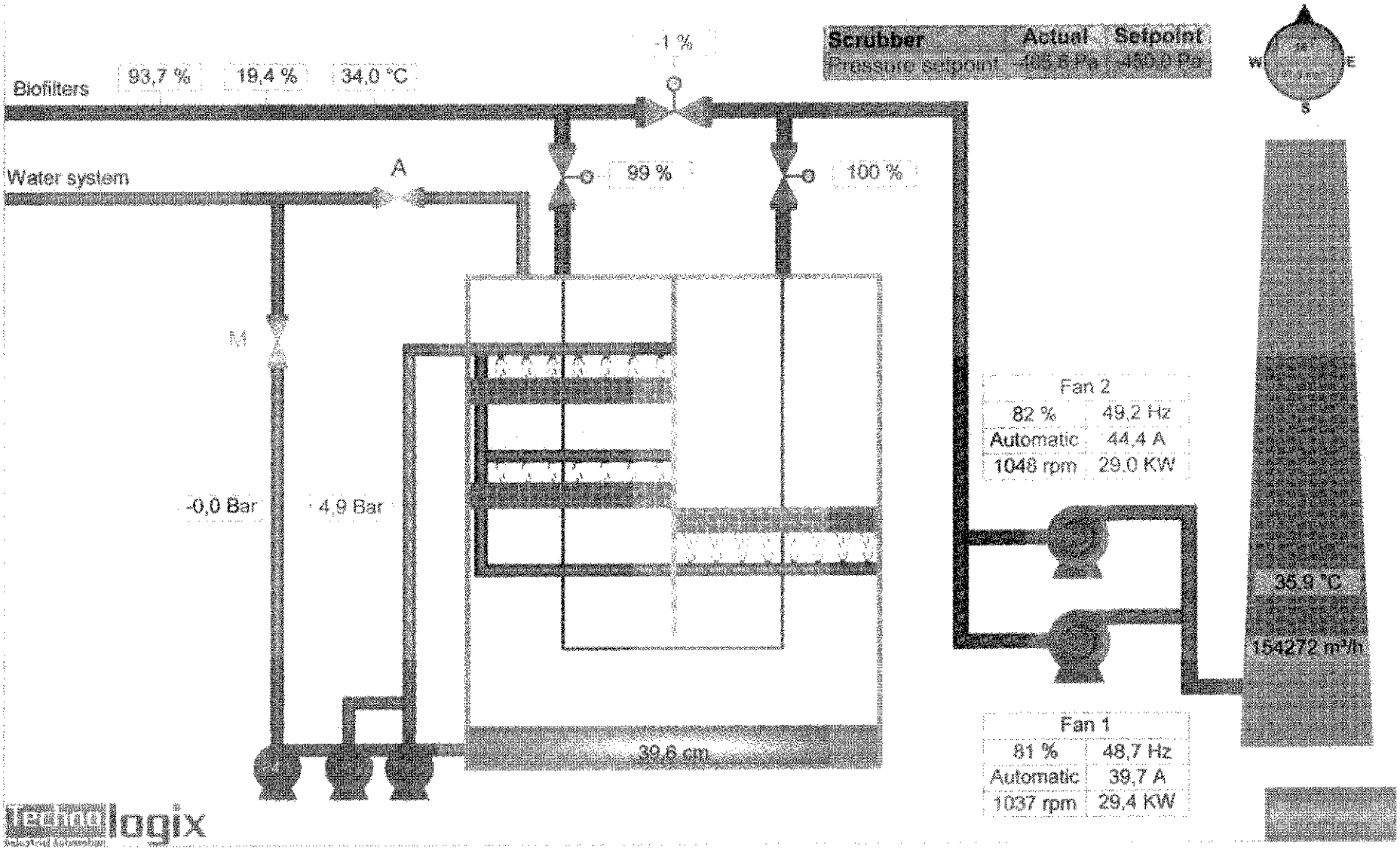
A ORGAWORLD

Scrubber	Actual	Setpoint
Pressure setpoint	-454.6 Pa	-450.0 Pa

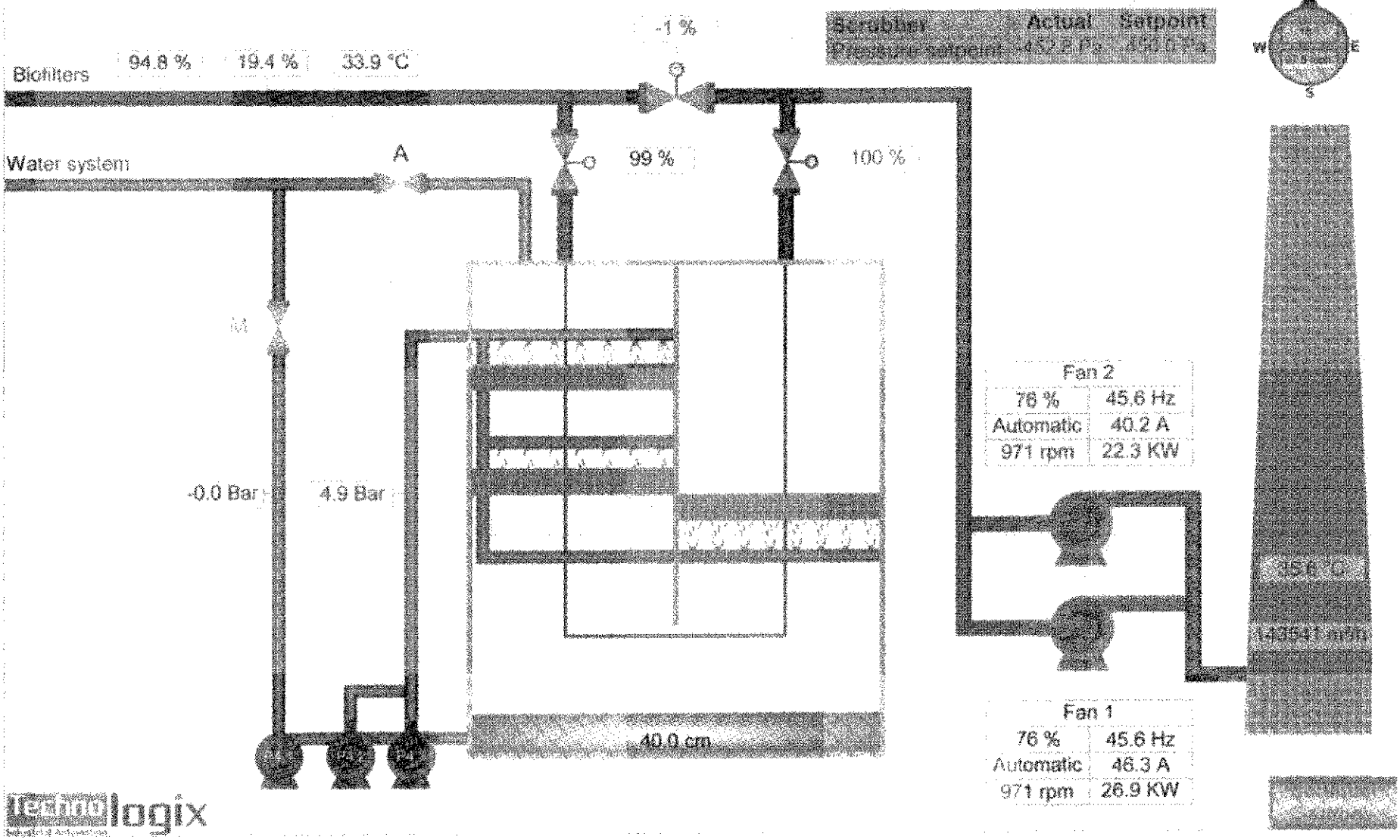


Technologix
Industrial Automation

SCRUBBER OVERVIEW



SCRUBBER OVERVIEW



002175

OVERVIEW BIOFILTERS

ORGAWORLD

Ammonia Scrubber -135.1 Pa 35.0 °C 20.4 %

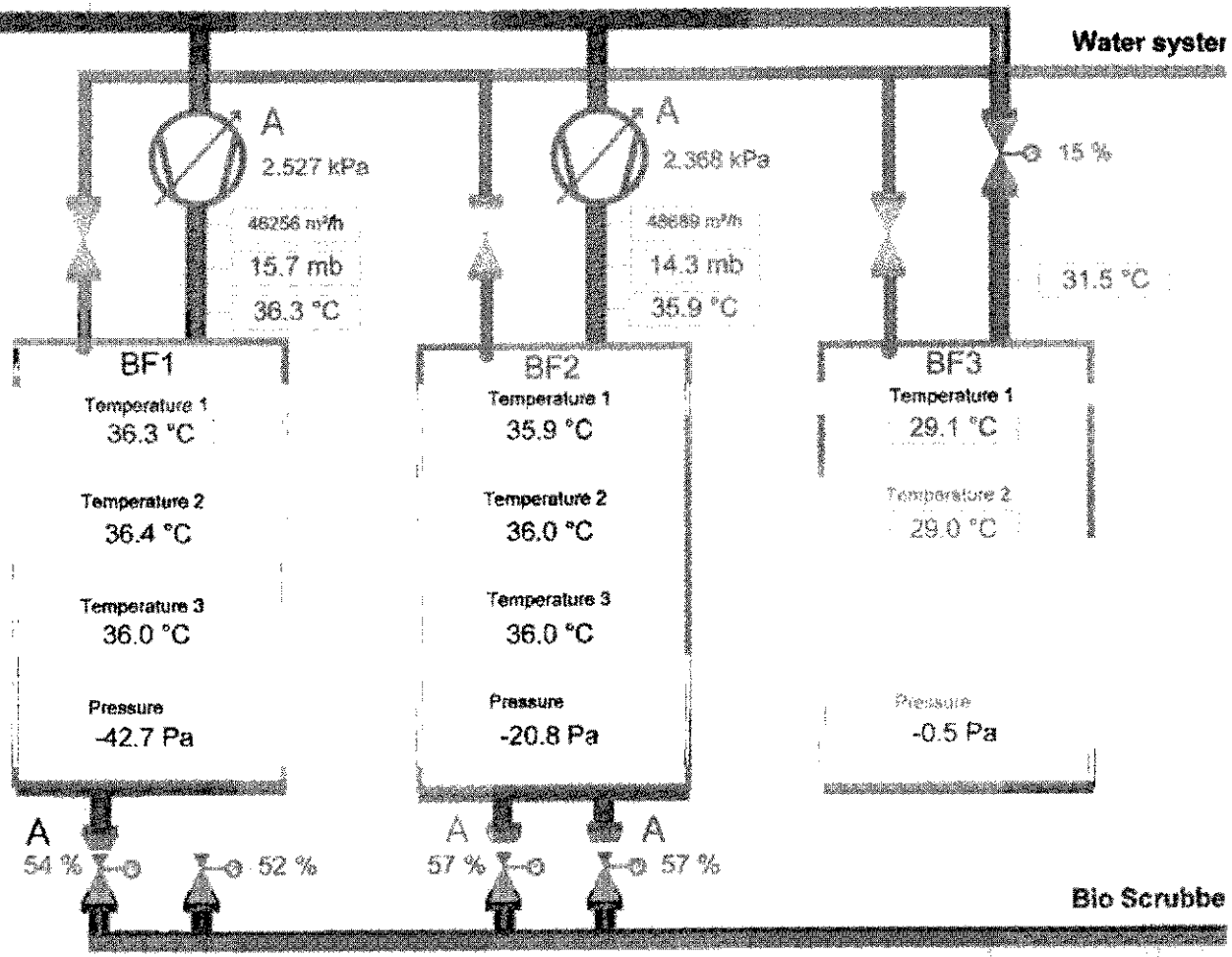
Pressure setpoint -140.0 Pa

Water syster

Fan 1	
85 %	51.0 Hz
46256 m³/h	57.6 A
1056 rpm	41.4 KW

Fan 2	
85 %	51.0 Hz
48689 m³/h	62.5 A
1056 rpm	45.1 KW

Fan 3	
0 %	0.0 Hz
0 m³/h	0.0 A
0 rpm	0.0 KW



Average temperature biofilter 1	36.2 °C
Actual humidity biofilter 1	98.9 %
Average temperature biofilter 2	36.0 °C
Actual humidity biofilter 2	98.5 %
Average temperature biofilter 3	0.0 °C
Actual humidity biofilter 3	0.0 %

technologix

002176

OVERVIEW BIOFILTERS

A

Ammonia Scrubber -141,9 Pa 36,8 °C 20,3 %

Pressure setpoint -140,0 Pa

Water syste

Fan 1	
93 %	55,8 Hz
51283 m³/h	67,8 A
1156 rpm	53,2 KW

Fan 2	
93 %	55,8 Hz
53818 m³/h	69,1 A
1156 rpm	54,6 KW

Fan 3	
0 %	0,0 Hz
0 m³/h	0,0 A
0 rpm	0,0 KW

Average temperature biofilter 1	36,1 °C
Actual humidity biofilter 1	97,8 %
Average temperature biofilter 2	35,8 °C
Actual humidity biofilter 2	98,8 %
Average temperature biofilter 3	0,0 °C
Actual humidity biofilter 3	0,0 %

A 2,958 kPa
51283 m³/h
19,7 mb
38,2 °C

A 2,804 kPa
53815 m³/h
17,0 mb
37,6 °C

15 %

31,3 °C

BF1
Temperature 1 35,8 °C
Temperature 2 36,3 °C
Temperature 3 36,3 °C
Pressure -31,2 Pa

BF2
Temperature 1 36,4 °C
Temperature 2 35,4 °C
Temperature 3 35,5 °C
Pressure -30,4 Pa

BF3
Temperature 1 29,5 °C
Temperature 2 28,9 °C
Pressure -3,9 Pa

A 56 % A 57 %

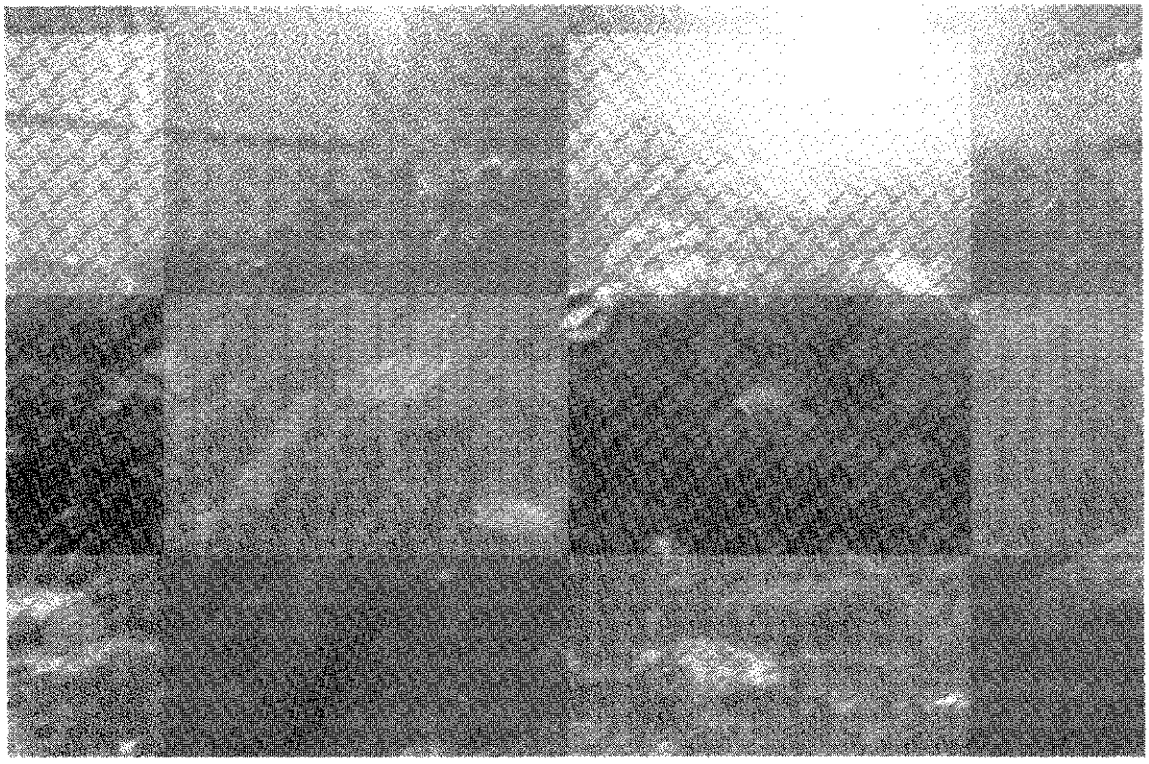
A 65 % A 65 %

Bio Scrubbe

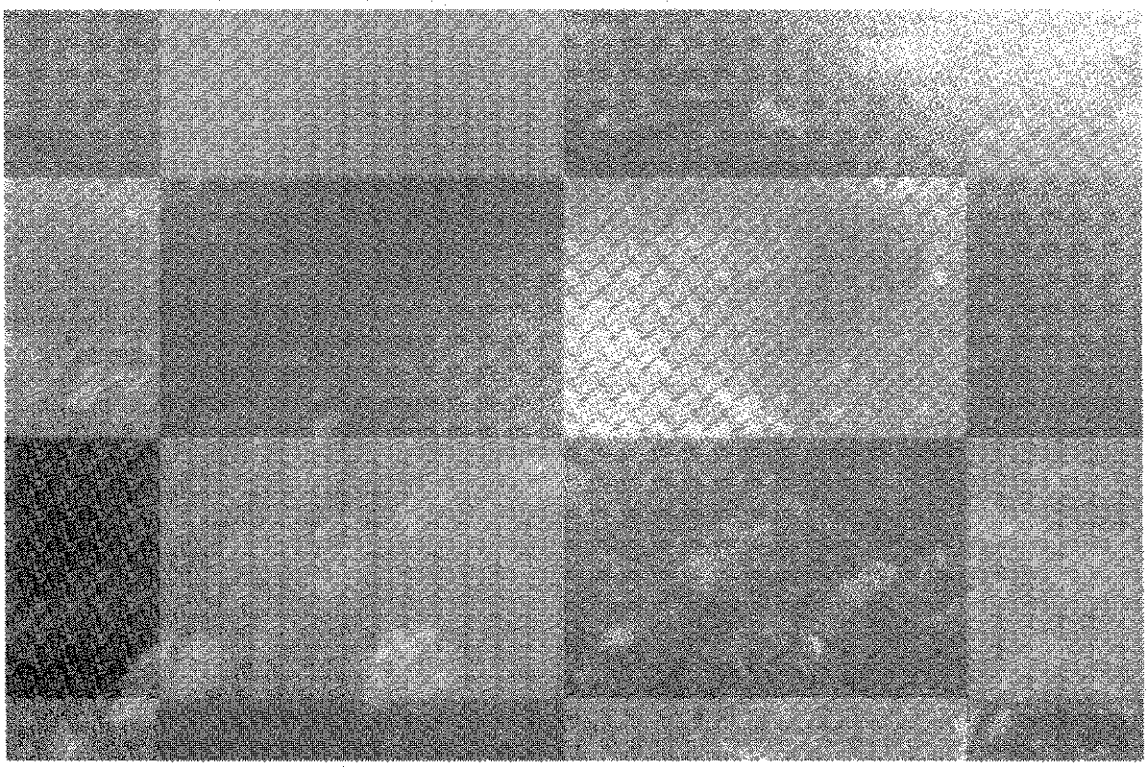
-435,2 Pa 19,4 %

Date	# of Deliveries	SSO Received (kg)	Ave Wgts/Delivery	SSO Tx to Processing Hall (kg)	Tunnel #'s Active	Tunnel Preparation	SSO in Processing Hall	SSO Mixed in Mixing Area	10-100(kg)
01/05/2011									
02/05/2011	38	331150	8714	331150	1,2,5,6	Screen 3	94370	606340	606860
03/05/2011	33	303310	9191	303310	1,2,4,6	Screen 6, Fill 4	96160	606340	606860
04/05/2011	37	364660	9856	364660	1,3,4,6	Fill 3, Screen 2	152640	606340	606860
05/05/2011	36	353370	9816	353370	1,2,3,4,6	Screen 5, Fill 2, Fill 6	116210	106340	606860
06/05/2011	37	334250	9034	334250	2,3,4,5,6	Screen 1, Fill 5	100460	156800	656860
07/05/2011									
08/05/2011									
09/05/2011	26	303800	10850	303800	1,2,5,6,8	Fill 1, Screen 4	104260	111060	606800
10/05/2011	33	338720	10264	338720	1,2,4,5,6	Fill 4, Screen 3	142980	106040	656860
11/05/2011	52	514180	9888	514180	1,2,4,5,6		257160	504040	606860
12/05/2011	53	481610	9087	481610	1,2,3,4,5,6	Fill 3	238770	554040	606860
13/05/2011	51	432490	8480	432490	1,2,3,4,5,6		471260	754040	606860
14/05/2011							271260	954040	606860
15/05/2011					1,2,3,4,5	Screen 6	271260	954040	606860
16/05/2011	31	336250	10848	336250	1,3,4,5,6	Fill 6, Screen 2	207950	904040	656860
17/05/2011	25	277350	11094	277350	1,2,3,4,5,6	Fill 2	184900	57850	606860
18/05/2011	32	352230	11007	352230	1,2,3,4,6	Screen 5, fill 5	357130	-192450	656860
19/05/2011	29	289840	9960	289840	1,2,3,5,6	Screen 4	125970	307550	956860
20/05/2011	28	320270	11044	320270	1,2,4,5,6	Screen 3, fill 4	146240	157550	706860
21/05/2011									
22/05/2011									
23/05/2011									
24/05/2011	31	455880	14706	455880	1,2,4,6	Screen 6	102120	857550	606860
25/05/2011	47	643710	13696	643710	1,2,3,4,5,6	fill 6, Fill 3	445830	57550	706860
26/05/2011	51	734050	14393	734050	1,3,4,5,6	screen 2	1179680	57550	806860
27/05/2011	36	407760	11582	407760	2,3,4,5,6	FILL 2, SCREEN 1	987640	207550	856860
28/05/2011	28	418740	14848	418740	2,3,4,5,6		803380	807550	656860
29/05/2011									
30/05/2011	19	216210	11379	216210	1,2,3,4	screen 6, screen 5, fill 1	419590	957550	1006860
31/05/2011	21	261710	9805	261710	1,2,3,6	screen 4, Fill 6	621300	907550	1056860
01/06/2011	23	275110	11961	275110	1,2,3,5,6	fill 5	296410	857550	1006860
02/06/2011	28	332510	11875	332510	1,2,4,5	screen 3, screen 6, fill4	628920	207550	1156860
03/06/2011	46	480710	10015	480710	1,2,3,4,6	fill 3	789630	57550	906860
04/06/2011									
05/06/2011									
06/06/2011	35	355290	10151	355290	1,3,4,5,6	screen 2, fill 6	644920	107550	956850
07/06/2011	33	414440	12559	414440	1,3,4,5,6		1059360	107550	
08/06/2011	42	409610	9753	409610	3,4,5,6	screen 1	668970	907550	1056860
09/06/2011	36	422180	11727	422180	2,3,4,6	screen 5, fill 2	1091150	457550	1106860
10/06/2011	34	268620	7901	268620	1,2,3,4,6	Fill 1	1359770	7550	1056860
11/06/2011	1	26880	26880	26880	1,2,3,4,6		986450	407550	1056819
12/06/2011									
13/06/2011	38	356030	9369	356030	1,2,3,5,6	Screen 4, Fill 5	1042480	257550	1106706
14/06/2011	29	288680	9954	288680	1,2,4,5,6	screen 3, fill 4	931160	207550	1156575
15/06/2011	37	410760	11102	410760	1,2,4,5,	fill 2, screen 6	741920	357550	1206575
16/06/2011	35	343060	11435	343060	2,4,5,6	screen 1, fill 6, 3 still open	484980	507550	1256364
17/06/2011	33	294730	8931	294730	2,3,4,5,6	screen 1, 3 closed	179710	657550	1356298
18/06/2011									
19/06/2011									
20/06/2011	30	280320	9677	280320	1,2,3,4,5,6	fill 1	470030	207550	1306230
21/06/2011	27	238320	8827	238320	1,3,4,5,6	screen 2	708350	207550	1406230
22/06/2011	33	314020	9518	314020	1,2,3,5,6	fill 2, screen 4	522370	257550	1456230
23/06/2011	29	293840	10132	293840	1,2,4,5,6	Screen 3, fill 4	316210	307550	1506196
24/06/2011	30	239920	7994	239920	1,2,4,5,6	screen3	556030	307550	1506196
25/06/2011									
26/06/2011									
27/06/2011	28	291040	10394	291040	1,2,3,4,5,6	fill 5	247070	457550	1456189
28/06/2011	28	277000	9893	277000	2,3,4,5,6	screen 1	524070	457550	1556189
29/06/2011	30	275960	9199	275960	2,3,4,5,6		860030	457550	1305119
30/06/2011	30	278520	9284	278520	2,3,4,5,6,		1078550	457550	1055033
01/07/2011									
02/07/2011	26	221710	8527	221710	1,2,3,4,5,6	fill 1	1300260	7550	805693
03/07/2011									
04/07/2011	27	261290	9677	261290	1,3,4,5,6	screen 2	781550	907550	905822
05/07/2011	26	251807	10070	251870	1,3,4,5,	screen 6	1023420	907550	905790
06/07/2011	35	272820	9747	272920	1,3,4,6	screening 5, filled 6	1266340	357550	855827
07/07/2011	31	340630	10988	340630	1,3,5,6	filled 5, screened 4	1236970	307550	903313
08/07/2011	29	279400	9324	280400	1,3,4,5,6	fill 4	927370	457550	855008
09/07/2011									

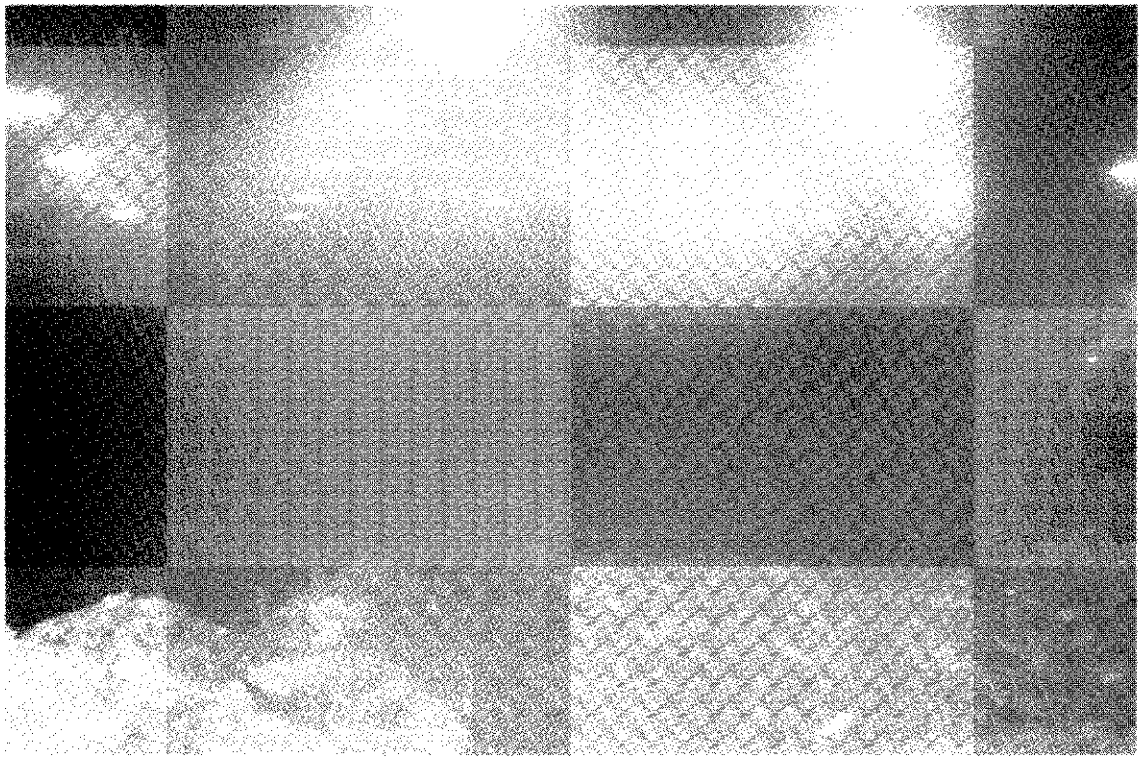
Orgaworld July 6, 2011
On Site with MOE Neil Hannington during STAE testing



incoming waste



incoming waste



View into entrance hall



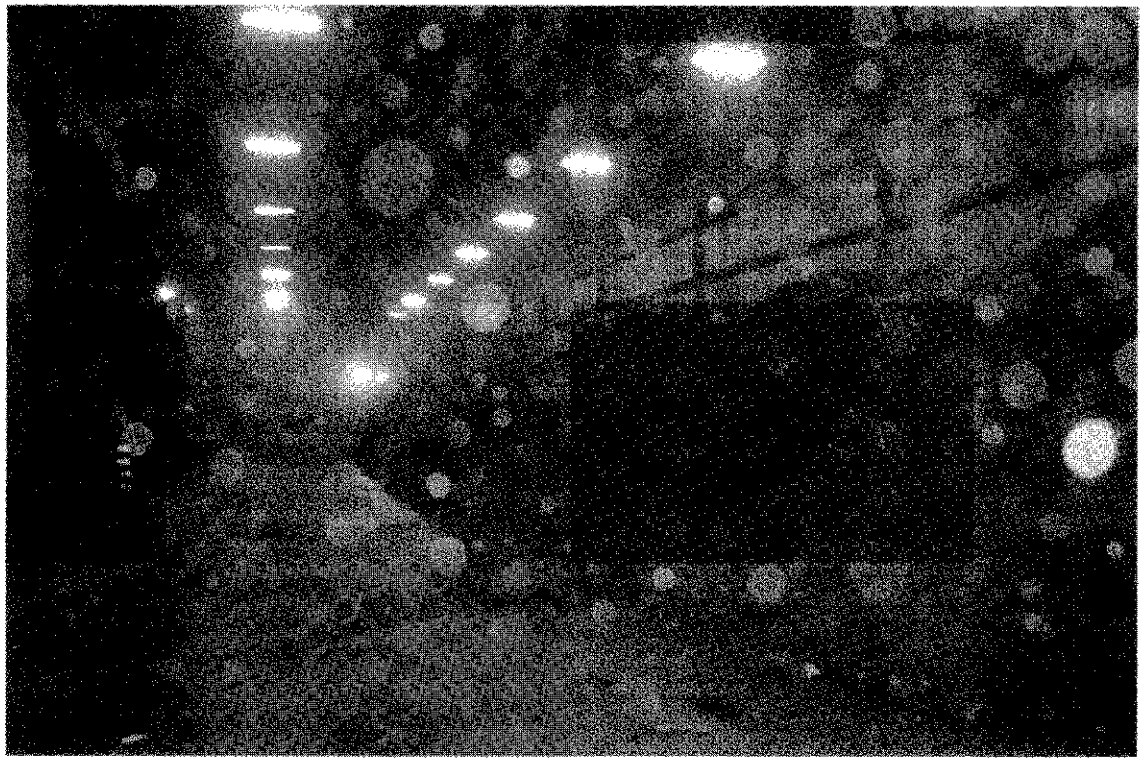
Meeting hall

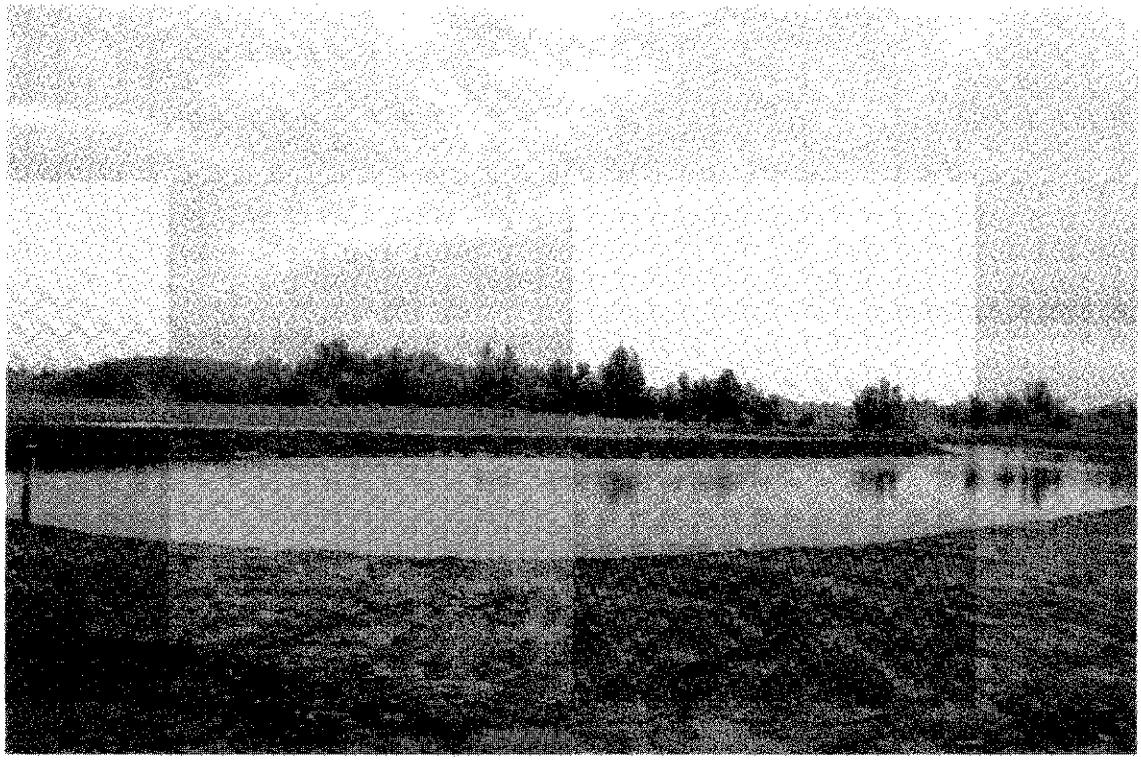


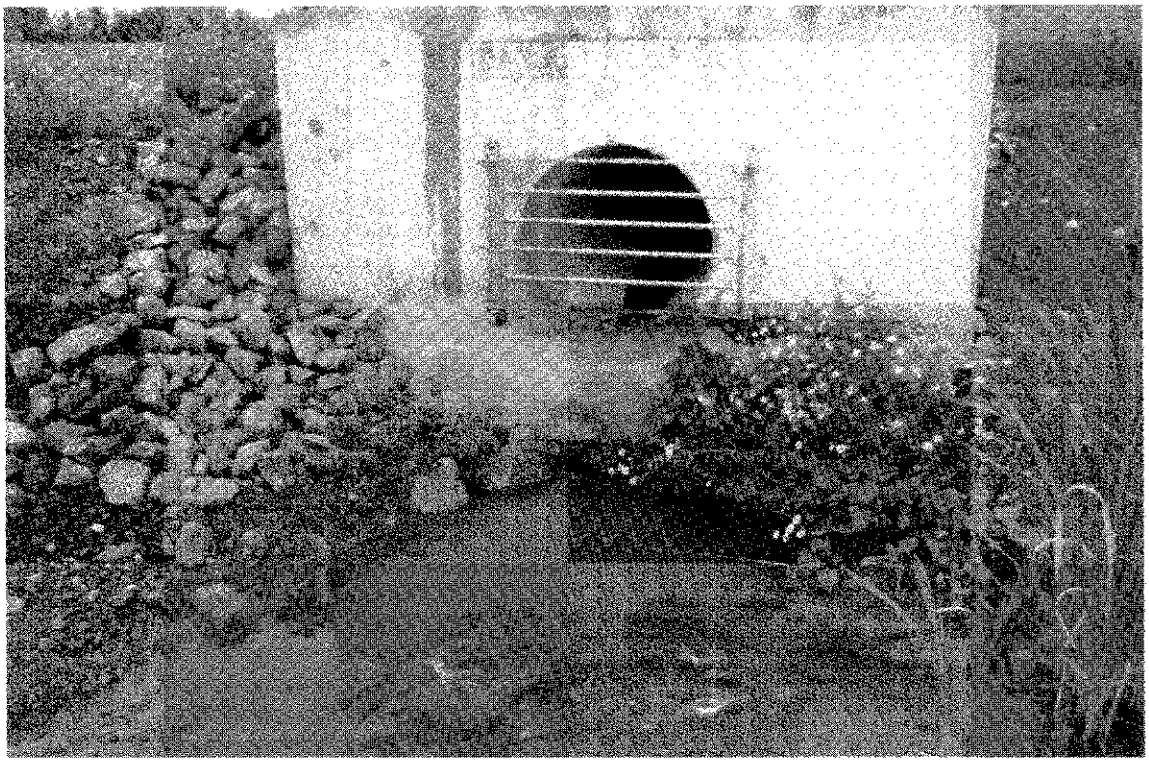
Waste blocking entrance hall



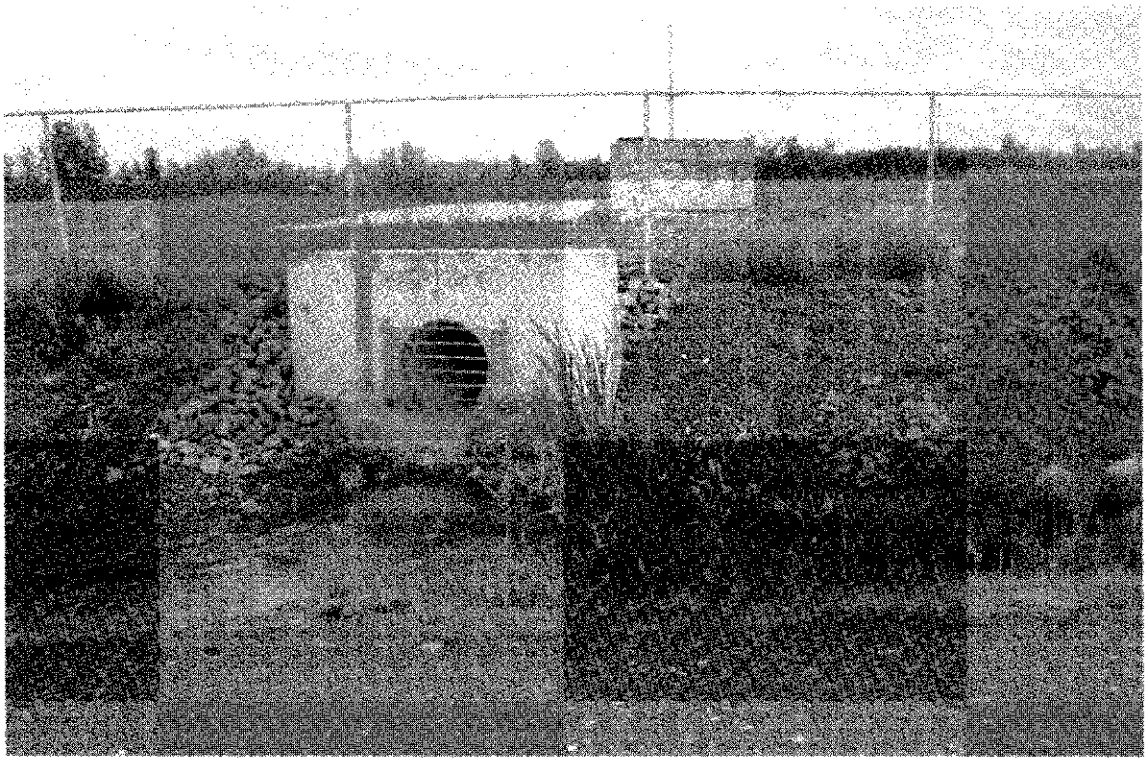
mixing hall







Organworld outfall





Tomlinson site
Compost storage.



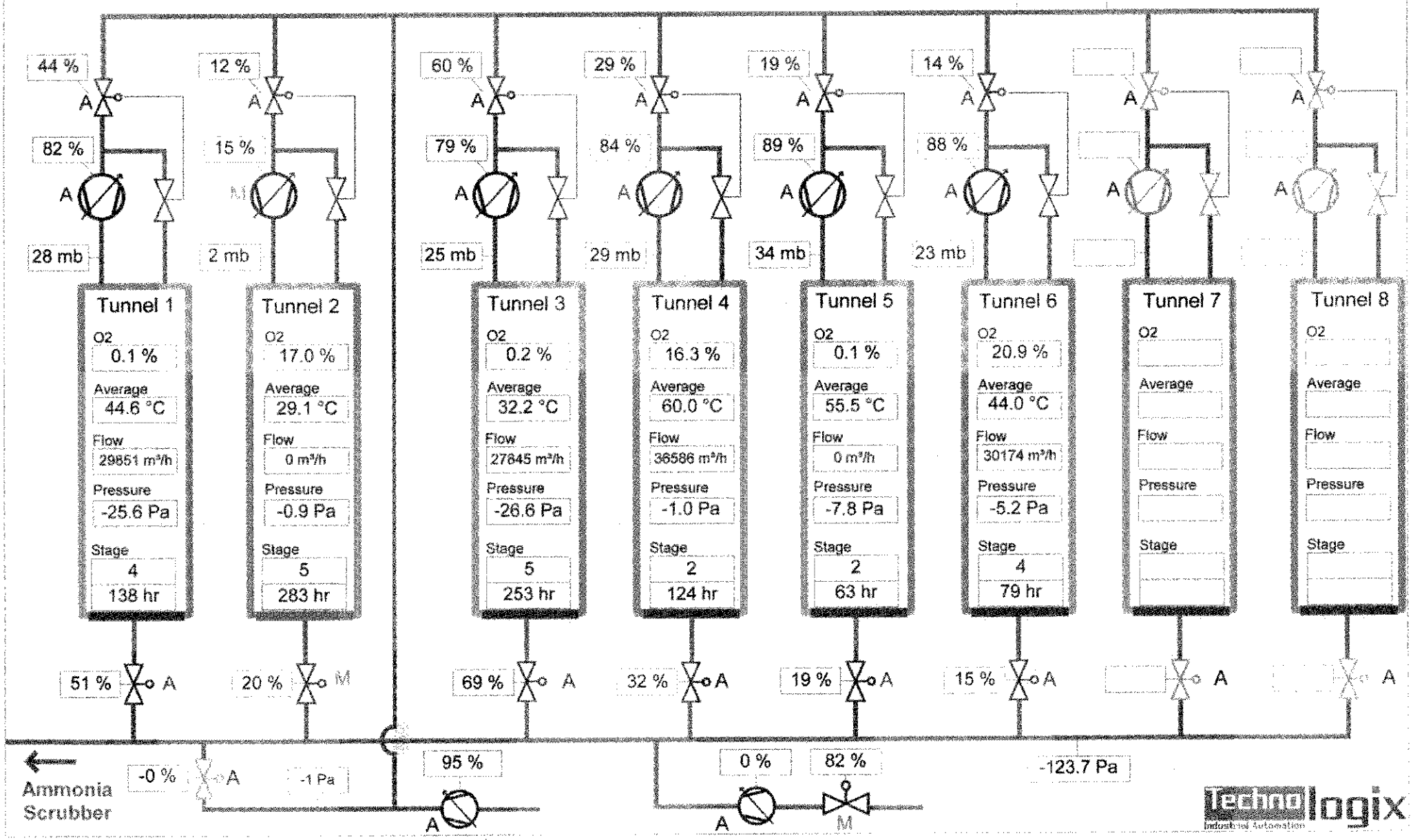


TUNNELS OVERVIEW

ORGAWORLD

Outside temperature 20.8 °C

30.5 °C -108 Pa



Technologix Industrial Automation

002186

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Rick Mosher	REF. NO.:	045804
FROM:	Sarah Tebbutt/Stephen Koo/ca/2	DATE:	March 5, 2009
RE:	**AERMOD Odour Modelling** **Orgaworld Canada Limited, Ottawa, Ontario**		

1.0 INTRODUCTION

This memorandum has been prepared for the Orgaworld Canada Limited facility located in Ottawa, Ontario (Facility). Conestoga-Rovers & Associates (CRA) performed AERMOD dispersion modelling of the Facility to assess future air contaminant compliance against Ontario Regulation 419/05 Schedule 3 standards, and proposed Ontario Ministry of the Environment (MOE) odour guidance.

The dispersion modelling was performed using the United States Environmental Protection Agency (USEPA) multi-source dispersion model, AERMOD, to assess the Facility's ground level concentrations (GLCs). AERMOD is an advanced steady-state plume model that has the ability to incorporate building cavity downwash, actual source parameters, emission rates, terrain, and historical meteorological information to predict ground level concentrations (GLCs) at specified locations.

The AERMOD air dispersion model was used for this assessment as it has been scheduled by the MOE to replace the Regulation 346 model as the new regulatory model in Ontario after a phase in period, as specified by Ontario Regulation 419/05. The Facility's North American Industry Classification System Code is 562210, and the AERMOD model will become the regulatory model for the Facility with Ontario Regulation 419/05 Schedule 3 air quality standards beginning in 2013.

For air contaminants, the MOE air dispersion modelling guidance document "Air Dispersion Modelling Guideline for Ontario" (ADMGO) dated July 2005 was followed. For odour, the MOE position paper "Proposed Approach for the Implementation of Odour-Based Standards and Guidelines" dated June 2006 was followed.

2.0 MODEL DEVELOPMENT

2.1 Computational Models

The following approved dispersion models and pre-processor models were used in the assessment:

- AERMOD dispersion model (v. 07026);
- AERMAP surface pre-processor (v. 06341); and

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

- BPIP building downwash pre-processor (v. 04274).

2.2 Meteorological Data

MOE provides three sets of pre-processed meteorological screening data for use with dispersion modelling. They are: urban, crops and forest. Based on the land-use characteristics around the Facility, the "crops" dataset was used. The surface data is from the Ottawa Airport and Upper Air Data is from Maniwaki, Quebec. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data included many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

2.3 Averaging Periods

Averaging periods were selected based on the type of air contaminants modelled. For the unitized emission rate model, the following averaging periods were selected: 1-hour, 24-hour, and 30-day. For the odour model, only the 1-hour averaging period was selected.

2.4 Digital Elevation Model Data

Digital elevation model (DEM) data was obtained from the MOE website and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD. The DEM data was provided by the MOE (tile set 135).

2.5 Source Input Parameters

The Facility bio-scrubber was modelled as a point source, with parameters based on the final operational design specifications. The area sources, used in the odour models, are based on predicted operational conditions.

A summary of the AERMOD source input parameters is provided in Table 1.

2.6 Ground Level Concentration Receptor Grid

A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 to 500 m;
- 100 m spacing from 500 to 1,000 m; and
- 200 m spacing from 1,000 to 2,000 m.

A property line ground level receptor grid with 10 m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Facility's property line.

2.7 Discrete Sensitive Receptors

For the evaluation of odour, discrete sensitive receptors were defined around the Facility based on the locations of nearby homes and communities. MOE defines a sensitive receptor as: residences, camping grounds, schools, community centres, day care centres, recreational centres and outdoor recreational areas; or any other locations as specified by the MOE. A total of 79 sensitive receptors were identified and modelled.

Table 2 provides a list of modelled sensitive receptors.

2.8 On-Site Building Data

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP), and run to evaluate any building cavity downwashing that may be occurring. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions.

The single on-site building was modelled with an average roof height of 11 metres.

3.0 DISPERSION MODELLING RESULTS

The AERMOD models were developed and executed following the methodology described above.

The five years of meteorological data included over 43,800 hours of data. For the unitized emission rate AERMOD model, the model was run to calculate the maximum 1-hour and 24-hour unitized GLC dispersion factors, in micrograms per cubic metre per one gram per second ($\mu g/m^3$ per g/s), potentially emitted from the Facility through the bio-scrubber. By multiplying the bio-scrubber contaminant emission rate, in grams per second, by the unitized GLC dispersion factor, a contaminant specific GLC is calculated. For the odour models, the 1-hour 99.85th percentile GLC was calculated for comparison against the odour guideline limit. The MOE proposed guidance specifies the 99.85th percentile modelled maximum concentration to be used for odour assessment. The meteorological conditions, which result in the maximum concentration, are typically stable atmospheric conditions such as an inversion with low wind speed.

MOE guidance allows for the removal of meteorological outliers for comparison of GLCs against a standard or guideline limit. For the 1-hour averaging period, the eight highest 1-hour averaging periods for each single year was removed for a total of 40 one-hour periods. For the 24-hour averaging period, the single highest 24-hour averaging period for each single year was removed for a total of five 24-hour periods. For each air contaminant, the appropriate unitized averaging period GLC dispersion factor was multiplied by the emission rate of the contaminant to calculate its GLC.

Table 3 summarizes the maximum predicted GLCs for each air contaminant and its percentage of the POI.

For odour, the calculated 1-hour 99.85th percentile odour value was converted to a 10-minute odour value using the MOE time-based conversion factor of 1.65. Figure 1 presents the maximum calculated 10-minute 99.85th percentile odour level at each discrete receptor. Figure 2 presents the maximum calculated 10-minute 99.85th percentile odour isopleths around the Facility.

4.0 CONCLUSIONS

The AERMOD dispersion modelling assessment was completed for odour and each of the contaminants potentially emitted from the Facility.

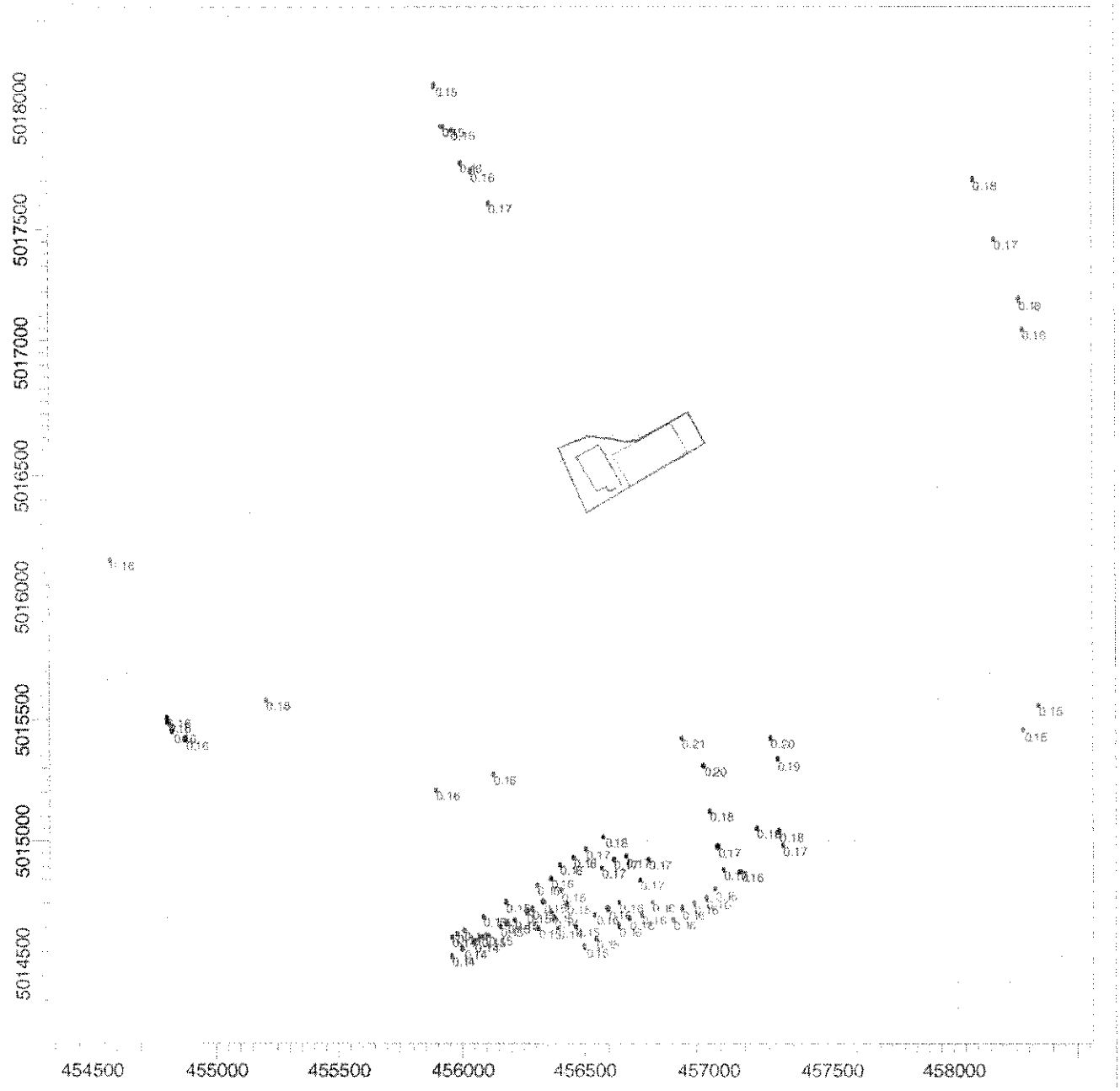
Based on the modelled GLC results, no air contaminants were identified to exceed any Ontario Regulation 419/05 Schedule 3 standard or MOE guideline.

Based on the modelled odour results, no sensitive receptors were identified that would be impacted with an odour value of greater than the allowable one odour unit.

Should you have any questions on the above, please do not hesitate to contact us.

PROJECT TITLE:

FIGURE 1 - MAXIMUM 10-MINUTE 99.85TH PERCENTILE ODOUR CONCENTRATIONS
RESIDENTIAL SENSITIVE RECEPTORS, ALL SOURCES



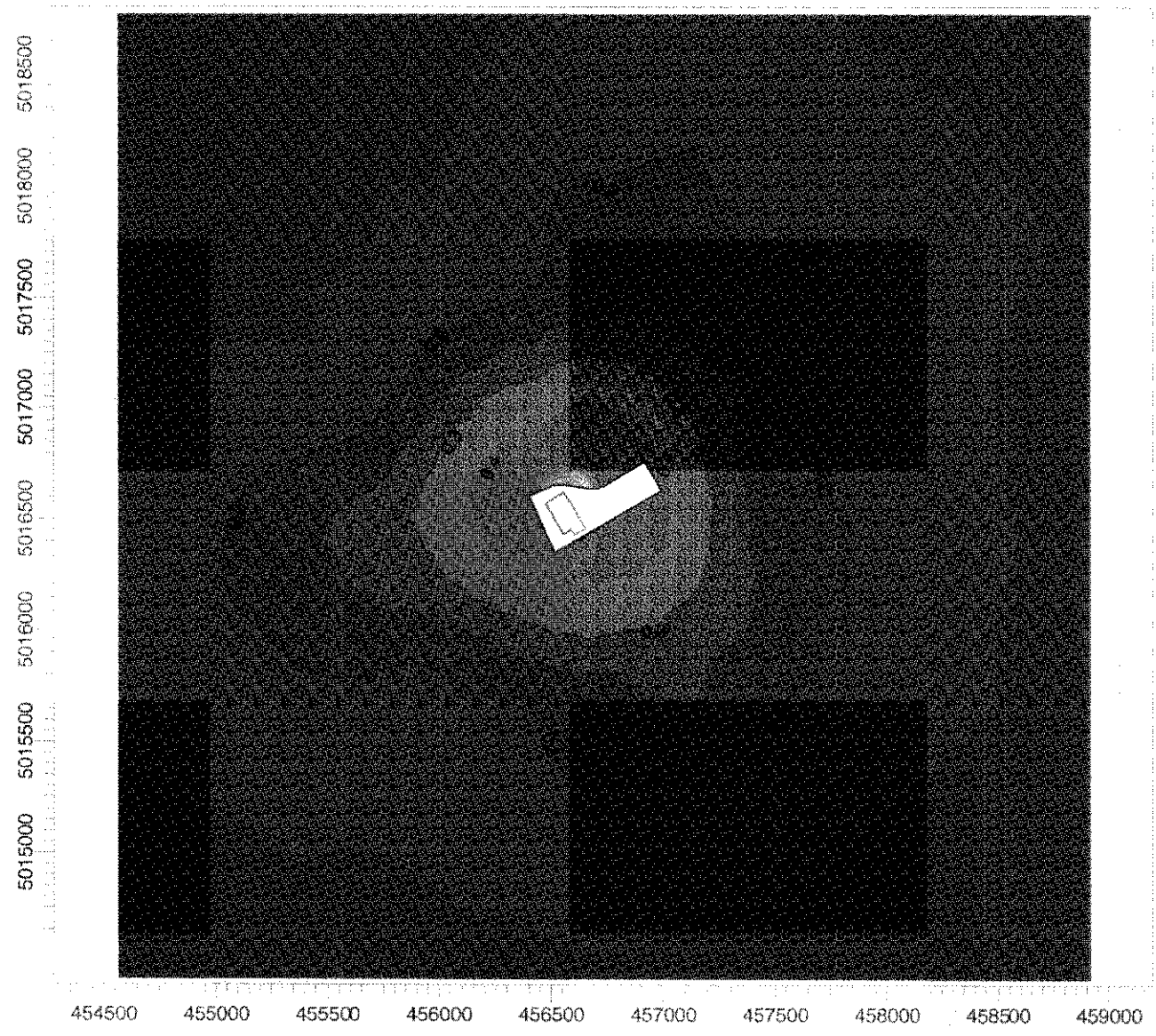
COMMENTS:	SOURCES: 3	COMPANY NAME: ORGAWORLD CANADA LTD., OTTAWA, ONTARIO	
	RECEPTORS: 79	MODELER: CRA	
	OUTPUT TYPE: Concentration	SCALE: 1:25,840 0 1 km	CONESTOGA-ROVERS & ASSOCIATES
	MAX: 0.20978 OU	DATE: 3/5/2009	PROJECT NO.: 45804

ISC-AERMOD View - Lakes Environmental Software

D:\45804_Orgaworld_Ottawa\2009_March\odor01r.isc

PROJECT TITLE:

FIGURE 2 - MAXIMUM 10-MINUTE 99.85TH PERCENTILE ODOUR CONCENTRATION ISOPLETHS ALL SOURCES



PLOT FILE OF 99.85TH PERCENTILE 10.0-MIN VALUES FOR SOURCE GROUP: ALL

OU

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

COMMENTS:	SOURCES: 3	COMPANY NAME: ORGAWORLD CANADA LTD., OTTAWA, ONTARIO	
	RECEPTORS: 2694	MODELER: CRA	CONESTOGA-ROVERS & ASSOCIATES
	OUTPUT TYPE: Concentration	SCALE: 1:30,000 (0 ——— 1 km)	
	MAX: 0.93248 OU	DATE: 3/5/2009	PROJECT NO.: 45804

ISC-AERMOD View - Lakes Environmental Software

D:\45804_Orgaworld_Ottawa\2009_March\odor01g.isc

TABLE 1

AERMOD INPUT MODELLING PARAMETERS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Table 1A: Point Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Release Height* (m)	*Exit Diameter* (m)	*Exit Flow Rate* (m^3/hr)	*Exit Velocity* (m/s)	*Exit Temperature* (K)	*Modelled Emission Rate* (ou/s or g/s)
BIOSCRUB	Bioscrubber Stack, odour	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	6.11E-02 ou/s
	Bioscrubber Stack, unit emission rate	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	1.00 g/s

Table 1B: Area Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Release Height* (m)	*Total Area* (m^2)	*Number of Sources*	*Area per Source* (m^2)	*Radius of Source* (m)	*Modelled Emission Rate* (ou/m^2/s)
SICPILE	Small Immature Compost Pile, odour	circle area	456,662.54	5,016,557.69	2.5	2,900	1	2,900	30.38	0.00E+00 (1)
LEAFPILE	Leaf and Yard Pile, odour	circle area	456,584.57	5,016,612.31	2.5	600	1	600	13.82	1.00E-07

Note:
(1) The compost pile is modelled with zero odour emissions as it will be maintained in an enclosed building with potential odours directed to the Facility's abatement equipr

002193

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Approximate Distance* (m)	*Approximate Direction*
1	5023 Bank Street	454,577.90	5,016,159.86	2,057	WSW
2	5201 Bank Street	454,804.74	5,015,514.93	2,083	WSW
3	5207 Bank Street	454,815.64	5,015,478.88	2,092	WSW
4	5217 Bank Street	454,833.51	5,015,446.96	2,094	WSW
5	5227 Bank Street	454,875.57	5,015,431.23	2,068	SW
6	5401 Bank Street	455,890.82	5,015,215.67	1,540	SSW
7	7354 Dawn Tara Drive	456,484.33	5,014,574.93	2,015	S
8	7363 Dawn Tara Drive	456,454.63	5,014,654.49	1,938	S
9	7364 Dawn Tara Drive	456,555.19	5,014,604.89	1,983	S
10	7373 Dawn Tara Drive	456,556.97	5,014,706.51	1,881	S
11	7383 Dawn Tara Drive	456,623.45	5,014,659.55	1,928	S
12	7384 Dawn Tara Drive	456,589.80	5,014,729.71	1,858	S
13	7393 Dawn Tara Drive	456,653.83	5,014,753.92	1,835	S
14	7394 Dawn Tara Drive	456,689.29	5,014,689.19	1,901	S
15	7404 Dawn Tara Drive	456,721.27	5,014,707.38	1,885	S
16	7413 Dawn Tara Drive	456,711.60	5,014,845.71	1,746	S
17	7414 Dawn Tara Drive	456,782.47	5,014,754.41	1,843	S
18	7420 Dawn Tara Drive	456,857.18	5,014,684.98	1,921	S
19	7426 Dawn Tara Drive	456,884.13	5,014,729.14	1,882	S
20	7438 Dawn Tara Drive	456,946.70	5,014,751.42	1,870	S
21	7442 Dawn Tara Drive	456,976.47	5,014,768.34	1,860	SSE
22	7446 Dawn Tara Drive	457,032.97	5,014,810.03	1,832	SSE
23	7454 Dawn Tara Drive	457,075.38	5,014,894.09	1,762	SSE
24	7455 Dawn Tara Drive	457,048.43	5,014,988.06	1,664	SSE
25	7462 Dawn Tara Drive	457,142.93	5,014,885.13	1,790	SSE
26	7486 Dawn Tara Drive	457,301.45	5,014,989.10	1,750	SSE
27	7494 Dawn Tara Drive	457,277.39	5,015,043.14	1,691	SSE
28	7497 Dawn Tara Drive	457,206.04	5,015,062.26	1,645	SSE
29	4751 Hawthorne Road	455,889.72	5,018,088.84	1,657	NNW
30	4791 Hawthorne Road	455,933.86	5,017,932.37	1,496	NNW
31	4811 Hawthorne Road	455,970.66	5,017,915.26	1,465	NNW
32	4839 Hawthorne Road	456,007.06	5,017,782.29	1,329	NNW
33	4865 Hawthorne Road	456,048.32	5,017,748.72	1,281	NNW
Closest – 34	4885 Hawthorne Road	456,111.86	5,017,612.44	1,131	NNW
35	5529 Hawthorne Road	456,979.58	5,015,312.58	1,333	SSE
36	1075 John Quinn Road	458,350.30	5,015,571.08	2,033	ESE
37	1100 John Quinn Road	458,276.95	5,015,449.50	2,035	ESE
38	7265 Mitch Owens Road	455,949.38	5,014,616.50	2,072	SSW
39	7268 Mitch Owens Road	455,962.50	5,014,535.71	2,146	SSW
40	7273 Mitch Owens Road	455,989.32	5,014,623.43	2,054	SSW
41	7274 Mitch Owens Road	456,010.07	5,014,565.75	2,103	SSW
42	7277 Mitch Owens Road	455,996.22	5,014,646.00	2,030	SSW
43	7280 Mitch Owens Road	456,055.71	5,014,594.23	2,064	SSW

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate*	*Approximate*
		X	*Y*	*Distance*	*Direction*
		(m)	*(m)*	*(m)*	
44	7286 Mitch Owens Road	456,096.80	5,014,610.17	2,038	SSW
45	7291 Mitch Owens Road	456,084.24	5,014,700.71	1,953	SSW
46	7292 Mitch Owens Road	456,100.53	5,014,625.13	2,022	SSW
47	7298 Mitch Owens Road	456,137.27	5,015,273.27	1,390	SSW
48	7304 Mitch Owens Road	456,144.84	5,014,660.17	1,978	SSW
49	7310 Mitch Owens Road	456,182.98	5,014,673.57	1,957	SSW
50	7313 Mitch Owens Road	456,168.21	5,014,761.40	1,874	SSW
51	7316 Mitch Owens Road	456,219.49	5,014,682.42	1,941	S
52	7320 Mitch Owens Road	456,317.26	5,014,648.26	1,958	S
53	7322 Mitch Owens Road	456,259.95	5,014,716.81	1,900	S
54	7328 Mitch Owens Road	456,295.32	5,014,728.24	1,882	S
55	7342 Mitch Owens Road	456,332.68	5,014,757.98	1,848	S
56	7343 Mitch Owens Road	456,310.31	5,014,822.88	1,787	S
57	7355 Mitch Owens Road	456,346.53	5,014,856.54	1,748	S
58	7385 Mitch Owens Road	456,384.12	5,014,912.33	1,688	S
59	7391 Mitch Owens Road	456,445.83	5,014,941.87	1,652	S
60	7400 Mitch Owens Road	456,560.33	5,014,898.97	1,689	S
61	7401 Mitch Owens Road	456,505.35	5,014,976.09	1,614	S
62	7409 Mitch Owens Road	456,589.80	5,015,024.66	1,563	S
63	7410 Mitch Owens Road	456,618.66	5,014,934.09	1,654	S
64	7420 Mitch Owens Road	456,675.92	5,014,944.17	1,646	S
65	7432 Mitch Owens Road	456,763.97	5,014,930.40	1,666	S
66	7481 Mitch Owens Road	456,900.57	5,015,427.69	1,201	SSE
67	7563 Mitch Owens Road	457,259.06	5,015,428.31	1,339	SSE
68	7564 Mitch Owens Road	457,281.10	5,015,340.35	1,459	SSE
69	5130 Ramsayville Road	458,081.87	5,017,711.85	1,868	NE
70	5208 Ramsayville Road	458,171.37	5,017,464.18	1,808	ENE
71	5280 Ramsayville Road	458,262.45	5,017,229.57	1,792	ENE
72	5300 Ramsayville Road	458,279.83	5,017,104.19	1,767	ENE
73	1013 Sale Barn Road	456,402.20	5,014,802.57	1,795	S
74	1018 Sale Barn Road	456,360.14	5,014,717.08	1,884	S
75	1023 Sale Barn Road	456,428.85	5,014,747.86	1,847	S
76	1028 Sale Barn Road	456,390.64	5,014,692.63	1,905	S
77	1038 Sale Barn Road	456,386.26	5,014,650.98	1,947	S
78	Trailer Park	455,209.77	5,015,584.85	1,706	SW
79	7474 Mitch Owens Road	457,007.62	5,015,130.39	1,516	SSE

TABLE 3

AERMOD MAXIMUM PREDICTED GROUND LEVEL CONCENTRATIONS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Air Contaminant	*CAS No.*	*Total Site-Wide Emission Rate (g/s)*	*Maximum Predicted GLC (ug/m^3)*	*MOE POI (ug/m^3) (1)*	*Averaging Period (hours)*	*Status*	*Regulation Schedule*	*Limiting Effect*	*Percentage of MOE POI (%)*
Odour	NA	6.12E-02	2.10E-01 (2)	1 ou	10-minute	PS	NA	NA	21.0%
Carbon Monoxide, Single Source	630-08-0	1.56E+00	1.16E+01 (5)	6000	0.5	S	3	health	0.2%
Nitrogen Oxides	10102-44-0	7.22E+00	4.50E+01 (3)	400	1	S	3	health	11.3%
			1.36E+01	200	24	S	3	health	6.8%
Sulphur Oxides (as Sulphur Dioxide)	7446-09-5	4.77E-01	2.98E+00 (3)	690	1	S	3	health & vegetation	0.4%
			8.98E-01 (4)	275	24	S	3	health & vegetation	0.3%
Total Suspended Particulates	NA	5.15E-01	9.68E-01 (4)	120	24	S	3	visibility	0.8%
Ammonia	7664-41-7	2.65E+00	4.99E+00 (4)	100	24	S	3	health	5.0%

Notes:
NA - Not Available.
PS - Proposed standard.
S - Ontario Regulation 419/05 published standard.
(1) Units are in ug/m^3 unless otherwise noted.
(2) The odour value represents the maximum predicted 10-minute 99.85th percentile value at any sensitive receptor identified in Table 2.
(3) Based on a 1-hour unitized dispersion factor, after removal of meteorological outliers, of 6.24 ug/m^3 per g/s.
(4) Based on a 24-hour unitized dispersion factor, after removal of meteorological outliers, of 1.88 ug/m^3 per g/s.
(5) Based on the 1-hour unitized dispersion factor as described in note (3) and applying the MOE 1-hour to 30-minute time-based conversion factor of 1.2.

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Rick Mosher	REF. NO.:	045804
FROM:	Sarah Tebbutt/Stephen Koo/ca/2	DATE:	March 5, 2008
RE:	**AERMOD Odour Modelling** **Orgaworld Canada Limited, Ottawa, Ontario**		

1.0 INTRODUCTION

This memorandum has been prepared for the Orgaworld Canada Limited facility located in Ottawa, Ontario (Facility). Conestoga-Rovers & Associates (CRA) performed AERMOD dispersion modelling of the Facility to assess future air contaminant compliance against Ontario Regulation 419/05 Schedule 3 standards, and proposed Ontario Ministry of the Environment (MOE) odour guidance.

The dispersion modelling was performed using the United States Environmental Protection Agency (USEPA) multi-source dispersion model, AERMOD, to assess the Facility's ground level concentrations (GLCs). AERMOD is an advanced steady-state plume model that has the ability to incorporate building cavity downwash, actual source parameters, emission rates, terrain, and historical meteorological information to predict ground level concentrations (GLCs) at specified locations.

The AERMOD air dispersion model was used for this assessment as it has been scheduled by the MOE to replace the Regulation 346 model as the new regulatory model in Ontario after a phase in period, as specified by Ontario Regulation 419/05. The Facility's North American Industry Classification System Code is 562210, and the AERMOD model will become the regulatory model for the Facility with Ontario Regulation 419/05 Schedule 3 air quality standards beginning in 2013.

For air contaminants, the MOE air dispersion modelling guidance document "Air Dispersion Modelling Guideline for Ontario" (ADMGO) dated July 2005 was followed. For odour, the MOE position paper "Proposed Approach for the Implementation of Odour-Based Standards and Guidelines" dated June 2006 was followed.

2.0 MODEL DEVELOPMENT

2.1 Computational Models

The following approved dispersion models and pre-processor models were used in the assessment:

- AERMOD dispersion model (v. 07026);
- AERMAP surface pre-processor (v. 06341); and

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

- BPIP building downwash pre-processor (v. 04274).

2.2 Meteorological Data

MOE provides three sets of pre-processed meteorological screening data for use with dispersion modelling. They are: urban, crops and forest. Based on the land-use characteristics around the Facility, the "crops" dataset was used. The surface data is from the Ottawa Airport and Upper Air Data is from Maniwaki, Quebec. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data included many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

2.3 Averaging Periods

Averaging periods were selected based on the type of air contaminants modelled. For the unitized emission rate model, the following averaging periods were selected: 1-hour, 24-hour, and 30-day. For the odour model, only the 1-hour averaging period was selected.

2.4 Digital Elevation Model Data

Digital elevation model (DEM) data was obtained from the MOE website and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD. The DEM data was provided by the MOE (tile set 135).

2.5 Source Input Parameters

The Facility bio-scrubber was modelled as a point source, with parameters based on the final operational design specifications. The area sources, used in the odour models, are based on predicted operational conditions.

A summary of the AERMOD source input parameters is provided in Table 1.

2.6 Ground Level Concentration Receptor Grid

A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 to 500 m;
- 100 m spacing from 500 to 1,000 m; and
- 200 m spacing from 1,000 to 2,000 m.

A property line ground level receptor grid with 10 m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Facility's property line.

2.7 Discrete Sensitive Receptors

For the evaluation of odour, discrete sensitive receptors were defined around the Facility based on the locations of nearby homes and communities. MOE defines a sensitive receptor as: residences, camping grounds, schools, community centres, day care centres, recreational centres and outdoor recreational areas; or any other locations as specified by the MOE. A total of 79 sensitive receptors were identified and modelled.

Table 2 provides a list of modelled sensitive receptors.

2.8 On-Site Building Data

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP), and run to evaluate any building cavity downwashing that may be occurring. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions.

The single on-site building was modelled with an average roof height of 11 metres.

3.0 DISPERSION MODELLING RESULTS

The AERMOD models were developed and executed following the methodology described above.

The five years of meteorological data included over 43,800 hours of data. For the unitized emission rate AERMOD model, the model was run to calculate the maximum 1-hour and 24-hour unitized GLC dispersion factors, in micrograms per cubic metre per one gram per second ($\mu g/m^3$ per g/s), potentially emitted from the Facility through the bio-scrubber. By multiplying the bio-scrubber contaminant emission rate, in grams per second, by the unitized GLC dispersion factor, a contaminant specific GLC is calculated. For the odour models, the 1-hour 99.85th percentile GLC was calculated for comparison against the odour guideline limit. The MOE proposed guidance specifies the 99.85th percentile modelled maximum concentration to be used for odour assessment. The meteorological conditions, which result in the maximum concentration, are typically stable atmospheric conditions such as an inversion with low wind speed.

MOE guidance allows for the removal of meteorological outliers for comparison of GLCs against a standard or guideline limit. For the 1-hour averaging period, the eight highest 1-hour averaging periods for each single year was removed for a total of 40 one-hour periods. For the 24-hour averaging period, the single highest 24-hour averaging period for each single year was removed for a total of five 24-hour periods. For each air contaminant, the appropriate unitized averaging period GLC dispersion factor was multiplied by the emission rate of the contaminant to calculate its GLC.

Table 3 summarizes the maximum predicted GLCs for each air contaminant and its percentage of the POI.

For odour, the calculated 1-hour 99.85th percentile odour value was converted to a 10-minute odour value using the MOE time-based conversion factor of 1.65. Figure 1 presents the maximum calculated 10-minute 99.85th percentile odour level at each discrete receptor. Figure 2 presents the maximum calculated 10-minute 99.85th percentile odour isopleths around the Facility.

4.0 CONCLUSIONS

The AERMOD dispersion modelling assessment was completed for odour and each of the contaminants potentially emitted from the Facility.

Based on the modelled GLC results, no air contaminants were identified to exceed any Ontario Regulation 419/05 Schedule 3 standard or MOE guideline.

Based on the modelled odour results, no sensitive receptors were identified that would be impacted with an odour value of greater than the allowable one odour unit.

Should you have any questions on the above, please do not hesitate to contact us.

TABLE 1

AERMOD INPUT MODELLING PARAMETERS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Table 1A: Point Sources

Source Identifier	Description	Source Type	UTM Coordinates X (m)	UTM Coordinates Y (m)	Release Height (m)	Exit Diameter (m)	Exit Flow Rate (m^3/hr)	Exit Velocity (m/s)	Exit Temperature (K)	Modelled Emission Rate (ou/s or g/s)
BIOSCRUB	Bioscrubber Stack, odour	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	6.11E-02 ou/s
	Bioscrubber Stack, unit emission rate	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	1.00 g/s

Table 1B: Area Sources

Source Identifier	Description	Source Type	UTM Coordinates X (m)	UTM Coordinates Y (m)	Release Height (m)	Total Area (m^2)	Number of Sources	Area per Source (m^2)	Radius of Source (m)	Modelled Emission Rate (ou/m^2/s)
SICPILE	Small Immature Compost Pile, odour	circle area	456,662.54	5,016,557.69	2.5	2,900	1	2,900	30.38	0.00E+00 (1)
LEAFPILE	Leaf and Yard Pile, odour	circle area	456,584.57	5,016,612.31	2.5	600	1	600	13.82	1.00E-07

Note:
(1) The compost pile is modelled with zero odour emissions as it will be maintained in an enclosed building with potential odours directed to the Facility's abatement equipr

002201

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate Distance*	*Approximate Direction*
		X (m)	*Y (m)*	*(m)*	
1	5023 Bank Street	454,577.90	5,016,159.86	2,057	WSW
2	5201 Bank Street	454,804.74	5,015,514.93	2,083	WSW
3	5207 Bank Street	454,815.64	5,015,478.88	2,092	WSW
4	5217 Bank Street	454,833.51	5,015,446.96	2,094	WSW
5	5227 Bank Street	454,875.57	5,015,431.23	2,068	SW
6	5401 Bank Street	455,890.82	5,015,215.67	1,540	SSW
7	7354 Dawn Tara Drive	456,484.33	5,014,574.93	2,015	S
8	7363 Dawn Tara Drive	456,454.63	5,014,654.49	1,938	S
9	7364 Dawn Tara Drive	456,555.19	5,014,604.89	1,983	S
10	7373 Dawn Tara Drive	456,556.97	5,014,706.51	1,881	S
11	7383 Dawn Tara Drive	456,623.45	5,014,659.55	1,928	S
12	7384 Dawn Tara Drive	456,589.80	5,014,729.71	1,858	S
13	7393 Dawn Tara Drive	456,653.83	5,014,753.92	1,835	S
14	7394 Dawn Tara Drive	456,689.29	5,014,689.19	1,901	S
15	7404 Dawn Tara Drive	456,721.27	5,014,707.38	1,885	S
16	7413 Dawn Tara Drive	456,711.60	5,014,845.71	1,746	S
17	7414 Dawn Tara Drive	456,782.47	5,014,754.41	1,843	S
18	7420 Dawn Tara Drive	456,857.18	5,014,684.98	1,921	S
19	7426 Dawn Tara Drive	456,884.13	5,014,729.14	1,882	S
20	7438 Dawn Tara Drive	456,946.70	5,014,751.42	1,870	S
21	7442 Dawn Tara Drive	456,976.47	5,014,768.34	1,860	SSE
22	7446 Dawn Tara Drive	457,032.97	5,014,810.03	1,832	SSE
23	7454 Dawn Tara Drive	457,075.38	5,014,894.09	1,762	SSE
24	7455 Dawn Tara Drive	457,048.43	5,014,988.06	1,664	SSE
25	7462 Dawn Tara Drive	457,142.93	5,014,885.13	1,790	SSE
26	7486 Dawn Tara Drive	457,301.45	5,014,989.10	1,750	SSE
27	7494 Dawn Tara Drive	457,277.39	5,015,043.14	1,691	SSE
28	7497 Dawn Tara Drive	457,206.04	5,015,062.26	1,645	SSE
29	4751 Hawthorne Road	455,889.72	5,018,088.84	1,657	NNW
30	4791 Hawthorne Road	455,933.86	5,017,932.37	1,496	NNW
31	4811 Hawthorne Road	455,970.66	5,017,915.26	1,465	NNW
32	4839 Hawthorne Road	456,007.06	5,017,782.29	1,329	NNW
33	4865 Hawthorne Road	456,048.32	5,017,748.72	1,281	NNW
34	4885 Hawthorne Road	456,111.86	5,017,612.44	1,131	NNW
35	5529 Hawthorne Road	456,979.58	5,015,312.58	1,333	SSE
36	1075 John Quinn Road	458,350.30	5,015,571.08	2,033	ESE
37	1100 John Quinn Road	458,276.95	5,015,449.50	2,035	ESE
38	7265 Mitch Owens Road	455,949.38	5,014,616.50	2,072	SSW
39	7268 Mitch Owens Road	455,962.50	5,014,535.71	2,146	SSW
40	7273 Mitch Owens Road	455,989.32	5,014,623.43	2,054	SSW
41	7274 Mitch Owens Road	456,010.07	5,014,565.75	2,103	SSW
42	7277 Mitch Owens Road	455,996.22	5,014,646.00	2,030	SSW
43	7280 Mitch Owens Road	456,035.71	5,014,594.23	2,064	SSW

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate Distance*	*Approximate Direction*
		X (m)	*Y (m)*	*(m)*	
44	7286 Mitch Owens Road	456,096.80	5,014,610.17	2,038	SSW
45	7291 Mitch Owens Road	456,084.24	5,014,700.71	1,953	SSW
46	7292 Mitch Owens Road	456,100.53	5,014,625.13	2,022	SSW
47	7298 Mitch Owens Road	456,137.27	5,015,273.27	1,390	SSW
48	7304 Mitch Owens Road	456,144.84	5,014,660.17	1,978	SSW
49	7310 Mitch Owens Road	456,182.98	5,014,673.57	1,957	SSW
50	7313 Mitch Owens Road	456,168.21	5,014,761.40	1,874	SSW
51	7316 Mitch Owens Road	456,219.49	5,014,682.42	1,941	S
52	7320 Mitch Owens Road	456,317.26	5,014,648.26	1,958	S
53	7322 Mitch Owens Road	456,259.95	5,014,716.81	1,900	S
54	7328 Mitch Owens Road	456,295.32	5,014,728.24	1,882	S
55	7342 Mitch Owens Road	456,332.68	5,014,757.98	1,848	S
56	7343 Mitch Owens Road	456,310.31	5,014,822.88	1,787	S
57	7355 Mitch Owens Road	456,346.53	5,014,856.54	1,748	S
58	7385 Mitch Owens Road	456,384.12	5,014,912.33	1,688	S
59	7391 Mitch Owens Road	456,445.83	5,014,941.87	1,652	S
60	7400 Mitch Owens Road	456,560.33	5,014,898.97	1,689	S
61	7401 Mitch Owens Road	456,505.35	5,014,976.09	1,614	S
62	7409 Mitch Owens Road	456,589.80	5,015,024.66	1,563	S
63	7410 Mitch Owens Road	456,618.66	5,014,934.09	1,654	S
64	7420 Mitch Owens Road	456,675.92	5,014,944.17	1,646	S
65	7432 Mitch Owens Road	456,763.97	5,014,930.40	1,666	S
66	7481 Mitch Owens Road	456,900.57	5,015,427.69	1,201	SSE
67	7563 Mitch Owens Road	457,259.06	5,015,428.31	1,339	SSE
68	7564 Mitch Owens Road	457,281.10	5,015,340.35	1,459	SSE
69	5130 Ramsayville Road	458,081.87	5,017,711.85	1,868	NE
70	5208 Ramsayville Road	458,171.37	5,017,464.18	1,808	ENE
71	5280 Ramsayville Road	458,262.45	5,017,229.57	1,792	ENE
72	5300 Ramsayville Road	458,279.83	5,017,104.19	1,767	ENE
73	1013 Sale Barn Road	456,402.20	5,014,802.57	1,795	S
74	1018 Sale Barn Road	456,360.14	5,014,717.08	1,884	S
75	1023 Sale Barn Road	456,428.85	5,014,747.86	1,847	S
76	1028 Sale Barn Road	456,390.64	5,014,692.63	1,905	S
77	1038 Sale Barn Road	456,386.26	5,014,650.98	1,947	S
78	Trailer Park	455,209.77	5,015,584.85	1,706	SW
79	7474 Mitch Owens Road	457,007.62	5,015,130.39	1,516	SSE

TABLE 3

AERMOD MAXIMUM PREDICTED GROUND LEVEL CONCENTRATIONS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Air Contaminant	*CAS No.*	*Total Site-Wide Emission Rate (g/s)*	*Maximum Predicted GLC (ug/m^3)*	*MOE POI (ug/m^3) (1)*	*Averaging Period (hours)*	*Status*	*Regulation Schedule*	*Limiting Effect*	*Percentage of MOE POI (%)*
Odour	NA	6.12E-02	2.10E-01 (2)	1 ou	10-minute	PS	NA	NA	21.0%
Carbon Monoxide, Single Source	630-08-0	1.56E+00	1.16E+01 (5)	6000	0.5	S	3	health	0.2%
Nitrogen Oxides	10102-44-0	7.22E+00	4.50E+01 (3)	400	1	S	3	health	11.3%
			1.36E+01	200	24	S	3	health	6.8%
Sulphur Oxides (as Sulphur Dioxide)	7446-09-5	4.77E-01	2.98E+00 (3)	690	1	S	3	health & vegetation	0.4%
			8.98E-01 (4)	275	24	S	3	health & vegetation	0.3%
Total Suspended Particulates	NA	5.15E-01	9.68E-01 (4)	120	24	S	3	visibility	0.8%
Ammonia	7664-41-7	2.65E+00	4.99E+00 (4)	100	24	S	3	health	5.0%

Notes:
NA - Not Available.
PS - Proposed standard.
S - Ontario Regulation 419/05 published standard
(1) Units are in ug/m^3 unless otherwise noted.
(2) The odour value represents the maximum predicted 10-minute 99.85th percentile value at any sensitive receptor identified in Table 2.
(3) Based on a 1-hour unitized dispersion factor, after removal of meteorological outliers, of 6.24 ug/m^3 per g/s.
(4) Based on a 24-hour unitized dispersion factor, after removal of meteorological outliers, of 1.88 ug/m^3 per g/s.
(5) Based on the 1-hour unitized dispersion factor as described in note (3) and applying the MOE 1-hour to 30-minute time-based conversion factor of 1.2.

5107GL AA 610

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: April 17, 2018 8:51 AM
To: David Veinot (dveinot@orgaworld.ca)
Cc: Brian Begg (bbegg@orgaworld.ca); Andre Boucher
Subject: MOECC Inspection Reports - Orgaworld Canada Inc., 5123 Hawthorne Road, Ottawa, On
Attachments: Air Facility Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Industrial Sewage Works Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Non-Hazardous Waste Transfer Processing Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Subject Waste Generator Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf

Hello David,

Please find attached copies of the inspection reports completed at Orgaworld Ottawa, dated March 15, 2018, located at 5123 Hawthorne Road, Ottawa, On. If you have any questions after the review of the reports please contact me to discuss.

Attachments:

- Air Facility Inspection Report
- Industrial Sewage Works Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report
- Subject Waste Generator Inspection Report

The Subject Waste Generator Inspection Report outlines an action item for the confirmation of Copy 6 of Waste Manifest No. RS77263. In your email, dated March 23, 2018, the copy was provided to me therefore the action item has been addressed. The report was already completed and sent for sign-off when you provided the information therefore I couldn't make any changes at that time.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

file: S1 OT GL HA 6TH
5123 Hawthorne

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-02040

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 31-Jan-14
DATE REPORTED: 04-Feb-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Incoming SSO			
			Sample I.D.		B14-02040-1			
			Date Collected		31-Jan-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Arsenic	µg/g	2	EPA 6020	04-Feb-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	03-Feb-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	03-Feb-14/O	10			
Cobalt	µg/g	1	EPA 6010	03-Feb-14/O	< 1			
Copper	µg/g	1	EPA 6010	03-Feb-14/O	9			
Lead	µg/g	5	EPA 6010	03-Feb-14/O	5			
Mercury	µg/g	0.005	EPA 7471A	04-Feb-14/O	< 0.01			
Molybdenum	µg/g	1	EPA 6010	03-Feb-14/O	1			
Nickel	µg/g	1	EPA 6010	03-Feb-14/O	3			
Selenium	µg/g	2	EPA 6020	04-Feb-14/O	< 2			
Zinc	µg/g	3	EPA 6010	03-Feb-14/O	40			

no exceedance

K. Pipin

Krystyna Pipin , M. Sc.
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002206

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-03737

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 25-Feb-14
DATE REPORTED: 27-Feb-14
SAMPLE MATRIX: Compost

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

Parameter			Poly-Chlorinated Biphenyls (PCB's)	Aroclor			
	Units		µg/g	-			
	M.D.L.		0.02				
	Reference Method		EPA 8081	-			
	Date Analyzed/Site		26-Feb-14/O	26-Feb-14			
Client I.D.	Sample I.D.	Date Collected					
Incoming SSO	B14-03737-1	25-Feb-14	< 0.02	-			

no exceedance

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-06650

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 03-Apr-14
DATE REPORTED: 17-Apr-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Incoming SSO			
			Sample I.D.		B14-06650-1			
			Date Collected		31-Mar-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			08-Apr-14/O	87.8	✓		
Arsenic	µg/g	2	EPA 6020	08-Apr-14/O	< 2	✓		
C/N Ratio	-		Calc.	17-Apr-14	18.6	✓		
Cadmium	µg/g	0.5	EPA 6010	07-Apr-14/O	< 0.5	✓		
Chromium	µg/g	1	EPA 6010	07-Apr-14/O	15	✓		
Cobalt	µg/g	1	EPA 6010	07-Apr-14/O	< 1	✓		
Copper	µg/g	1	EPA 6010	07-Apr-14/O	13	✓		
Lead	µg/g	5	EPA 6010	07-Apr-14/O	< 5	✓		
Mercury	µg/g	0.005	EPA 7471A	08-Apr-14/O	0.041	✓		
Molybdenum	µg/g	1	EPA 6010	07-Apr-14/O	< 1	✓		
Nickel	µg/g	1	EPA 6010	07-Apr-14/O	8	✓		
Selenium	µg/g	2	EPA 6020	08-Apr-14/O	< 2	✓		
Zinc	µg/g	3	EPA 6010	07-Apr-14/O	49	✓		
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	08-Apr-14/K	< 0.3	✓		
Aroclor	-		-	08-Apr-14	-	✓		

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002208

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G12322

REPORT No. B14-12322

Report To:
Orgaworld
2123 Hawthorne Rd.
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 29-May-14
DATE REPORTED: 17-Jun-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.	Incoming SSO			
			Sample I.D.	B14-12322-1			
			Date Collected	29-May-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
% moisture	%			30-May-14/O	62.0		
Arsenic	µg/g	2	EPA 6020	02-Jun-14/O	< 2		
Total Organic Carbon	% by wt	0.005	EPA 415.1	11-Jun-14/O	11.5		
C/N Ratio	-		Calc.	11-Jun-14	11.5		
Aluminum	µg/g	10	EPA 6010	03-Jun-14/O	4150		
Cadmium	µg/g	0.5	EPA 6010	03-Jun-14/O	< 0.5		
Calcium	µg/g	10	EPA 6010	03-Jun-14/O	18600		
Chromium	µg/g	1	EPA 6010	03-Jun-14/O	119		
Cobalt	µg/g	1	EPA 6010	03-Jun-14/O	5		
Copper	µg/g	1	EPA 6010	03-Jun-14/O	18		
Lead	µg/g	5	EPA 6010	03-Jun-14/O	8		
Mercury	µg/g	0.005	EPA 7471A	03-Jun-14/O	0.025		
Molybdenum	µg/g	1	EPA 6010	03-Jun-14/O	1		
Nickel	µg/g	1	EPA 6010	03-Jun-14/O	55		
Selenium	µg/g	2	EPA 6020	02-Jun-14/O	< 2		
Zinc	µg/g	3	EPA 6010	03-Jun-14/O	62		
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	05-Jun-14/K	< 0.3		
Aroclor	-		-	05-Jun-14	-		

1 Subcontracted to SGS Lakefield

no reference

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002209

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed, Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-19099

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 30-Jul-14
DATE REPORTED: 14-Aug-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Incoming SSO			
	Sample I.D.	B14-19099-1			
	Date Collected	30-Jul-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			30-Jul-14/O	52.1			
Aluminum	µg/g	10	EPA 6010	05-Aug-14/O	6180			
Arsenic	µg/g	2	EPA 6020	05-Aug-14/O	< 2			
Calcium	µg/g	10	EPA 6010	05-Aug-14/O	18800			
Cadmium	µg/g	0.5	EPA 6010	05-Aug-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	05-Aug-14/O	49			
Cobalt	µg/g	1	EPA 6010	05-Aug-14/O	< 1			
Copper	µg/g	1	EPA 6010	05-Aug-14/O	19			
Mercury	µg/g	0.005	EPA 7471A	01-Aug-14/O	0.043			
Molybdenum	µg/g	1	EPA 6010	05-Aug-14/O	2			
Nickel	µg/g	1	EPA 6010	05-Aug-14/O	21			
Lead	µg/g	5	EPA 6010	05-Aug-14/O	12			
Selenium	µg/g	2	EPA 6020	05-Aug-14/O	< 2			
Zinc	µg/g	3	EPA 6010	05-Aug-14/O	66			
C/N Ratio	-		Calc	14-Aug-14	14.2			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8081	06-Aug-14/K	< 1			

PO exempt - CL

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002210

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed, Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-24599

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 22-Sep-14
DATE REPORTED: 30-Sep-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Incoming SSO			
	Sample I.D.	B14-24599-1			
	Date Collected	19-Sep-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			30-Sep-14/O	73.0			
C/N Ratio	-		Calc.	29-Sep-14	15.8			
Aluminum	µg/g	10	EPA 6010	25-Sep-14/O	3060			
Arsenic	µg/g	2	EPA 6020	24-Sep-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	25-Sep-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	25-Sep-14/O	23300			
Chromium	µg/g	1	EPA 6010	25-Sep-14/O	9			
Cobalt	µg/g	1	EPA 6010	25-Sep-14/O	2			
Copper	µg/g	1	EPA 6010	25-Sep-14/O	44			
Lead	µg/g	5	EPA 6010	25-Sep-14/O	17			
Mercury	µg/g	0.005	EPA 7471A	24-Sep-14/O	0.035			
Molybdenum	µg/g	1	EPA 6010	25-Sep-14/O	1			
Nickel	µg/g	1	EPA 6010	25-Sep-14/O	6			
Selenium	µg/g	2	EPA 6020	24-Sep-14/O	< 2			
Zinc	µg/g	3	EPA 6010	25-Sep-14/O	104			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	25-Sep-14/K	< 1			

NO EXCEEDANCE

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002211

CADUCEON ENVIRONMENTAL LABORATORIES

Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-31656

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Leigh Moulton

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 08-Dec-14
DATE REPORTED: 16-Dec-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Incoming SSO			
			Sample I.D.		B14-31656-1			
			Date Collected		29-Nov-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%	0.1		11-Dec-14/O	54.6			
C/N Ratio	-		Calc.	16-Dec-14	27.8			
Aluminum	µg/g	10	EPA 6010	10-Dec-14/O	1410			
Arsenic	µg/g	2	EPA 6020	10-Dec-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	10-Dec-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	10-Dec-14/O	18500			
Chromium	µg/g	1	EPA 6010	10-Dec-14/O	7			
Cobalt	µg/g	1	EPA 6010	10-Dec-14/O	< 1			
Copper	µg/g	1	EPA 6010	10-Dec-14/O	15			
Lead	µg/g	5	EPA 6010	10-Dec-14/O	6			
Mercury	µg/g	0.005	EPA 7471A	10-Dec-14/O	0.024			
Molybdenum	µg/g	1	EPA 6010	10-Dec-14/O	1			
Nickel	µg/g	1	EPA 6010	10-Dec-14/O	12			
Selenium	µg/g	2	EPA 6020	10-Dec-14/O	< 2			
Zinc	µg/g	3	EPA 6010	10-Dec-14/O	72			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	10-Dec-14/K	< 1			

No Exceedance

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Gord Murphy
Lab Supervisor

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002212

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-32460

Report To:
Orgaworld
5123 Hawthorne Rd.
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 17-Dec-14
DATE REPORTED: 24-Dec-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Sawdust - Feedstock
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Sawdust - Feedstock			
	Sample I.D.	B14-32460-1			
	Date Collected	16-Dec-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%	0.1		22-Dec-14/O	11.1			
Total Organic Carbon	%	0.005	Subcontract	22-Dec-14	49.1 [2]			
C/N Ratio	-		Calc.	24-Dec-14	480			
Aluminum	µg/g	10	EPA 6010	18-Dec-14/O	240			
Arsenic	µg/g	2	EPA 6020	18-Dec-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	18-Dec-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	18-Dec-14/O	2510			
Chromium	µg/g	1	EPA 6010	18-Dec-14/O	4			
Cobalt	µg/g	1	EPA 6010	18-Dec-14/O	< 1			
Copper	µg/g	1	EPA 6010	18-Dec-14/O	4			
Lead	µg/g	5	EPA 6010	18-Dec-14/O	< 5			
Mercury	µg/g	0.005	EPA 7471A	19-Dec-14/O	< 0.01			
Molybdenum	µg/g	1	EPA 6010	18-Dec-14/O	< 1			
Nickel	µg/g	1	EPA 6010	18-Dec-14/O	3			
Selenium	µg/g	2	EPA 6020	18-Dec-14/O	< 2			
Zinc	µg/g	3	EPA 6010	18-Dec-14/O	23			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	18-Dec-14/K	< 3 [1]	0.5		

1. Elevated MDL due to sample matrix
2. Subcontracted to SGS Lakefield

no exceedance for metals.

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002213

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

C.O.C.: ---

2013/2014 waste inspections - analytical results - SCADA

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

DATE RECEIVED: 13-Jan-14
DATE REPORTED: 20-Jan-14
SAMPLE MATRIX: Compost

Client I.D.								
Sample I.D.								
Date Collected								
Parameter	Units	M.D.L.	Reference Method	Date Analyzed				
pH @25°C	pH Units		SM 4500H	15-Jan-14/O	5.88			
% moisture	%			13-Jan-14/O	51.5			
Non-Biodegradable material ->No.8 Mesh	%	1	IN-HOUSE	17-Jan-14/O	< 1			
Plastic->No. 8	%	1	IN-HOUSE	17-Jan-14/O	< 1			
Org. Matter (LOI @550)	% by wt	1	Agri.-Food 84-045	13-Jan-14/O	72			
C/N Ratio	-		Calc.	17-Jan-14	41.9			
Ammonia (N)-Total	µg/g	0.01	MOEE 3364	15-Jan-14/O	2380			
Total Kjeldahl Nitrogen	µg/g	0.05	MOEE 3367	14-Jan-14/O	14200			
Phosphorus-Total	µg/g	0.01	MOEE 3367	14-Jan-14/O	2330			
Arsenic	µg/g	2	EPA 6020	14-Jan-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	14-Jan-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	14-Jan-14/O	12			
Cobalt	µg/g	1	EPA 6010	14-Jan-14/O	2			
Copper	µg/g	1	EPA 6010	14-Jan-14/O	42			
Lead	µg/g	5	EPA 6010	14-Jan-14/O	17			
Mercury	µg/g	0.005	EPA 7471A	14-Jan-14/O	0.035			
Molybdenum	µg/g	1	EPA 6010	14-Jan-14/O	1			
Nickel	µg/g	1	EPA 6010	14-Jan-14/O	6			
Selenium	µg/g	2	EPA 6020	14-Jan-14/O	< 2			
Zinc	µg/g	3	EPA 6010	14-Jan-14/O	108			
E coli	cfu/g	1	MOE E3371	13-Jan-14/O	< 100			
Salmonella	MPN/4g	0.0	CSMSAL01	14-Jan-14	0			

1 % WW of "dry"sample (34.8% of "wet" sample)

no exceedance

K. Pipin

Krystyna Pipin , M. Sc.
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002214

CADUCEON ENVIRONMENTAL LABORATORIES

Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-04018

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 28-Feb-14
DATE REPORTED: 17-Mar-14
SAMPLE MATRIX: Compost

JOB/PROJECT NO.: Compost
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Bunker #3			
			Sample I.D.		B14-04018-1			
			Date Collected		28-Feb-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
pH @25°C	pH Units		SM 4500H	03-Mar-14/O	7.12			
% moisture	%			03-Mar-14/O	26.9			
Total Solids	% by wt	0.1	SM 2540	03-Mar-14/O	73.1			
Plastic->No. 8	%	1	IN-HOUSE	06-Mar-14/O	< 1			
Non-Biodegradable material ->No.8 Mesh	%	1	IN-HOUSE	06-Mar-14/O	< 1			
Nitrite (N)	µg/g	1	SM4110C	03-Mar-14/O	5			
Nitrate (N)	µg/g	1	SM4110C	03-Mar-14/O	10			
Total Organic Carbon	% by wt	0.1	EPA 415.1	10-Mar-14/O	33.8	3		
Ammonia (N)-Total	µg/g	0.01	MOEE 3364	06-Mar-14/O	2340			
Total Kjeldahl Nitrogen	µg/g	0.05	MOEE 3367	10-Mar-14/O	22600			
Phosphorus-Total	µg/g	0.01	MOEE 3367	10-Mar-14/O	4460			
C/N Ratio	%		Calc.	11-Mar-14	15.0			
Org. Matter (LOI @550)	% by wt	1	Agri.-Food 84-045	03-Mar-14/O	72	1		
Arsenic	µg/g	2	EPA 6020	04-Mar-14/O	2			
Cadmium	µg/g	0.5	EPA 6010	03-Mar-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	03-Mar-14/O	90			
Cobalt	µg/g	1	EPA 6010	03-Mar-14/O	2			
Copper	µg/g	1	EPA 6010	03-Mar-14/O	37			
Lead	µg/g	5	EPA 6010	03-Mar-14/O	13			
Mercury	µg/g	0.005	EPA 7471A	04-Mar-14/O	0.027			
Molybdenum	µg/g	1	EPA 6010	03-Mar-14/O	2			
Nickel	µg/g	1	EPA 6010	03-Mar-14/O	44			
Selenium	µg/g	2	EPA 6020	04-Mar-14/O	< 2			
Zinc	µg/g	3	EPA 6010	03-Mar-14/O	110			
E coli	cfu/g	1	MOE E3371	28-Feb-14/O	<100			
Salmonella	MPN/4g	0.1	CSMSAL01	17-Mar-14	< 0.1	2		

no exceedance

Moisture content low (50%).

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

002215

REPORT NO.
C14111-70000

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1117001
SAMPLE ID:COMPOST

Bunker # 3

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-04-16
DATE RECEIVED:2014-04-21
DATE REPORTED:2014-04-28
DATE PRINTED:2014-04-28

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.20 ✓	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL* ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	1.06 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	6.84 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	32.69 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL* ✓	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5 ✓	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.96 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	11.16 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL* ✓	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	106.05 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

no exceedances

Moisture low

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14111-70000

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14111-70000

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1117002
SAMPLE ID:COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-04-16
DATE RECEIVED:2014-04-21
DATE REPORTED:2014-04-28
DATE PRINTED:2014-04-28

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Ammonia (NH3/NH4-N)	1858.50	ug/g	.01	Colourimetric
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.19	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.19	%	0.01	TMECC 03.08
Total FM > 25 mm	0.04	%	.01	TMECC 03.08
Total FM > 25 mm	4	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.13	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.13	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	3	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	3	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Nitrogen (Total)	2.29	%	0.01	TMECC.04.02-D
pH	8.1	---	0.1	TMECC.04.11
Phosphorus	7840.00	ug/g	5.00	TMECC.04.06 *
Potassium	12570.00	ug/g	5.00	TMECC.04.06
Organic Matter	59.00	%	0.10	TMECC.05.07-A
Moisture	26.34	%	0.10	TMECC.03.09-A
C:N Ratio	14:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

he results of this report relate to the sample submitted and analyzed.

C14111-70000

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14142-70015

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1427038
SAMPLE ID:BUNKER 2

COMPOST
Bunker "2"

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-05-28
DATE RECEIVED:2014-05-22
DATE REPORTED:2014-05-29
DATE PRINTED:2014-05-29

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	1.70	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	1.21	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	8.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	31.57	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.2	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.71	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	17.35	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	92.80	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exception

low moisture

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14142-70015

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14142-70015

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1427039
SAMPLE ID:BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-05-20
DATE RECEIVED:2014-05-22
DATE REPORTED:2014-05-29
DATE PRINTED:2014-05-29

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.52	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.52	%	0.01	TMECC 03.08
Total FM > 25 mm	0.02	%	.01	TMECC 03.08
Total FM > 25 mm	2	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.52	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.52	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	66.02	%	0.10	TMECC.05.07-A
Moisture	14.94	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14142-70015

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14176-70007

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1767018
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-06-23
DATE RECEIVED:2014-06-25
DATE REPORTED:2014-07-03
DATE PRINTED:2014-07-03

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.70	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.53	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	15.24	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	25.76	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	7.82	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	12.71	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	82.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14176-70007

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14176-70007

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2056

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1767019
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-06-23
DATE RECEIVED:2014-06-25
DATE REPORTED:2014-07-03
DATE PRINTED:2014-07-03

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Ammonia (NH3/NH4-N)	1135.97	ug/g	.01	Colourimetric
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.08	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.08	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	1	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.08	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.08	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Nitrogen (Total)	1.50	%	0.01	TMECC.04.02-D
pH	8.0	---	0.1	TMECC.04.11
Phosphorus	3357.00	ug/g	5.00	TMECC.04.06 *
Potassium	7210.00	ug/g	5.00	TMECC.04.06
Organic Matter	53.55	%	0.10	TMECC.05.07-A
Moisture	20.69	%	0.10	TMECC.03.09-A
C:N Ratio	20:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14176-70007

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A & L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14220-70009

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2207021
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-06
DATE RECEIVED:2014-08-08
DATE REPORTED:2014-08-15
DATE PRINTED:2014-08-15

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.00	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	3.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	22.14	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	30.32	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	2.0	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.97	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	13.23	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	77.15	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance.

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14220-70009

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14220-70009

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2207022
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-06
DATE RECEIVED:2014-08-08
DATE REPORTED:2014-08-15
DATE PRINTED:2014-08-15

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	BDL*	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	BDL*	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	BDL*	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	BDL*	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	49.54	%	0.10	TMECC.05.07-A
Moisture	36.09	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14220-70009

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14246-70002

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2467005
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-29
DATE RECEIVED:2014-09-03
DATE REPORTED:2014-09-10
DATE PRINTED:2014-09-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Ammonia (NH3/NH4-N)	2596.00	ug/g	.01	Colourimetric
Total FM >8 mesh	0.77	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.77	%	0.01	TMECC 03.08
Total FM > 25 mm	0.17	%	.01	TMECC 03.08
Total FM > 25 mm	3	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.20	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.20	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	1	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	1	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	1	pieces/500ml		TMECC 03.08
Nitrogen (Total)	1.58	%	0.01	TMECC.04.02-D
pH	6.5	---	0.1	TMECC.04.11
Phosphorus	2321.00	ug/g	5.00	TMECC.04.06 *
Potassium	7945.00	ug/g	5.00	TMECC.04.06
Organic Matter	57.55	%	0.10	TMECC.05.07-A
Moisture	42.81	%	0.10	TMECC.03.09-A
C:N Ratio	23:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14246-70002

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14246-70002

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2467004
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-29
DATE RECEIVED:2014-09-03
DATE REPORTED:2014-09-10
DATE PRINTED:2014-09-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.39	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.14	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	21.31	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	21.42	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.58	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	10.52	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	59.85	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance.

low moisture & check sharps.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14246-70002

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14268-70004

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minank

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2687017
SAMPLE ID:70/30 BLEND COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-22
DATE RECEIVED:2014-09-25
DATE REPORTED:2014-10-02
DATE PRINTED:2014-10-02

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.47	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.09	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	23.49	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	22.27	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.7	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.34	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	8.16	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	65.15	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14268-70004

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14268-70004

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2687018
SAMPLE ID:70/30 BLEND COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-22
DATE RECEIVED:2014-09-25
DATE REPORTED:2014-10-02
DATE PRINTED:2014-10-02

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	112	CFU/g		MFHPB-34 *
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.11	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.11	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.11	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.11	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	69.47	%	0.10	TMECC.05.07-A
Moisture	33.07	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

ne results of this report relate to the sample submitted and analyzed.

C14268-70004

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14275-70001

ACCOUNT NUMBER
08200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2757003
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-30
DATE RECEIVED:2014-10-02
DATE REPORTED:2014-10-10
DATE PRINTED:2014-10-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.60	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	22.22	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	34.43	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.8	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.64	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	12.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	70.20	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No Excedance *

low moisture

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14275-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14275-70001

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2757004
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-30
DATE RECEIVED:2014-10-02
DATE REPORTED:2014-10-10
DATE PRINTED:2014-10-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	>1000	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.02	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.02	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	1	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.02	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.02	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	53.20	%	0.10	TMECC.05.07-A
Moisture	29.21	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14275-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14304-70003

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3047005
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-10-29
DATE RECEIVED:2014-10-31
DATE REPORTED:2014-11-07
DATE PRINTED:2014-11-07

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.10	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.19	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	13.35	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	27.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.6	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.87	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	10.74	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	70.50	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

no exceedances -

low moisture

- re-Test e-coli (pass)

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14304-70003

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14304-70003

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3047006
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-10-29
DATE RECEIVED:2014-10-31
DATE REPORTED:2014-11-07
DATE PRINTED:2014-11-07

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	CFU/g		MFHPB-34 *
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.05	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.05	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.05	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.05	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	63.08	%	0.10	TMECC.05.07-A
Moisture	30.55	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14304-70003

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14296-90006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3

ATTN:Tanya, Leigh, Mike

Phone:613-822-2056
Fax:613-822-2056

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2969056
SAMPLE ID:RE-TEST COMPOST BUNKER 1

SAMPLE MATRIX:SOLID
DATE SAMPLED:2014-10-21
DATE RECEIVED:2014-10-23
DATE REPORTED:2014-11-03
DATE PRINTED:2014-11-03

PARAMETER	RESULT	UNIT	METHOD REFERENCE
E. coli	<3	MPN/g dry	MFHPB-19*

Results reported on a as is basis
* - accredited test
ND - Not Detected
P/A - Presence / Absence

The results of this report relate to the sample submitted and analyzed.

C14296-90006

Results Authorized By:

Keri Wang, Microbiology Manager

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14335-70001

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3

FOR:BIOFILTER

ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3357003
SAMPLE ID:BIOFILTER 3

SAMPLE MATRIX:SOLID
DATE SAMPLED:2014-11-27
DATE RECEIVED:2014-12-01
DATE REPORTED:2014-12-08
DATE PRINTED:2014-12-09

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.45	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.45	%	0.01	TMECC 03.08
Total FM > 25 mm	0.39	%	.01	TMECC 03.08
Total FM > 25 mm	2	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.45	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.45	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	1	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	1	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
OM @ 550 deg C	71.23	%	0.10	LOI@550C
Moisture (as received)	51.40	%	0.10	Moisture @ 105C

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14335-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14199-70006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1997013
SAMPLE ID:10-100 TUNNEL 7

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-07-16
DATE RECEIVED:2014-07-18
DATE REPORTED:2014-07-24
DATE PRINTED:2014-07-24

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.20	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.63	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	19.20	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	23.21	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.8	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.40	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	9.77	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	57.45	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

he results of this report relate to the sample submitted and analyzed.

C14199-70006

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14199-70006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1997014
SAMPLE ID:10-100 TUNNEL 7

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-07-16
DATE RECEIVED:2014-07-18
DATE REPORTED:2014-07-24
DATE PRINTED:2014-07-24

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	>1000	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.96	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.96	%	0.01	TMECC 03.08
Total FM > 25 mm	0.78	%	.01	TMECC 03.08
Total FM > 25 mm	6	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.93	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.93	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	67.09	%	0.10	TMECC.05.07-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

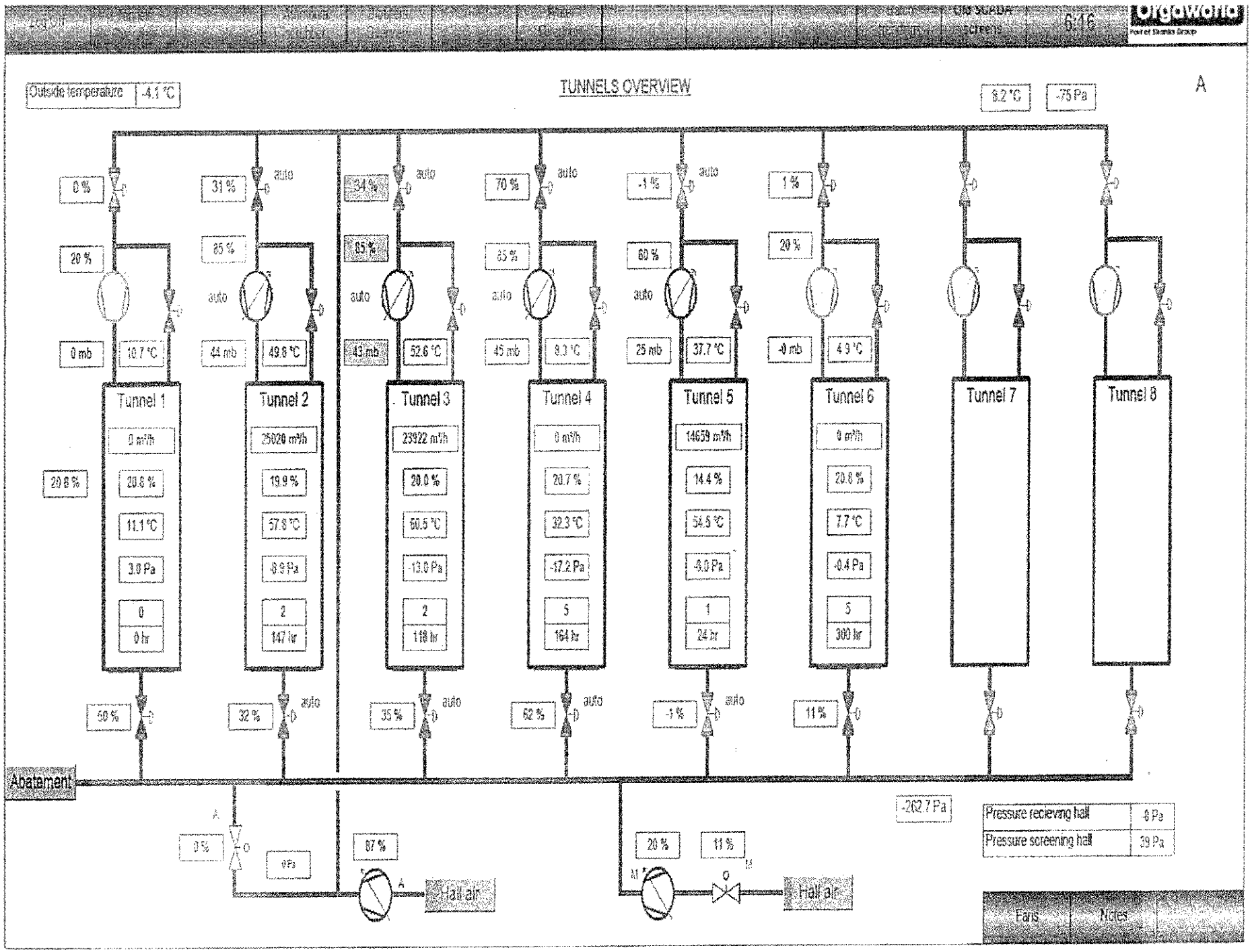
The results of this report relate to the sample submitted and analyzed.

C14199-70006

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca


TUNNELS OVERVIEW
Outside temperature
-4.1 °C
6.2 °C
-75 Pa
A
Tunnel 1
Tunnel 2
Tunnel 3
Tunnel 4
Tunnel 5
Tunnel 6
Tunnel 7
Tunnel 8
0 %
31 %
34 %
70 %
-1 %
1 %
auto
20 %
65 %
60 %
0 mb
10.7 °C
44 mb
49.8 °C
43 mb
52.6 °C
45 mb
9.3 °C
25 mb
37.7 °C
-0 mb
4.9 °C
0 m³/h
25020 m³/h
23922 m³/h
0 m³/h
14659 m³/h
0 m³/h
20.8 %
20.0 %
19.9 %
20.0 %
20.7 %
14.4 %
20.8 %
11.1 °C
57.8 °C
60.5 °C
32.3 °C
54.5 °C
7.7 °C
3.0 Pa
-8.9 Pa
-13.0 Pa
-17.2 Pa
-6.0 Pa
-0.4 Pa
0
0 hr
2
147 hr
2
119 hr
5
164 hr
1
24 hr
5
300 hr
50 %
32 %
35 %
62 %
-1 %
11 %
Abatement
-262.7 Pa
Pressure recieving hall
-8 Pa
Pressure screening hall
39 Pa
3 %
0 Pa
87 %
20 %
11 %
Hall air
Hall air
Faris
Notes

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
2-Jan-2014	7:50AM	20.5	20.5	0
3-Jan-2014	10:50AM	21.5	22.5	1
6-Jan-2014	5:18PM	22	20.5	-1.5

Bunder #2

Date	Time	Temp Out	Temp In	Net Rise
17-Jan-2014	8:51AM	19	19	0
20-Jan-2014	12:17pm	18.5	18.5	0
21-Jan-2014	8:05am	18.5	18.5	0
22-Jan-2014	8:35am	18	18.5	0.5
23-Jan-2014	10:26am	18	19.5	1.5
24-Jan-2014	8:20am	19	19.5	0.5

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
27-Jan-2014	8:12am	18.5	19	0.5
28-Jan-2014	7:44am	18.5	20.5	2
29-Jan-2014	8:14am	19	21	2
30-Jan-2014	7:11am	18.5	21	2.5
31-Jan-2014	9:09am	19.5	22	2.5
3-Feb-2014	8:34am	20	22	2

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
4-Feb-2014	8:54am	20.5	22	1.5
5-Feb-2014	7:37am	20	21.5	1
6-Feb-2014	7:15am	19.5	21	1.5
7-Feb-2014	8:45am	20	21	1
10-Feb-2014	7:18am	20	21.5	1.5
11-Feb-2014	7:51am	20	21	1
12-Feb-2014	7:20am	20.5	21.5	1

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
18-Feb-2014	7:29am	20.5	21	0.5
19-Feb-2014	7:28am	20.5	21	0.5
20-Feb-2014	7:54am	20.5	21	0.5
21-Feb-2014	9:31am	21	20.5	-0.5
24-Feb-2014	8:38am	19.5	20	0.5
25-Feb-2014	8:20am	19.5	20	0.5
26-Feb-14	8:13am	19.5	20	0.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
28-Feb-14	7:23am	21	21.5	0.5
3-Mar-14	8:36am	20	22	2
4-Mar-14	7:22am	20.5	22	1.5
5-Mar-14	7:44am	20.5	22	1.5
6-Mar-14	7:49am	18.5	20	1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
7-Mar-14	7:52am	19.5	20	0.5
8-Mar-14	8:09am	20.5	21.5	1
10-Mar-14	8:11am	18	20	2

11-Mar-14	7:32am	20	22	2
12-Mar-14	9:22am	18.5	21.5	3
13-Mar-14	11:44am	20	21.5	1.5
14-Mar-14	10:11am	20	22	2

TUNNEL #8

Date	Time	Temp Out	Temp In	Net Rise
20-Mar-14	3:36pm	18.5	20	1.5
21-Mar-14	9:02am	19.5	20	0.5
24-Mar-14	7:44am	19	20	1
25-Mar-14	7:16am	19.5	20	0.5
26-Mar-14	12:04pm	20	21.5	1.5
27-Mar-14	7:30am	19.5	20	0.5
28-Mar-14	7:16am	19.5	20	0.5

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
1-Apr-14	8:19am	19.5	20	0.5
2-Apr-14	7:32am	19.5	20	0.5
3-Apr-14	11:09am	19.5	19.5	0
4-Apr-14	7:56am	19	20	1
7-Apr-14	8:16am	19.5	20.5	1
8-Apr-14	10:32am	20	21	1
9-Apr-14	11:39am	21	22	1

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
10-Apr-14	4:22pm	21	22	1
11-Apr-14	11:05am	20.5	21.5	1
14-Apr-14	7:58am	18.5	18	-0.5
15-Apr-14	1:19pm	21.5	20	-1.5
16-Apr-14	7:08am	19.5	17	-2.5
17-Apr-14	7:11am	18.5	20	-1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
28-Apr-14	4:35pm	22.5	22	-0.5
29-Apr-14	12:23pm	19.5	20.5	1
30-Apr-14	8:27am	22	21.5	-0.5
1-May-14	7:57am	22.5	20.5	-2
2-May-14	8:13am	23	22.5	-0.5
5-May-14	9:21am	23.5	22.5	-1
6-May-14	7:43am	22	22.5	0.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
12-May-14	8:11am	21	20.5	-0.5
13-May-14	9:16am	22.5	22.5	0
14-May-14	8:09am	19.5	21.5	-2
15-May-14	7:47am	21.5	20	1.5
16-May-14	8:55am	22	22	0
18-May-14	8:35am	19	19.5	-0.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
22-May-14	2:43pm	19.5	20	-0.5
23-May-14	8:43am	20.5	19	1.5

24-May-14	10:41am	21	21.5	-0.5
26-May-14	8:34am	19.5	21.5	-2
27-May-14	10:28am	22	23	-1
28-May-14	10:43am	23.5	22	1.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
29-May-14	1:53pm	20	21.5	-1.5
30-May-14	10:19am	22.5	22	0.5
2-Jun-14	8:19am	21.5	23	-1.5
3-Jun-14	8:05am	23	22.5	1.5
4-Jun-14	9:57am	23	23	0

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
5-Jun-14	8:23am	21.5	20.5	1
6-Jun-14	8:42am	23.5	23.5	0
9-Jun-14	7:49am	23	23.5	-0.5
10-Jun-14	8:11am	22.5	22.5	0
11-Jun-14	10:27am	23	22	1

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
13-Jun-14	2:03pm	22	21.5	0.5
14-Jun-14	1:13pm	21.5	22	-0.5
15-Jun-14	10:23am	22.5	21.5	1
16-Jun-14	8:02am	21	20.5	0.5
17-Jun-14	11:36am	22.5	22	0.5

Bunker #2 (sent to test)

Date	Time	Temp Out	Temp In	Net Rise
17-Jun-14	7:33am	22.5	20.5	2
18-Jun-14	8:18am	22	23	-1
19-Jun-14	9:16am	22	23	-1
20-Jun-14	10:15am	23	22.5	0.5
23-Jun-14	8:42am	19.5	20.5	-1

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
23-Jun-14	2:38pm	24.5	22.5	2
24-Jun-14	7:11am	23.5	24.5	-1
25-Jun-14	9:10am	24.5	23	1.5
26-Jun-14	9:09am	22	24.5	-2.5
27-Jun-14	10:40am	23	22.5	1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
3-Jul-14	8:21am	21.5	19.5	2
4-Jul-14	9:28am	22	23.5	-1.5
5-Jul-14	11:12am	23.5	22	1.5
7-Jul-14	8:49am	21.5	22	-0.5
8-Jul-14	8:22am	22	22.5	-0.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
11-Jul-14	11:19am	19.5	21	-1.5
14-Jul-14	7:51am	21.5	20	1.5
15-Jul-14	8:24am	20	22.5	-2.5

16-Jul-14	9:02am	22.5	21	1.5
17-Jul-14	8:14am	19.5	20	-0.5

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
22-Jul-14	9:39am	21	19.5	1.5
23-Jul-14	7:57am	22.5	19.5	3
24-Jul-14	9:27am	21	21.5	-0.5
25-Jul-14	7:11am	22.5	19	3.5
28-Jul-14	7:22am	21.5	20.5	1

Bunker #2

August 6 = send for testing (lab)

Date	Time	Temp Out	Temp In	Net Rise
28-Jul-14	12:37pm	23	23.5	-0.5
29-Jul-14	11:56am	24.5	22	2.5
30-Jul-14	8:07am	22	23.5	-1.5
31-Jul-14	10:48am	21.5	20.5	1
1-Aug-14	9:16am	22.5	20.5	2

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
5-Aug-14	8:21am	22	19.5	2.5
6-Aug-14	9:39am	19.5	23	-3.5
7-Aug-14	7:47am	20.5	19.5	1
8-Aug-14	9:12am	21	19.5	2.5
11-Aug-14	8:16am	22	19.5	3.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
12-Aug-14	11:32am	23.5	19.5	4
13-Aug-14	8:21am	22.5	20	2.5
14-Aug-14	8:01am	19.5	22.5	-3
15-Aug-14	8:03am	21.5	19	2.5
18-Aug-14	7:12am	19	21.5	-2.5

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
18-Aug-14	8:12am	23.5	20.5	3
19-Aug-14	10:11am	23.5	22	1.5
20-Aug-14	8:18am	21.5	23.5	-2
21-Aug-14	7:36am	18.5	21	-2.5
22-Aug-14	8:11am	21.5	21	0.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
23-Aug-14	9:35am	22	21.5	0.5
24-Aug-14	7:56am	19.5	21.5	-2
25-Aug-14	8:50am	21	19.5	1.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
25-Aug-14	9:23am	21	19.5	1.5
26-Aug-14	10:30am	21	20	1
27-Aug-14	9:14am	23	19.5	3.5
28-Aug-14	10:31am	22.5	19.5	3
29-Aug-14	11:11am	21.5	19	2.5

Tunnel #3

Date	Time	Temp Out	Temp In	Net Rise

1-Sep-14	7:12am	19.5	22	-2.5
2-Sep-14	9:13am	21.5	20	1.5
3-Sep-14	10:01am	19	22.5	-3.5
4-Sep-14	8:14am	20.5	22	-1.5
5-Sep-14	8:26am	19.5	21.5	-2

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
4-Sep-14	7:13am	20.5	23	-2.5
5-Sep-14	9:14am	19.5	22	-2.5
6-Sep-14	7:12am	20.5	21.5	-1
7-Sep-14	9:52am	19.5	19	0.5
8-Sep-14	8:14am	21	22.5	-1.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
10-Sep-14	3:12pm	21.5	20.5	1
11-Sep-14	12:41am	22	22.5	-0.5
12-Sep-14	11:16am	21.5	19	2.5
15-Sep-14	9:03am	19.5	20	-0.5
16-Sep-14	10:12am	20.5	22	-1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
24-Sep-14	9:21am	22.5	19	3.5
25-Sep-14	10:18am	19.5	20.5	-1
26-Sep-14	9:24am	21	21.5	-0.5
27-Sep-14	8:13am	22.5	22	0.5
28-Sep-14	11:13am	19.5	21	-1.5
29-Sep-14	9:39am	20.5	19	1.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
26-Sep-14	8:41am	19.5	20	-0.5
27-Sep-14	9:13am	22	19.5	2.5
28-Sep-14	10:11am	21.5	22	-0.5
29-Sep-14	11:14am	23	19.5	3.5
30-Sep-14	9:12am	21.5	20	1.5
1-Oct-14	7:32am	23.5	22	1.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
2-Oct-14	2:48pm	19.5	19	0.5
3-Oct-14	7:18am	18	22.5	-4.5
6-Oct-14	8:44am	20	22.5	-2.5
7-Oct-14	10:41am	22.5	19	3.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
15-Oct-14	8:22am	19.5	21.5	-2
16-Oct-14	11:42am	21.5	22	-0.5
17-Oct-14	9:13am	20	21.5	-1.5
18-Oct-14	11:11am	22	21.5	0.5
20-Oct-14	2:14pm	19.5	19.5	0
21-Oct-14	8:35am	22	22.5	-0.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise

25-Oct-14	6:32am	19.5	22.5	-3
26-Oct-14	12:58pm	20.5	22	-1.5
27-Oct-14	7:44am	23	19.5	3.5
28-Oct-14	8:03am	22.5	20	2.5
29-Oct-14	8:51am	19.5	21.5	-2
30-Oct-14	9:13am	22	22.5	-0.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
23-Dec-14	4:11pm	21.5	22	-0.5
24-Dec-14	7:52am	20	19.5	0.5
26-Dec-14	8:22am	19.5	22	-2.5
27-Dec-14	9:10am	18	21.5	-3.5
28-Dec-14	10:11am	22	18	4

Tunnel #7

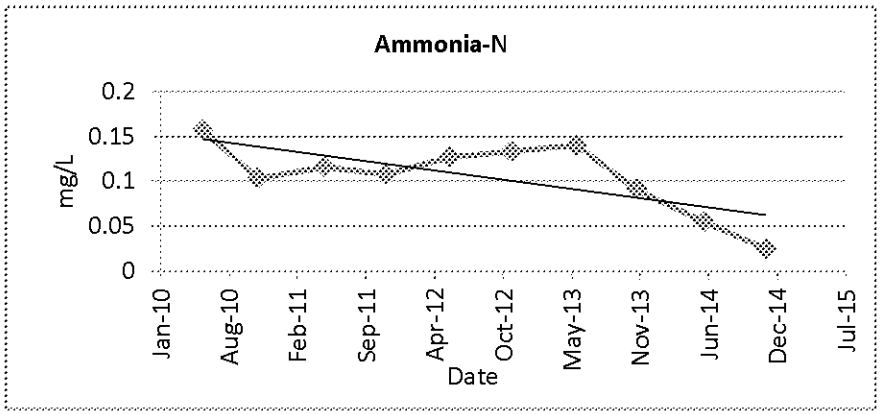
Date	Time	Temp Out	Temp In	Net Rise
2-Jan-15	9:13am	19.5	19	0.5
3-Jan-15	10:11am	22	21.5	0.5
5-Jan-15	8:16am	20.5	21.5	-1
6-Jan-15				
7-Jan-15				

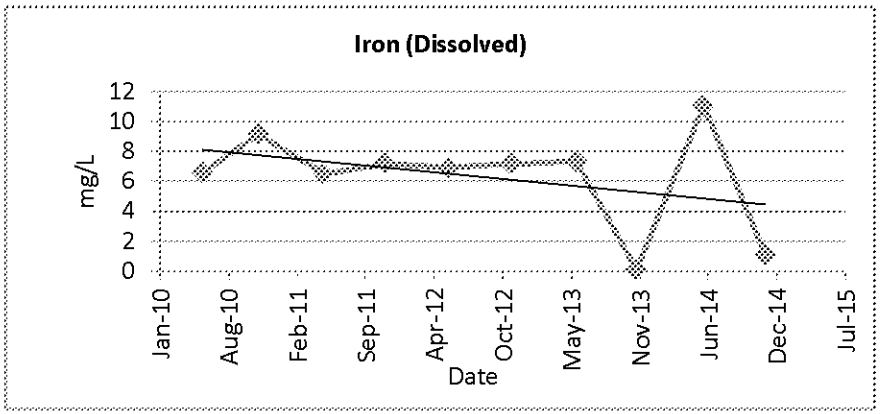
Date	Time	Temp Out	Temp In	Net Rise

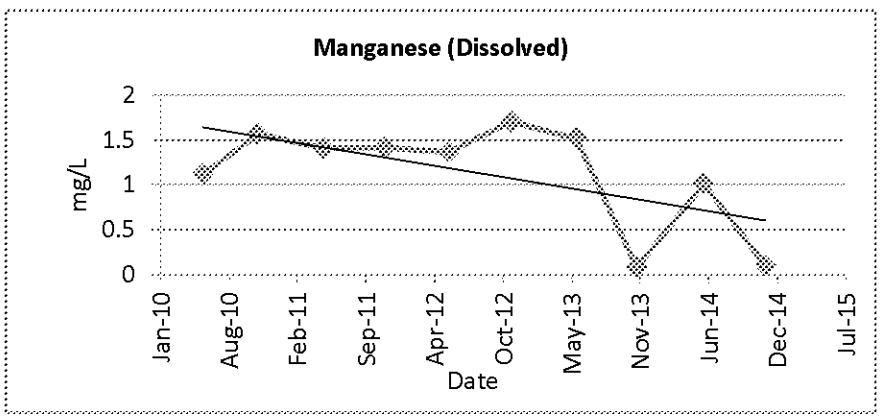
Page 2243

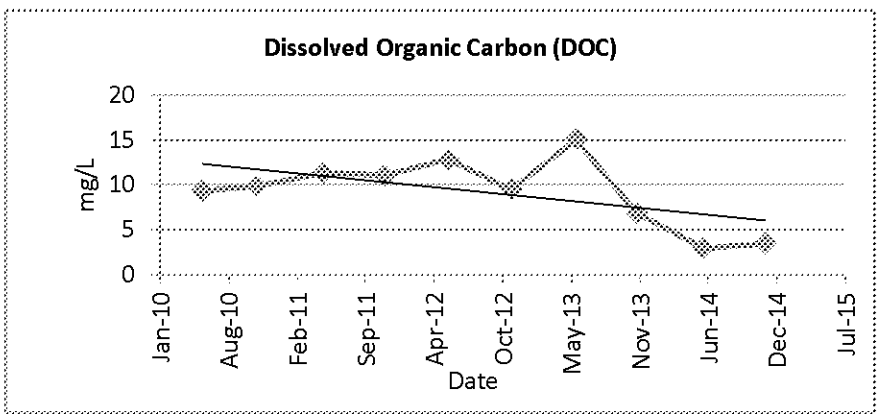
is not relevant

est non pertinente









Note: ND results as 1/2 the detection limit

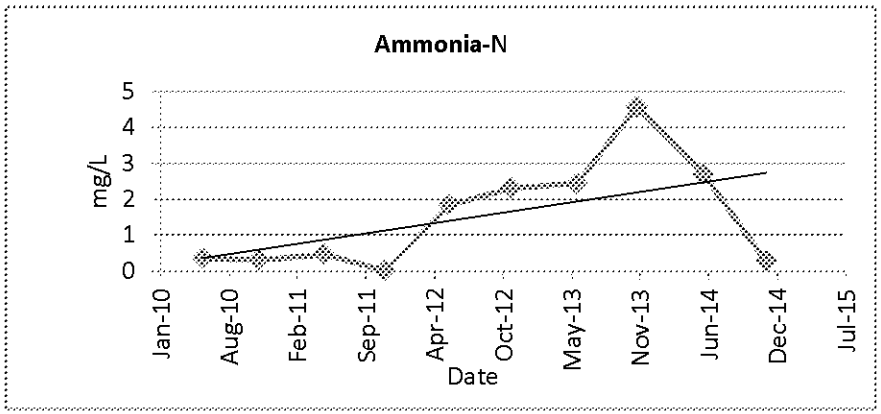
figure H2-B

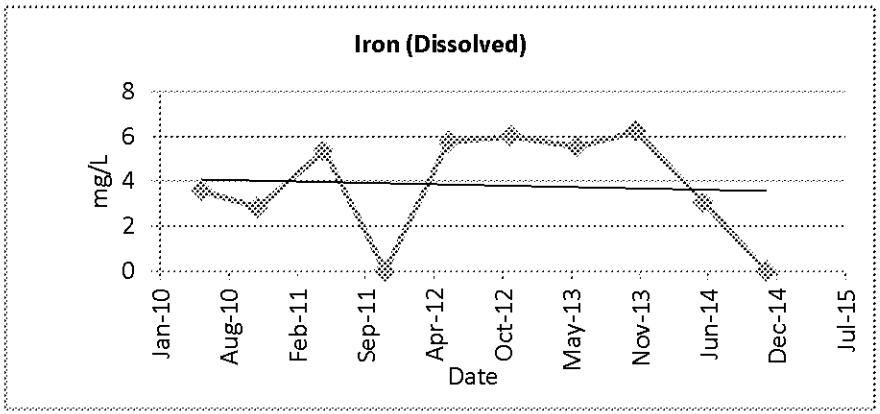
ANALYTICAL PLOTS SELECTED PARAMETERS

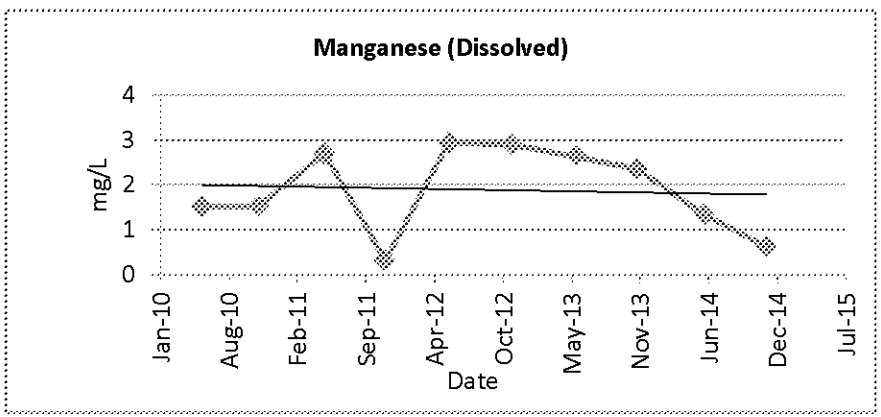
TW-7

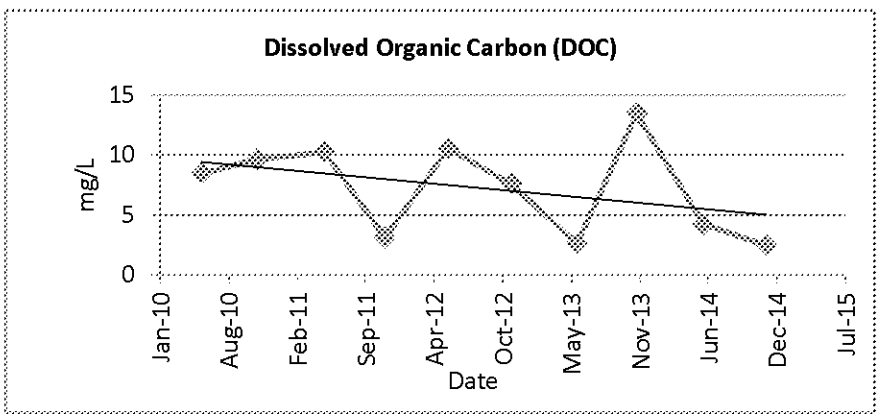
2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

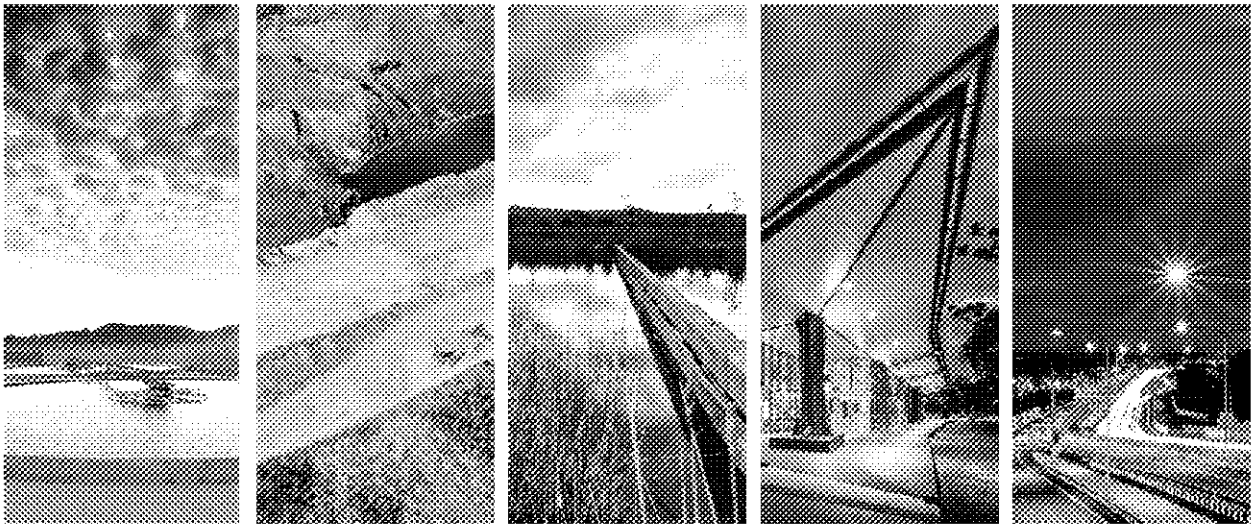
figure H2-C

ANALYTICAL PLOTS SELECTED PARAMETERS

TW-8

2014 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY



2017 Groundwater and Surface Water Monitoring Report

Orgaworld Organics Facility
5123 Hawthorne Road
Ottawa, Ontario

Orgaworld Canada Limited

GHD | 455 Phillip Street Waterloo Ontario N2L 3X2 Canada

045804 | 58 | **** | Report No 72 | March 15 2018

Table of Contents

1. Introduction 1
   - 1.1 Site Background 1
   - 1.2 Site Setting 2
   - 1.3 Site Processes 3
   - 1.4 MOECC Correspondence to Date 3
   - 1.5 Groundwater/Surface Water Monitoring Activities 5
2. Physical Setting 5
   - 2.1 Site Geology 5
   - 2.2 Site Hydrogeology 7
   - 2.3 Surface Water and Drainage Features 8
   - 2.4 Groundwater Use 8
3. Monitoring Program 8
   - 3.1 Monitoring Network 9
   - 3.2 Monitoring Protocol 9
     - 3.2.1 Groundwater Monitoring 9
     - 3.2.2 Surface Water Monitoring 10
   - 3.3 Quality Assurance/Quality Control Program 10
4. Monitoring Results 10
   - 4.1 Groundwater Hydraulic Monitoring 11
   - 4.2 Water Quality Monitoring 12
     - 4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality 12
     - 4.2.2 Deep Bedrock Aquifer Groundwater Quality 17
     - 4.2.3 Surface Water Quality 19
5. Shallow Groundwater Extraction System 21
6. Compliance and Trigger Level Program 22
   - 6.1 Trigger Parameters 22
   - 6.2 Trigger Concentrations 22
   - 6.3 Trigger Level Assessment 23
7. Conclusions 25
8. Recommendations 25
9. References 26

Figure Index

Figure 1.1	Site Location Map
Figure 1.2	Site Plan
Figure 3.1	Groundwater and Surface Water Monitoring Locations
Figure 3.2	Orgaworld Property Groundwater and Surface Water Monitoring Locations
Figure 4.1	Unconfined Shallow Groundwater Elevations – June 1-2, 2017
Figure 4.2	Unconfined Shallow Groundwater Elevations – November 29-30, 2017
Figure 4.3	Bedrock Groundwater Elevations – June 1-2, 2017
Figure 4.4	Bedrock Groundwater Elevations – November 29-30, 2017
Figure 4.5	Median 2017 Ammonia Concentration Isopleths
Figure 4.6	Median 2017 Dissolved Iron Concentration Isopleths
Figure 4.7	Median 2017 Dissolved Manganese Concentration Isopleths
Figure 4.8	Median 2017 Dissolved Organic Carbon Concentration Isopleths
Figure 4.9.1	Temporal Plots Selected Parameters - MW1 08
Figure 4.9.2	Temporal Plots Selected Parameters - MW2 08
Figure 4.9.3	Temporal Plots Selected Parameters - MW3 08
Figure 4.9.4	Temporal Plots Selected Parameters - MW4 08 & MW4 09
Figure 4.9.5	Temporal Plots Selected Parameters - MW5 09
Figure 4.9.6	Temporal Plots Selected Parameters - MW101 09 & MW101 13
Figure 4.9.7	Temporal Plots Selected Parameters - MW102 09
Figure 4.9.8	Temporal Plots Selected Parameters - MW103 09
Figure 4.9.9	Temporal Plots Selected Parameters - MW104 13
Figure 4.9.10	Temporal Plots Selected Parameters - MW105 13
Figure 4.9.11	Temporal Plots Selected Parameters - MW106 15
Figure 4.9.12	Temporal Plots Selected Parameters - EW107 15
Figure 4.10	Northern Ditch Topography with May 17, 2017 Groundwater Contours
Figure 4.11.1	Temporal Plots Selected Parameters - TW 7
Figure 4.11.2	Temporal Plots Selected Parameters - TW 4
Figure 4.11.3	Temporal Plots Selected Parameters – TW 8
Figure 4.12	Temporal Plot Select Parameter – SW-4

Table Index

Table 2.1	Monitoring Location Details
Table 3.1	Monitoring Program Schedule
Table 4.1	Groundwater Elevations
Table 4.2	Shallow Unconfined Aquifer Groundwater Analytical Results
Table 4.2A	MW103 09 Analytical Results – PWQO Comparison
Table 4.3	Deep Bedrock Aquifer Groundwater Analytical Results
Table 4.4	Surface Water Analytical Results
Table 4.5	SW4 09 Monthly Sampling Analytical Results
Table 5.1	EW107-15 Daily Pumping Log

Appendix Index

Appendix A	Environmental Compliance Approval (No. 7251-8GKRPD and No. 2844-9YNGZC)	
Appendix B	Background Correspondence	
	Appendix B1	Compliance and Trigger Level Program Memorandum
	Appendix B2	Monitoring Program Rationalization Memorandum
	Appendix B3	Groundwater Assessment and Work Plan Memorandum
Appendix C	Stratigraphic and Instrumentation Logs	
	Appendix C1	Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs
	Appendix C2	Deep Bedrock Water Well and Stratigraphic Logs
Appendix D	QA/QC Assessment Memorandum and Laboratory Analytical Reports	
Appendix E	2010 – 2017 Analytical Data	

1. Introduction

GHD (formerly Conestoga-Rovers & Associates [CRA]) was retained by Orgaworld Canada Ltd. (Orgaworld) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Orgaworld Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

A Site location map is provided on Figure 1.1.

The 2017 Monitoring Program was completed in general accordance with the requirements of the Facility's Industrial Sewage Works Environmental Compliance Approval (No. 2844-9YNGZC) as amended on February 1, 2017 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A which is included on the CD at the end of this report. Please note that all Appendices are included on the CD.

The purpose of the Monitoring Program is to assess the potential for activities conducted at the Site to adversely affect the surrounding surface water and groundwater quality, in accordance with the ECA.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Orgaworld is a tenant of Tomlinson.

Between June and August 2008, GHD conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO facility in the southwest portion of the HIP (CRA, 2008a). GHD submitted the ESAs to the City of Ottawa on behalf of Orgaworld.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates Ltd. (Golder) conducted a pumping test and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, GHD was tasked by Orgaworld to generate the Monitoring Program, based on a request from the MOECC through the process of reviewing the ECA application. In March 2010, the Monitoring Program was modified through an ECA amendment to reflect current Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the former ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, GHD prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/2015. The TLP was submitted to the MOECC along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 5.0. For reference, a copy of the memorandum sent to the MOECC that outlines the updated TLP is included in Appendix B1.

GHD prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure that groundwater and surface water was being adequately monitored. This was accomplished through a review of the monitoring program and removal of any redundant or unnecessary monitoring. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of GHD's memorandum outlining the MPR is included in Appendix B2.

On February 1, 2017, the MOECC issued a revised ECA (No. 2844-9YNGZC) for the facility. The revised ECA incorporates the updated TLP submitted to the MOECC in March 2015. The 2017 monitoring program was completed in accordance to the schedules in the revised ECA. A copy of the revised ECA is included in Appendix A.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2017.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of a large processing plant with a delivery/receiving area, administrative office, septic bed area, and emission stack. An asphalt skirt extends around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system. The on-Site perimeter ditch system drains to the storm water management (SWM) pond located at the east side

of the Site (see Figure 1.2) Surface run-off from the Site generally drains to the on-Site perimeter ditch system to the on-site SWM pond where it is impounded for re-use in the Facility process or until manual release off-Site through local roadside ditches within the HIP subdivision, which discharge to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River. The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, levelled fill material, and a few shrubs and grass scrub.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects as backfill, and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to convey groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry (all located west/southwest of the Site) has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), brush material, food wastes (solid or sludge), commercial waste (restaurant wastes, etc.) and other sludges. Organics are processed into a Non-Agricultural Source Material (NASM) and into animal bedding, or for other similar applications. The Facility is designed to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts that are a result of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond and is retained for use in Orgaworld's process, in accordance with the Site's ECA. If excess water is available in the SWM pond, then Orgaworld undertakes analysis and testing of the pond water. If analysis and testing show acceptable water quality, the excess stormwater is discharged into the HIP roadside ditch network.

1.4 MOECC Correspondence to Date

The correspondence below documents the communications between Orgaworld and the MOECC with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 2844-9YNGZC (formerly covered under ECA No. 7251-8GKRPD):

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b).
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009).

- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009).
- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a).
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010).
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011).
- Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013).
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014).
- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 3, 2015a).
- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015b).
- Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2015d).
- Memorandum RE: Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa- Hydrogeologic Assessment from Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region (MOECC, January 3, 2017a).
- Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOECC, February 1 ,2017b).

1.5 Groundwater/Surface Water Monitoring Activities

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), GHD has completed ongoing monitoring from 2009 to present.

The following monitoring activities were completed at the Site during the current monitoring period:

- June 2017 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
- August 2017 - Tri-annual sampling:
  - Hydraulic monitoring and sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW106-15)
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
- November 2017 - Semi-annual sampling::
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch

2. Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and through examination of the stratigraphic logs.

A total of 19 monitoring wells and one extraction well have been completed in the shallow unconfined aquifer unit throughout the HIP subdivision, 16 of which have been completed within the limits of the Orgaworld Site.

Test wells (TW-1 to TW-6) were completed by Golder in 1993 and 2008. TW-1 through TW-6 extend into the deep bedrock aquifer unit which was identified as the Nepean bedrock formation (Golder Associates, 2008).

In May 2010, GHD oversaw the installation of two on-Site deep bedrock test wells (TW-7 and TW-8). The stratigraphic logs from GHD's monitoring wells confirmed the presence of limestone.

Ontario Geologic Survey (OGS) mapping shows the Oxford Formation (Dolostone) covers much of the Site with the March and Nepean Formations (Dolostone/Sandstone formations) exist in the Northern portions of the HIP (OGS, Map 1508A).

The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix C for the overburden and deep bedrock wells. Monitoring location details are provided in Table 2.1.

Examination of the stratigraphic logs prepared by GHD indicates that the geology is generally consistent across the HIP subdivision. Five main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer
- Alluvial sand and silts
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, marine deposits with some removal by fluvial erosion. The Site is located on a former quarry and thus filling activities have been carried out since the early 1990's which have significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the ground surface; however the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by GHD indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick), occasionally some clay, boulders, and dredged sediment. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was dark brown to black in colour, and was generally loose and moist. Topsoil was found in most locations that were not used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface outcrops to a depth of approximately 7.6 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to identify and characterize the bedrock. The bedrock at MW2-08 and MW4-08 was described as fractured grey limestone. The bedrock was generally found to be fractured in the upper meter, where core recovery ranged from 93 to 94 percent and Rock Quality Designation (RQD) ranged from 63 to 75 percent. At depths in excess of 1 m into the bedrock, at MW2-08, the bedrock was found to be more competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- A shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock.
- A deep confined bedrock unit (referred to as the deep bedrock aquifer).

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

As part of GHD's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by

performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. During the pumping test, water levels gathered from the shallow unconfined aquifer unit indicated no corresponding drawdown between the shallow and deep wells. Water levels in the deep bedrock aquifer unit lowered from 1.2 to 3.7 m during the 6-hour period. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface water run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to the on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch which runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually out letting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Orgaworld Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by GHD shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs (Appendix C2). Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. As necessary, TW-4 is also used as an alternative refilling source for replenishing the fire suppression water holding tank.

3. Monitoring Program

The Site's Monitoring Program consists of the following:

- Hydraulic (water level) monitoring (in the monitoring wells, extraction well, and surface water staff gauges)
- Groundwater and surface water sample collection and analysis
- Quality Assurance/Quality Control (QA/QC) sample collection and analysis

3.1 Monitoring Network

Currently the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer unit: twelve groundwater monitoring wells and one extraction well: MW01-08, MW2-08, MW3-08, MW4-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, MW106-15, and EW107-15.
- Deep bedrock aquifer unit: three monitoring wells: TW-4, TW-7, and TW-8.

Surface water quality is monitored through four surface water monitoring locations (SW-1 to SW-4). Surface water level monitoring in the northern ditch is monitored by the four staff gauges (SG-1 through SG-4).

Table 3.1 provides a summary of the 2017 monitoring program.

The groundwater and surface water monitoring locations within the HIP subdivision are provided on Figure 3.1. Figure 3.1 also shows the Site limits included in the Orgaworld lease and the boundary of the HIP subdivision.

Figure 3.2 shows the groundwater and surface water locations on the Orgaworld Property.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following GHD's field method guideline protocols, which are consistent with MOECC requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling techniques with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled following stabilized field readings.

During mid-2016, a dedicated sampling port was installed in the Facility to facilitate sampling from EW107-15. The sample is collected after the extraction well and sample port are purged for several minutes to ensure the sample port and associated lines are clear of stagnant water.

Due to the greater depth to groundwater, deep bedrock aquifer unit monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted to ALS Environmental (ALS) of Waterloo, Ontario for analysis under standard chain-of-custody protocol. Analytical results are discussed in Section 4.

The analytical parameter list for groundwater is summarized in Table 3.1.

The original laboratory analytical reports are provided in Appendix D.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW-1 to SW-4) following GHD's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch, creek or pond water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, dissolved oxygen, oxidation reduction potential (ORP), turbidity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. Potential dissolution of particulates by the acid preservative in the metals sample bottles may affect parameter results for the surface water samples. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

Hydraulic level monitoring is completed at four staff gauges located throughout the northern Site ditch. The depth to standing-surface water was visually observed to be nil/dry during the staff gauge monitoring events in 2017.

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2017 analytical data were made through the QA/QC assessment.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix D. The qualifications indicated in Appendix D do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

4. Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 - Groundwater Hydraulic Monitoring
- Section 4.2 - Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow unconfined aquifer unit, deep bedrock aquifer unit, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the June and November 2017 monitoring events are consistent with those observed historically at the Site, and were used to develop groundwater contour figures, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the June 2017 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2017 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.51 to 98.36 metres above mean sea level (m AMSL) at MW103-09 and MW3-08 during the June monitoring event and 90.50 to 98.43 m AMSL at MW103-09 and MW3-08 during the November event. Based on the groundwater elevations gathered in June and November 2017, flow occurs in an east-northeast direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the June and November 2017 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.02 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 40 percent for the shallow unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)

K = hydraulic conductivity (L/T)

i = horizontal hydraulic gradient (unitless)

n = effective porosity

Based on this equation, the local groundwater velocity in 2017 is estimated to range from a few millimeters per year to a high of approximately 6.2 m per year in the fill deposits and shallow fractured bedrock. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

During the 2017 monitoring period, the deep bedrock aquifer unit groundwater levels ranged from a low of 83.41 m AMSL (TW-8) to high of 89.56 m AMSL (TW-7). The seasonal water level fluctuation ranged from 0.05 m (TW-4) to 0.07 m (TW-8). The seasonal water level fluctuation ranges were much smaller than past years due to the elimination of the winter sampling event which historically exhibited the highest water elevations. Based on the 2017 groundwater elevations, groundwater in the deep bedrock aquifer unit flows in a west-southwest direction, which is opposite to the flow direction of the shallow unconfined aquifer unit. It is likely that the presence of a quarry to the west

and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit. This is consistent with previous interpretations of groundwater flow across the Site.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.015 m/m for both the June and November 2017 events.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in an east-northeast direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08 and MW4-09
- Upgradient/cross gradient wells: MW2-08
- Facility Area: EW107-15, MW101-13, and MW105-13
- Downgradient: MW1-08, MW5-09, MW102-09, MW103-09, MW104-13, and MW106-15

Tabulated analytical results for the shallow unconfined aquifer from the 2017 sampling program are provided in Table 4.2.

On behalf of Orgaworld, GHD completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment, Appendix B3). The Groundwater Assessment evaluated the 2013 and historical groundwater quality in order to determine appropriate parameters of concern for the Site. Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of an ammonia plume within the shallow unconfined aquifer unit, originating from the Facility.

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MOECC criteria listed in the Ontario Drinking Water Standards (ODWS) (MOECC, 2003, amended 2006). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

Ammonia and DOC are direct indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within

the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2017 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleth figures are useful for evaluating and presenting spatial patterns in groundwater chemistry.

On Figures 4.5 and 4.8, the presence of elevated concentrations of the indicator parameters are identified in close proximity to or just downgradient from the Facility. The elevated concentrations appear to extend from the Facility to the east-northeast following the direction of groundwater flow. Some decrease in concentrations are observed with increased distance from the facility (following the path of groundwater flow in the shallow unconfined aquifer) and concentrations remain low to the west, south, and southeast of the Facility. Please note that due to the highly elevated median concentrations of ammonia and DOC from EW107-15 that location has not been included in the contouring presented in Figures 4.5 and 4.8. Further discussion of the extraction well is provided in Section 5.

The pattern of iron and manganese concentrations presented on Figures 4.6 and 4.7 is different than that observed during previous monitoring periods in that the concentrations reported in close proximity to the Facility are lower than those reported at the downgradient Site boundary. This change in the distribution of elevated iron and manganese may be due to efforts by Orgaworld to control the source of impact to the subsurface or due to active groundwater extraction in this vicinity during 2016 and 2017. Continued monitoring will provide insight into the evolution of these parameters near and downgradient from the Facility.

This distribution of elevated concentrations of ammonia, DOC, and to a lesser extent iron, and manganese is consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.

The 2017 median concentrations show that elevated DOC, iron, and manganese concentrations extend to MW103-09, located in the northeastern corner of the Site, but that elevated ammonia is limited to the western side of the stormwater management pond or the Northern Ditch (in the vicinity of MW102-09). This indicates that there may be an additional source of DOC, iron and manganese contributing to the elevated concentrations at MW103-09.

Figures 4.9.1 to 4.9.12 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges for ammonia, DOC, iron, and manganese in the shallow unconfined aquifer:

Location	Trend	Ammonia Concentration Range (mg/L)	
		Historic (pre-2017)	**2017**
MW4-09	stable	ND(0.050) – 0.117	ND(0.020) – 0.294
MW3-08	↑	ND(0.020) – 0.123	0.111 – 0.264
MW2-08	↑	ND(0.020) – 0.105	0.038 – 0.161
EW107-15	↑	0.123 – 51.3	14.1 – 88.0/91.1
MW105-13	↓	4.88 – 76.0	5.48/5.65 – 45.6
MW101-13	stable	0.237 – 34.9	9.25 – 15.9
MW104-13	↓	1.20 – 14.3	2.62 – 5.09
MW5-09	↑ and ↓ (2015-2017)	0.32 – 31.4	8.11 – 13.0
MW102-09	↑	ND(0.050) – 10.6	6.61 – 7.54
MW1-08	Stable to ↑	0.335 – 2.08J	1.14
MW103-09	Stable	0.508 –2.35	0.820/0.821 – 1.51
MW106-15	↓	1.91 – 10.0	1.96 – 3.92

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

As presented above, each of the upgradient locations have shown relatively stable and low ammonia levels. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have remained consistently very low to non-detect.

During the 2017 reporting year, overall trends of ammonia concentrations have been decreasing particularly near the facility and downgradient. Ammonia concentrations at MW105-13 and MW101-13 previously showed increasing trends. Current analytical data indicates declining and stable trends at each facility area well. The analytical database for EW107-15 is limited; however, concentrations have fluctuated during the period of operation of this extraction well. Continued monitoring is required to determine/confirm the trend at the extraction well particularly during active pumping periods. Notwithstanding the fluctuations, the presence of elevated ammonia in the extraction well indicates that active groundwater extraction at this location is an appropriate remedial strategy.

Ammonia concentrations at MW5-09 followed a clear increasing trend between 2009 and mid-2015. Monitoring results from 2015 through 2017 demonstrate a reversal of this trend with decreasing ammonia levels from above 30 mg/L to below 10 mg/L. Orgaworld's efforts to eliminate the source of subsurface discharge and remediate the zone of elevated ammonia adjacent to the facility through operation of EW107-15 are likely responsible for the observed improvements in water quality at MW5-09.

With the exception of MW102-09 each of the downgradient monitoring locations continue to show overall stable or decreasing temporal trends in ammonia concentrations. MW5-09 and MW102-09

continue to exhibit elevated concentrations downgradient of the Facility and adjacent to the run-off ditches to the north the Site.

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
		Historic (pre-2017)	**2017**	**Historic (pre-2017)**	**2017**
MW4-09	↓	0.045 – 1.86	0.055 – 0.38	0.126 – 1.25	0.0711 – 0.127
MW3-08	↓	ND(0.010) – 1.04	ND(0.010)	ND(0.00050)– 0.0987	ND(0.0005)- 0.0185
MW2-08	↓ and stable	ND(0.010) – ND(0.10)	ND(0.010)	0.00072 – 0.177	0.00058 – 0.207
EW107-15	↑ and ↓	0.022 – 2.56	ND(0.10) – 1.14	0.065 – 4.52/4.57	0.189/0.191 – 1.03
MW105-13	↑ and ↓	0.080/0.095 – 7.61	1.41 – 4.46	0.413/0.443 – 1.06	0.145 – 0.382/0.385
MW101-13	↓	ND(0.050) – 34.5	0.157 – 0.344	0.0114 – 2.24	0.76 – 0.836
MW104-13	↓	0.071 – 23.9	0.573 – 3.43	0.548 -19.4	1.73 – 2.36
MW5-09	↑ and stable	1.99 – 14.5	3.38 – 5.40	2.45 – 5.33	1.09 – 2.50
MW102-09	↓ and ↑	ND(0.010) – 24.0/24.7	3.64 – 6.06	ND(0.00050) – 5.16	2.28 – 3.97
MW1-08	↓	0.897 – 16.6/17.2	6.21	0.539 – 10.9/11.0	1.19
MW103-09	↓	2.69 – 22.9/23.8	1.24/1.3 – 3.76	1.78 – 7.70/7.77	1.43/1.46 – 2.11
MW106-15	↑ and stable	0.838 – 4.66	3.57 – 6.05	1.06 – 2.62	1.19 – 1.52

Notes:
ND non-detect at the associated value

Elevated concentrations of dissolved iron and manganese are apparent in the facility area and downgradient of the facility, with the most elevated concentrations being reported at MW105-13, MW104-13, MW5-09, MW102-09, MW106-15, and MW1-08. As discussed above, iron and manganese concentrations in the interpreted source area adjacent to the facility were observed to decrease in 2017 as compared to previous monitoring years.

The principal observation with respect to trends in iron and manganese concentrations within shallow groundwater at the Site is that concentrations have generally followed trends of decreasing levels over time. The exception to this observation is near the downgradient Site boundary where iron concentrations continue to increase. It is expected that these concentrations will stabilize and decrease with time in response to Orgaworld's efforts to control releases to the subsurface.

Location	Trend	DOC Concentration Range (mg/L)	
		Historic (pre-2017)	**2017**
MW4-09	Stable	1.0 – 3.1	1.6 – 3.5
MW3-08	Stable	1.5 – 3.5/9.0	1.7 – 3.0
MW2-08	↑	1.5 – 10.0	6.4

Location	Trend	DOC Concentration Range (mg/L)	
EW107-15	↓*	3.2 – 965/1,030	5.6 – 33.4/33.8
MW105-13	Stable to ↑	2.6 – 9.3/9.4	4.2/4.3 – 16.0
MW101-13	Stable	3.6 – 14.8	5.3 – 11.2
MW104-13	↓	5.9 – 51.2	5.5 – 10.7
MW5-09	Stable	5.4 – 11.1/12.1	6.5 – 13.0
MW102-09	↓	ND(1.0) – 18.5	8.2 – 13.6
MW1-08	Stable	6.2 – 10.7	7.9
MW103-09	Stable	3.0/8.9 – 17.9	7.8 -10.5/10.6
MW106-15	Stable to ↑	8.0 – 13.0	11.3 – 11.7

Notes:
ND non-detect at the associated value.
* Initial DOC levels in August 2015 were highly elevated. Trend will be reassessed with further data.

The current levels of DOC have remained consistent with some minor decreasing trends. Concentrations of DOC are relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility had previously demonstrated trends of elevated and increasing levels of DOC. Over the past monitoring year many of the concentrations have demonstrated decreasing or stable trends. Further sampling results are needed to establish the trend at EW107-15 following the initial August 2015 results being highly elevated. The 2017 DOC levels from this location fluctuated with slightly elevated concentrations in the summer samples.

In general, the increases in DOC concentrations downgradient of the facility relative to upgradient concentrations are minor compared to those observed for ammonia, iron or manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MOECC on the 2012 annual report, the MOECC requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of the future annual monitoring reports. Table 4.2A provides the 2017 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during the current monitoring period. The following provides a summary of those exceedances:

- Iron – 3 of 3 samples
- Phosphorus – 2 of 3 samples
- Field Measured Dissolved Oxygen – 2 of 2 measurements

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included that staff gauges be installed at four points within the northern ditch system and that a topographic survey of the northern portion of the Site be undertaken.

Topographic surveying of the northern ditch system (including the ditch which drains into the SWM Pond and the ditch that continues towards Findlay Creek – the HIP Ditch) was completed and the four staff gauges were installed in early 2015. The Site's northern ditch was dry at each of the staff gauge locations during each monitoring event in 2017, which provides some evidence that a significant volume of groundwater may not be continuously discharging to the creek.

Figure 4.10 presents the results of the topographic surveying of the northern ditch overlain by the June 1, 2017 groundwater contours. The topographic contours are provided in 0.5 m intervals with the lowest elevation presented representing the bottom of the ditch.

As shown in Figure 4.10, the topography of the ditches is 'w' shaped. The two ditch valleys or troughs travel parallel to the northern Site boundary with the on-Site ditch (that drains to the SWM Pond) found south of the HIP ditch. The inferred groundwater elevations from June 1, 2017 coincide closely with the bottom elevation of the ditches, and are above the bottom of the northern (roadside) ditch in several locations. These locations are illustrated on Figure 4.10 and are interpreted to be areas where shallow groundwater is discharging to the northern ditch. It should be noted that cattails and other hydrophyllic vegetation are present in portions of this ditch providing further support to this interpretation.

Figure 4.10 further shows that the total area where groundwater elevations are higher than the ditch bottom increases with proximity to the pond (the fall in the ditch is greater than the drop on groundwater elevation). Therefore, groundwater is likely discharging to the ditch during periods of high groundwater levels (typically during the spring freshet). This seepage is likely to be more prevalent closer to the stormwater pond.

However, as noted above each of the staff gauge locations did not contain sufficient standing or flow water for sampling during the 2017 monitoring events. Based on the information available, the volume of groundwater seeping into the ditch is too low to maintain a consistent base flow. It is likely that groundwater seepage into the ditch is largely lost to evapotranspiration.

In conclusion, small volumes of groundwater are likely seeping to the north roadside ditch but the volumes are insufficient to form a base flow. Based on current available information, groundwater discharging to the ditch is unlikely to cause any adverse impacts to the surface water bodies in the vicinity of the Site.

4.2.2 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2017 sampling program are provided in Table 4.3.

Because the deep bedrock aquifer is a potential source of drinking water in the vicinity of the Site, Table 4.3 also provides a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOECC, June 2003, revised June 2006).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2017:

Location	ODWQS Exceedances	
	June 2017	November 2017
TW-7 (upgradient)	Iron, manganese, turbidity (field)	Turbidity (field)
TW-4 (downgradient)	Manganese, alkalinity	Manganese, alkalinity, turbidity (field)
TW-8 (downgradient)	Manganese, iron, turbidity (field)	Manganese, turbidity (field)

ODWQS Operational Guidelines as well as the criteria for temperature and turbidity do not relate directly to water samples collected from monitoring wells. The criteria for each are included in the ODWQS as they related to the effectiveness of water treatment and are thus not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and are thus not directly relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer has historically been poor. Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer.

Water quality results from the both downgradient wells show that operations at the Facility are potentially degrading the already poor upgradient water quality. Figures 4.11.1 to 4.11.3 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

		Ammonia Concentration Range (mg/L)		DOC Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2017)**	**2017**	**Trend**	**Historic (pre-2017)**	**2017**
TW-7	↑ to stable	ND(0.05) – 0.157	0.065 – 0.825	↓	2.8 -15.1	2.1 – 3.2
TW-4	↑ to stable	0.218 – 3.72	0.642 – 0.961	stable	4.4 – 8.0	5.4 – 6.4
TW-8	stable	<0.050 – 4.60	0.240 – 0.550	↓	1.9 – 13.5	2.2 – 2.6

		Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2017)**	**2017**	**Trend**	**Historic (pre-2017)**	**2017**
TW-7	↓	0.082 – 11.1	ND(0.010) – 1.47	↓	0.0470 – 1.71	0.199 – 0.0352
TW-4	↓	ND(0.050) – 3.30	0.016 - ND(0.10)	↑	0.496 – 1.94	1.21 – 1.63
TW-8	↓	ND(0.050) – 6.25	0.163 – 1.00	↓	0.0256 – 2.95	0.314 – 0.315

Concentrations of ammonia showed notable decreases between late 2014 and 2016 at downgradient monitoring wells; however, the presence of ammonia at concentrations elevated above upgradient levels suggests that Facility operations may have had a minor effect on water quality in the deep bedrock aquifer. Ammonia concentrations in the upgradient monitoring well have steadily remained below or near the detection limits, with the exception of the unusually elevated ammonia concentration in the November 2017 sample.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. The overall pattern of groundwater quality within the deep bedrock aquifer suggests that water quality is naturally poor. It is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential facility-related water quality impacts. If trends of deteriorating water quality are consistent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy. Based on the monitoring results from the 2017 monitoring period, no additional investigation or remedial activities are necessary at this time.

4.2.3 Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW-4) and local ditch monitoring locations (SW-1 through SW-3) are presented in Table 4.4 and compared to the Provincial Water Quality Objectives (PWQO). The following table summarizes the surface water monitoring parameters that did not meet the PWQO during the 2017 sampling events.

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-2	Iron	0.3	0.356	0.585
SW-2	Phosphorus	0.01	0.0400	0.0226
SW-2	Escherichia Coli	100*	400*	180*
SW-3	Iron	0.3	0.375	0.624
SW-3	Phosphorus	0.01	0.0366	0.0174
SW-3	Escherichia Coli	100*	370*	210*

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-4	Phosphorus	0.01	0.0627	0.215/0.234

Notes:
*- Escherichia Coli concentrations are in colony forming units per 100 mL (CFU/100 mL)
0.0537/0.0653 indicates duplicate analytical results

In general, water quality at the downstream surface water monitoring location (SW-3) is similar to the upstream surface water monitoring location (SW-2), which indicates an upstream source impacting water quality.

Concentrations of phosphorus were consistently above the PWQO at each of the monitoring locations, with the exception of SW-1 in 2017. In addition, elevated iron concentrations were noted at SW-2 and SW-3. E. coli levels were in exceedance of the PWQO in all of the 2017 samples from SW-2 and SW-3.

Previous assessments of the Site concluded that concentrations of un-ionized ammonia were showing increases at SW-4. Temporal concentration versus time plots for ammonia, DOC, manganese, and iron levels at SW-4 are presented on Figure 4.12. Figure 4.12 shows that ammonia concentrations spiked throughout 2014 and during the fall of 2016. The fall 2017 results show a similar spike in elevated ammonia concentrations.

As discussed in Section 4.2.1, the potential for shallow groundwater to discharge to surface exists within the northern ditch and stormwater management pond. The presence of un-ionized ammonia at elevated concentrations in SW-4 is likely related to the discharge of impacted groundwater directly to the SWP or via overland flow of impacted runoff entering the pond.

A total of 10 additional samples were collected by Orgaworld staff at surface water monitoring location SW-4 during the 2017 monitoring period. Orgaworld staff collected monthly samples when the surface water was unfrozen. The analytical results for these samples have been included in Table 4.5 with results highlighted that did not meet their respective PWQO and the ECA discharge criteria. As indicated in Table 4.5, parameter concentrations that did not meet their respective PWQO were noted for:

- Chromium
- Escherichia Coli
- Phenols
- Total Phosphorus
- Un-Ionized Ammonia

Water was discharged from the stormwater management pond three times during the 2017 monitoring period in April, July, and December. The surface water quality results were compared to the trigger level parameters presented in the ECA prior to discharges to determine that the concentrations of trigger parameters were below the discharge criteria. All analytical results for samples collected prior to discharge were below their respective trigger levels. On this basis, all

stormwater management pond discharge events were in compliance with the ECA trigger levels (outlined in Table 2 of the ECA) during 2017.

Based on the results of the surface water monitoring, there were no measureable effects on downstream surface water quality from the discharges during the 2017 monitoring period.

5. Shallow Groundwater Extraction System

Beginning on October 4, 2016 regular pumping from shallow groundwater extraction well EW107-15 commenced. The daily volumes pumped from EW107-15 are summarized in Table 5.1. EW107-15 is only pumped on days when the Facility is staffed and as such the total available pumping days during 2017 was 258 days. Of those available days the well was pumping on 67 days with total volume pumped of 311 m^3 (average 1.20 m^3/day). The average volume pumped during the 67 days with pumping was 4.64 m^3/day.

As previously mentioned, EW107-15 was sampled three times during the current reporting period with all three samples collected via the dedicated sampling port. The following table provides a summary of the 2017 indicator parameters:

Parameter (mg/L)	June 2, 2017	August 30, 2017	November 30, 2017
Ammonia-N	14.1	91.1/88.0	33.3
Iron (dissolved)	0.304	ND(0.10)	1.14
Manganese (dissolved)	0.593	0.189/0.191	1.03
DOC	5.6	33.4/33.8	7.2

Notes:
0.0537/0.0653 indicates duplicate analytical results

There is a notable difference in the concentrations reported in the all three sample results. Groundwater quality at the Site is seasonally variable and the extent to which the groundwater extraction well was active prior to the sample collection, as shown in Table 5.1, also likely contributed to the variability in the results. The June sample was collected during a period of no pumping, the August sample was collected when the pumping was the greatest, and the November sample was collected following a period of relatively minor pumping.

There is currently insufficient data to quantify the effectiveness of the extraction well at controlling or reducing groundwater impacts at the Site, however water quality results for the 2016 and 2017 monitoring periods suggest some improvement in water quality in the vicinity of EW107-15. This improvement is likely related to active groundwater extraction within the interpreted historical source area. It is expected that continued operation of the shallow groundwater extraction well will, over time, remove the most impacted groundwater from the facility area. This will result in improved water quality in both the facility area and downgradient plume which should, in turn, reduce the occurrence of Tier I trigger exceedances.

Future assessments of water quality (i.e., the 2018 annual report) will be used to evaluate the effectiveness of the extraction well at controlling the downgradient migration of Facility-related groundwater quality impacts.

6. Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA (2011) requires the development of trigger level criteria in accordance with MOECC Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MOECC, dated February 27, 2015, GHD provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B1. The memo provides a detailed history of developing the TLP as well as the three tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

6.1 Trigger Parameters

A focused set of parameters which are related to the sources of potential impacts from on-Site activities were selected for the purposes of the TLP. The TLP parameter list includes the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and Escherichia Coli. Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic sources due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

6.2 Trigger Concentrations

The following table provides the trigger levels for the above-referenced trigger parameters.

The trigger levels for the shallow unconfined aquifer are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail on how the trigger concentrations were calculated is provided in Appendix B1.

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.)

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow and deep bedrock aquifer units.

Parameter	Shallow Unconfined Aquifer Trigger Level	Deep Bedrock Aquifer Trigger Level
Ammonia	4.0 mg/L	0.2 mg/L
Phosphorus	7.2 mg/L	0.5 mg/L
Dissolved Organic Carbon	34.6 mg/L	18.4 mg/L
Nitrate	1.3 mg/L	0.5 mg/L
Iron	48.3 mg/L	10.6 mg/L
Manganese	17.1 mg/L	2.1 mg/L
Alkalinity	633 mg/L	996 mg/L
Escherichia Coli	25.6 CFU/100 mL	5.0 CFU/100 mL

6.3 Trigger Level Assessment

The first Tier of the TLP consists of regular quarterly and semi-annual monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) have been updated to include the trigger concentrations.

Tier II confirmatory monitoring consists of collecting follow-up water quality samples in duplicate from the location(s) that exceed the Tier I trigger levels. The Tier II confirmatory monitoring will be carried-out during the next scheduled monitoring event. Tier I monitoring will resume following confirmatory samples below the Tier I trigger levels.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2017 Tier	Trigger Level Exceedances			2016 Tier
		June	**August**	**November**	
MW1-08	I	None	-	-	I
MW2-08	I	None	-	None	I

Location ID	2017 Tier	Trigger Level Exceedances			2016 Tier
		June	**August**	**November**	
MW5-09	I	Ammonia	Ammonia	Alkalinity, Ammonia	II
MW101-13	II*	Ammonia	Ammonia	-	I
MW102-09	I	Ammonia	Ammonia	Alkalinity, Ammonia	II
MW103-09	I	None	-	None	I
MW104-13	II*	None		Ammonia	I
MW105-13	I	Ammonia	Alkalinity, Ammonia	Alkalinity, Ammonia	II
MW106-15	I	None	None	None	I

As indicated in the above table, ammonia and nitrate concentrations were reported above their recommended trigger levels at several locations during 2017. In addition, the samples collected from the extraction well, EW107-15, indicated concentrations of ammonia above the trigger limit. In four instances (MW5-09 in November, MW102-09 in November, and MW105-13 in August and November), two parameters were above their trigger limits during the same monitoring event, thus, triggering the need for a Tier II response. The August trigger level exceedances from MW105-13 persistent into November. All three locations that triggered Tier II sampling should be completed during the spring 2018 event.

It should be noted that the Site initiated a program of groundwater remediation in 2016 in response to elevated ammonia concentrations in shallow groundwater near and downgradient of the facility. Operation of this system represents implementation of the contingency remedial response to observed groundwater quality impacts. Accordingly, future trigger level assessments should be undertaken for the purpose of tracking the evolution of groundwater quality as it relates to the remedial response, and should not be used for the purpose of triggering additional remedial response.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2017 Tier	Trigger Level Exceedances		2016 Tier
		June	November	
TW-7	I	None	Ammonia	I
TW-4	I	Ammonia	Ammonia, Nitrate	II
TW-8	I	Ammonia	Ammonia, Nitrate	II

All three bedrock locations were sampled under the normal Tier I sampling frequency in 2017. Concentrations of ammonia and nitrate concentrations exceeded their respective deep bedrock Tier I trigger levels at TW-4 and TW-8 in the fall 2017 samples. Thus, it is recommended that that Tier II sampling be initiated at both these locations in the spring of 2018.

7. Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2017:

1. Based on the groundwater elevations gathered in June and November 2017, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing trends of ammonia concentrations during previous monitoring periods have been observed downgradient of the Facility, however recent results show a reversal in these trends.
4. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2017 monitoring period.
5. Surface water was discharged three times from the on-Site Stormwater Management Pond during the 2017 monitoring period (April, July, and December). In the April, July, and December samples collected from the Stormwater Management Pond all parameters were below their respective trigger levels listed in the Site ECA.

8. Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. Operation of the groundwater extraction system should continue, removing as much impacted groundwater from the shallow flow system as is practical.
2. Future monitoring reports should assess the effectiveness of the extraction well and provide recommendations for continued operation or expansion, as appropriate, of the current remediation system.
3. Tier II confirmatory sampling should be completed during the spring 2018 sampling event at MW5-09, MW102-09, MW105-13, TW-4, and TW-8.

9. References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015a. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015b. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, March 23, 2015c. 2014 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, March 25, 2015d. Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2016- 2015 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2017- 2016 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario.

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region, January 3, 2017a. Hydrogeologic Assessment, Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa.

Ministry of the Environment and Climate Change, February 1, 2017b. Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

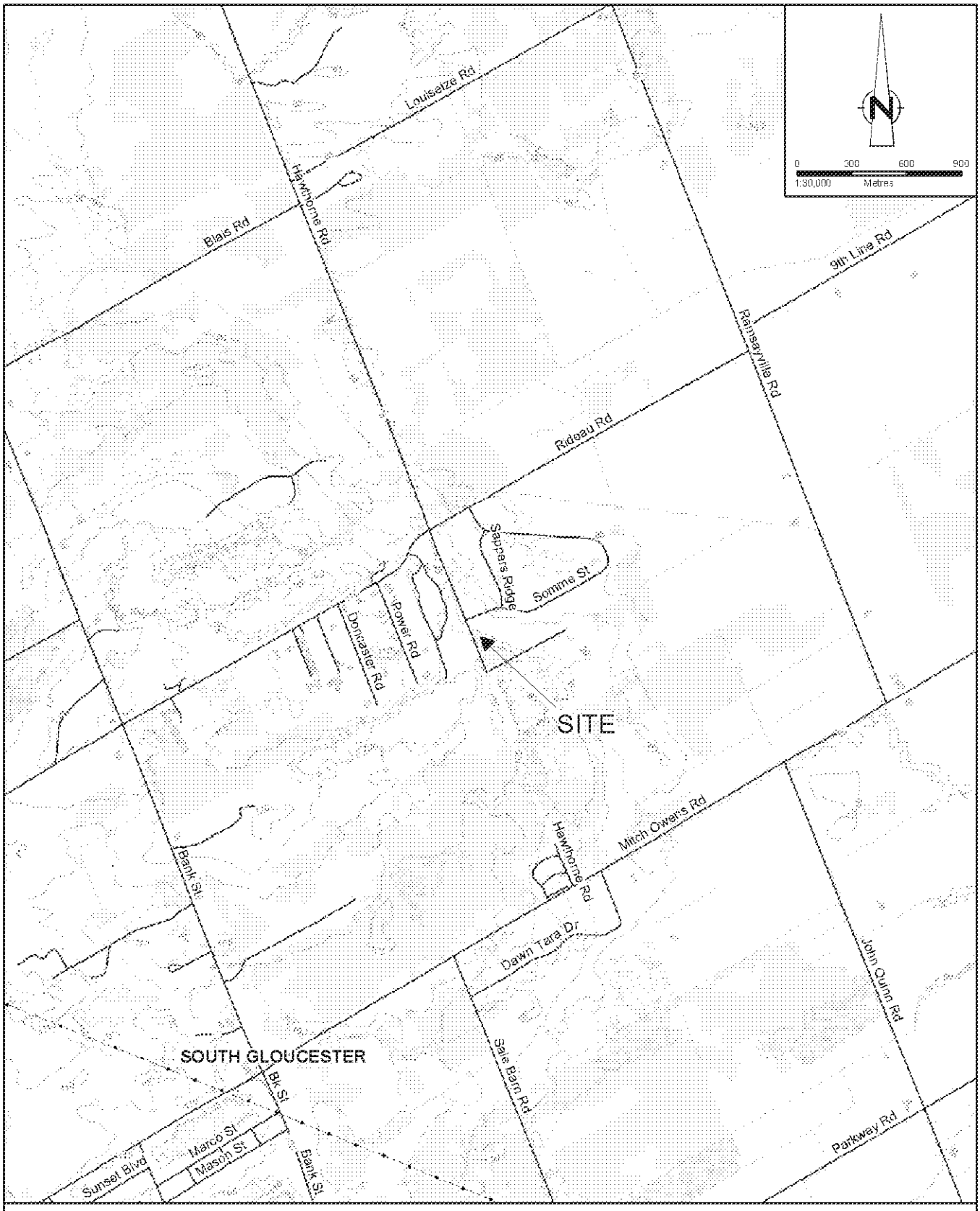
All of Which is Respectfully Submitted,

GHD

Ben Kempel, B.E.S.

Shawn Moloney, B.Sc.

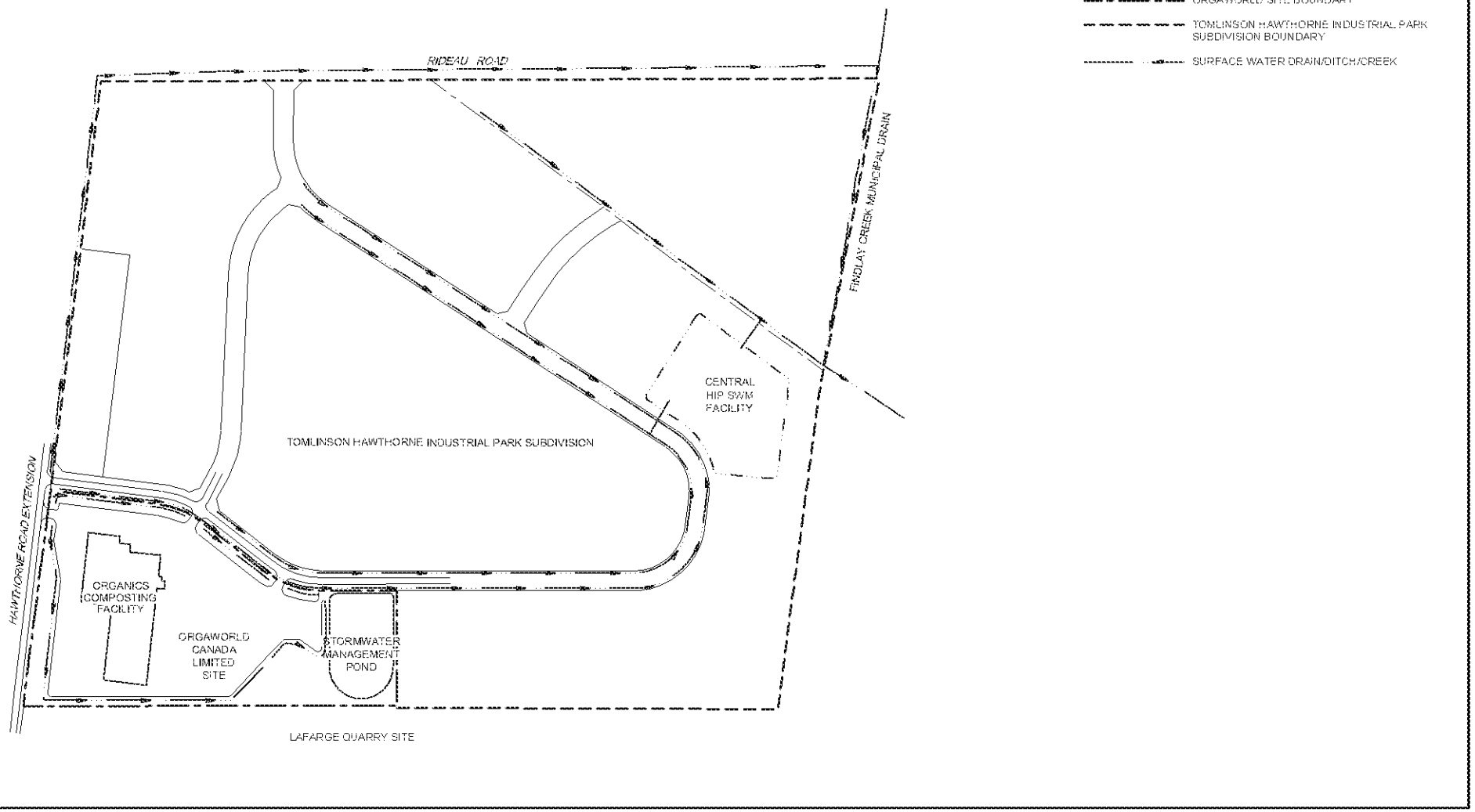
Ron Cherkewski, P. Eng.



Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;
Coordinate System: NAD 1983 UTM Zone 18N

figure 1.1

SITE LOCATION MAP
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.



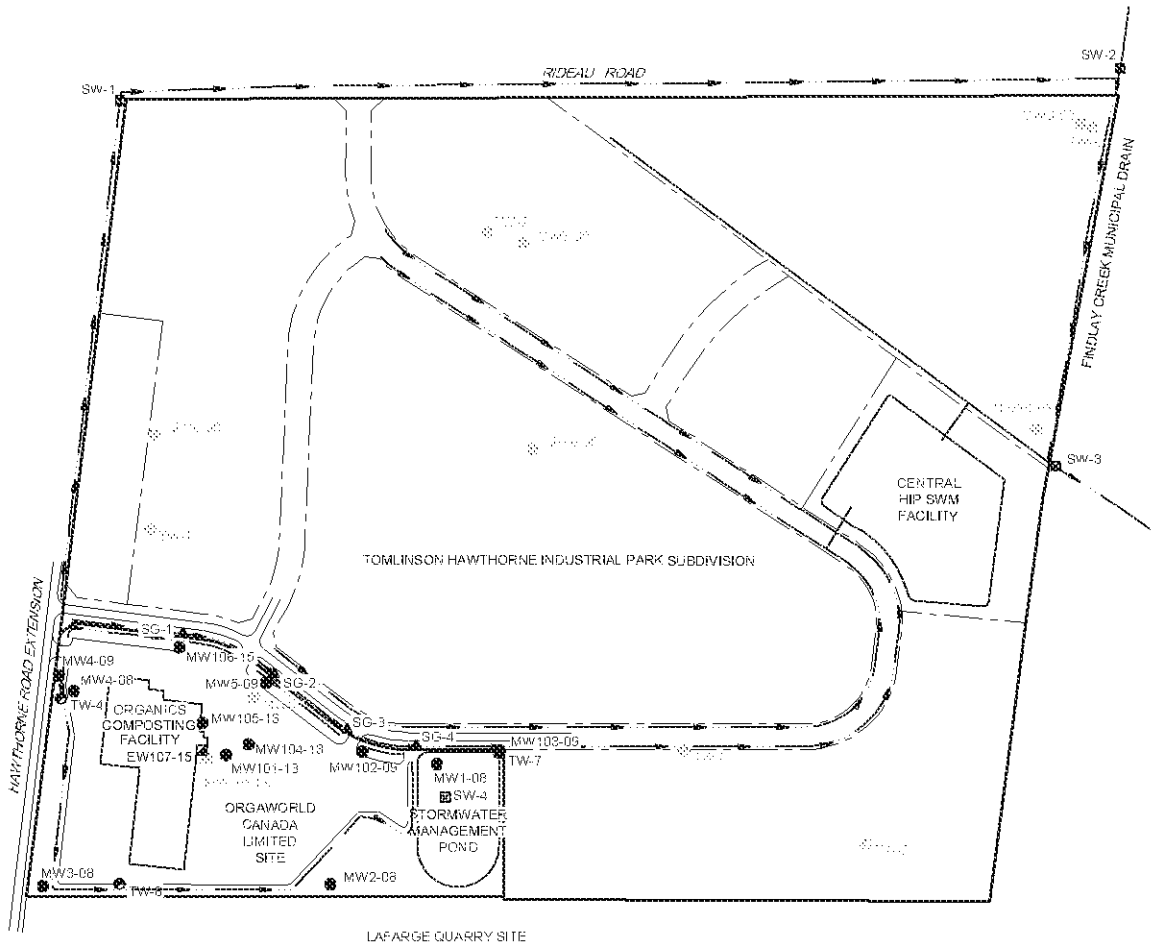
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Jan 9, 2018

SITE PLAN

figure 1.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58\072\45804-58(072)GN-WA001.dwg



LEGEND

- ORGAWORLD SITE BOUNDARY
- TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
- SURFACE WATER DRAIN/DITCH/CREEK
- MW2-06 SHALLOW MONITORING WELL LOCATION
- TW-4 DEEP BEDROCK MONITORING WELL LOCATION
- EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
- SW-3 SURFACE WATER MONITORING LOCATION
- SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
- MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE (SEE NOTE BELOW)

NOTES:

1. SHALLOW AND DEEP MONITORING WELLS LOCATED OUTSIDE OF ORGAWORLD SITE LIMITS ARE NO LONGER ACCESSIBLE TO OCL OR GHD AS OF JANUARY 2010.

0 50 100 150m

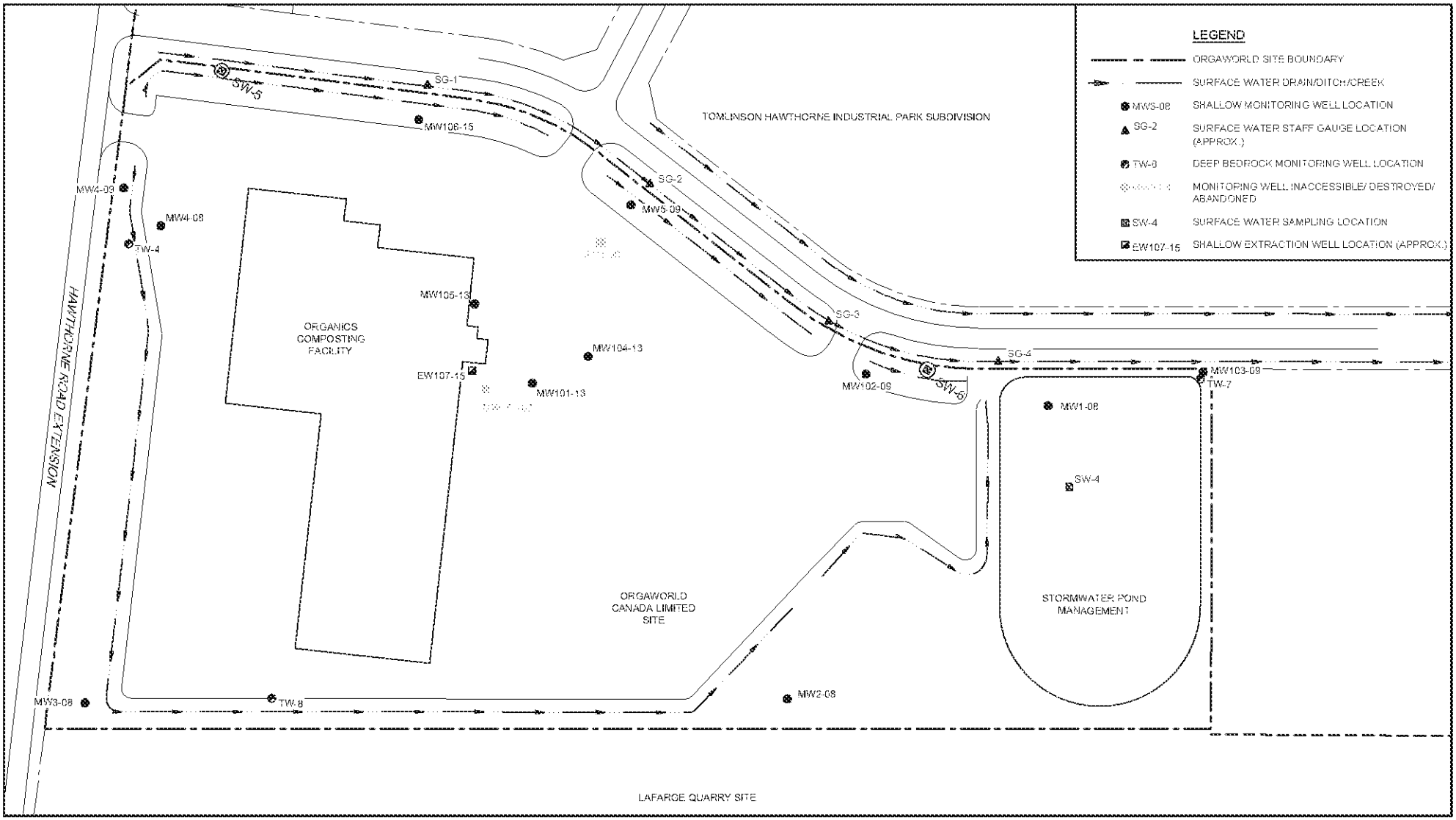
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Jan 9, 2018

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS figure 3.1

CAD File: P:\Drawings\45000s\45804\45804-reports\45804-58(072)\45804-58(072)GN-45804-58(072)GN-WA003.dwg

002280



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

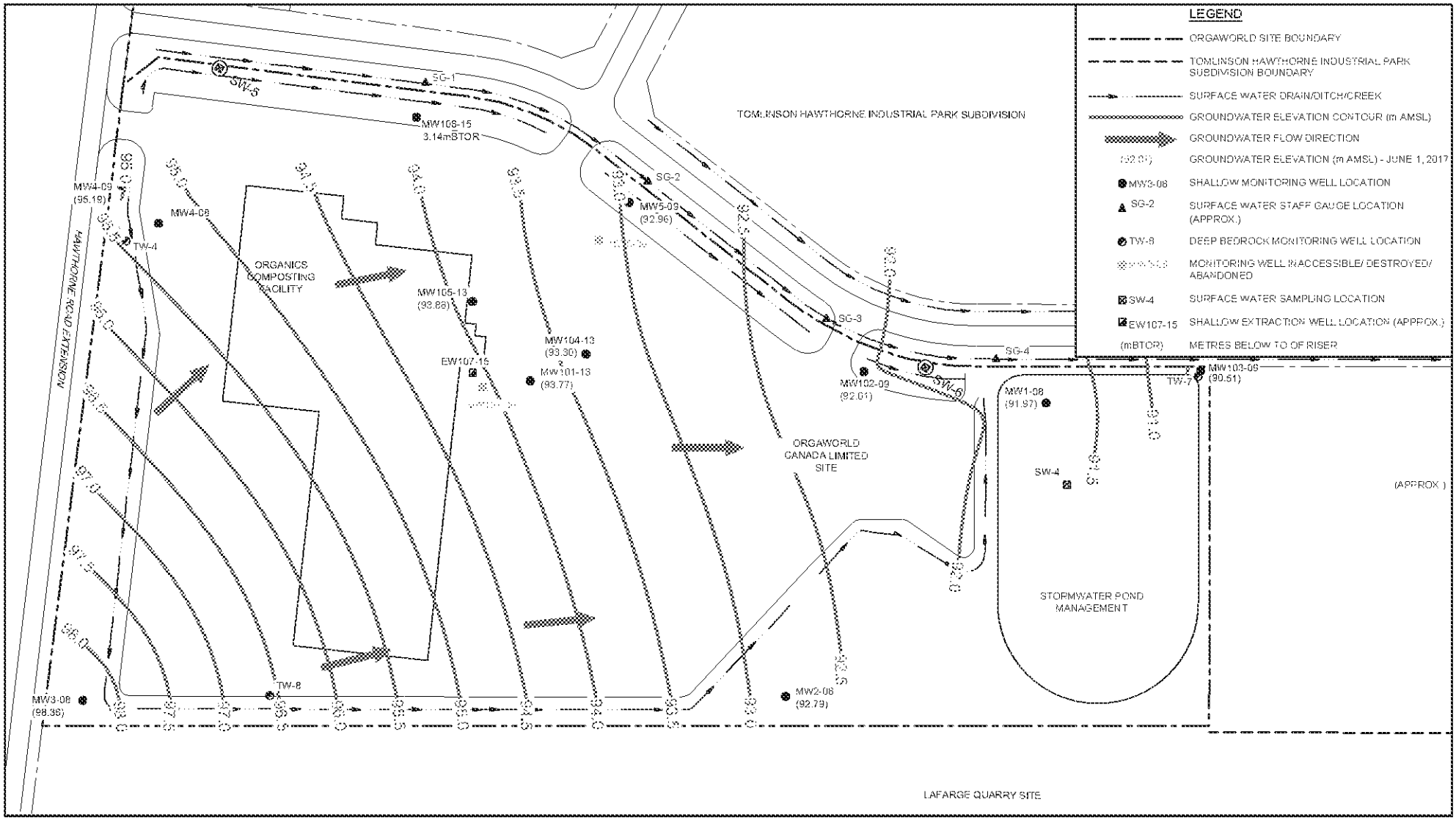
ORGAWORLD PROPERTY GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

45804-58
Jan 9, 2018

figure 3.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58\072\45804-58(072)GN-WA003.DWG

002281



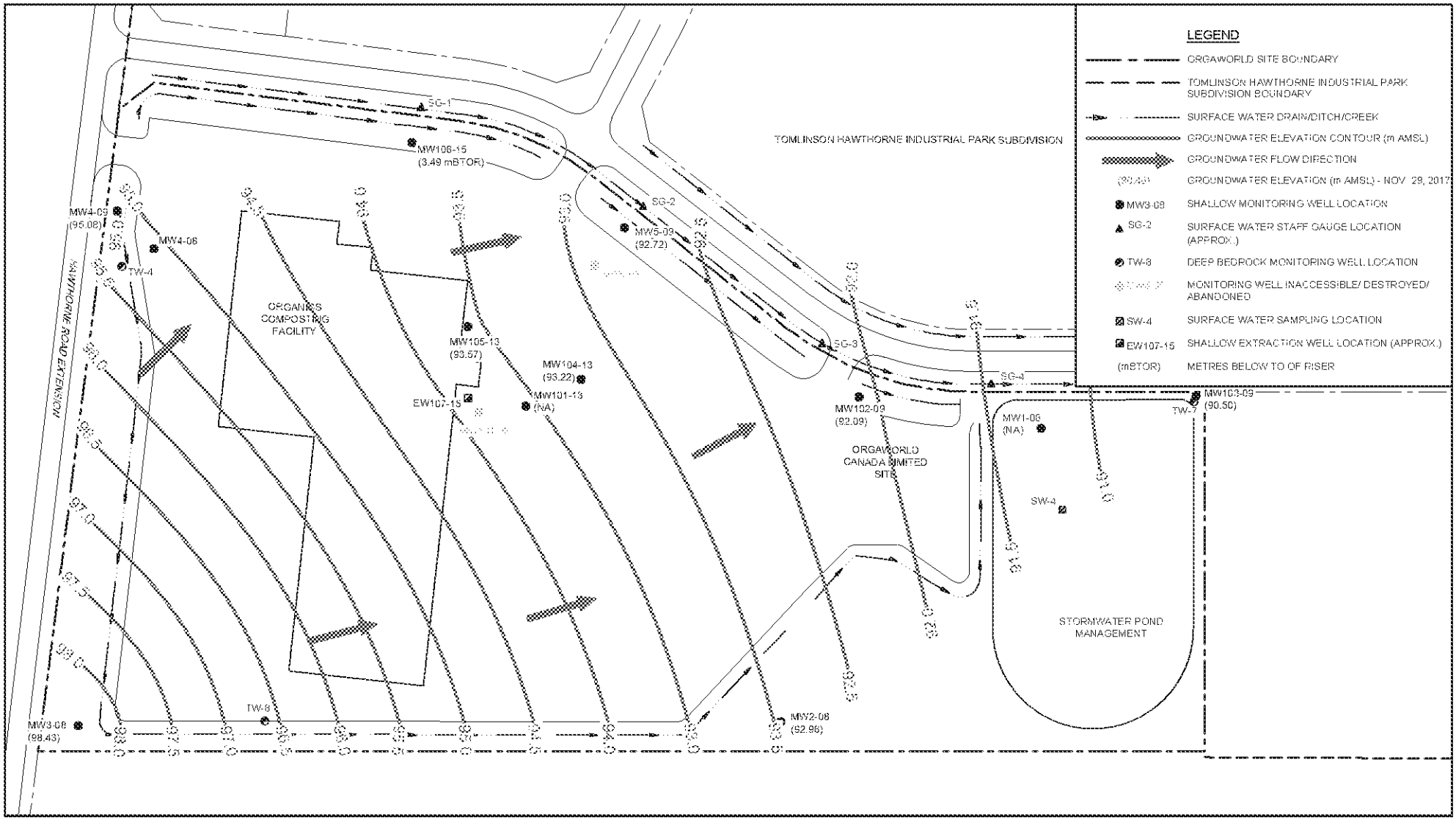
0 15 30 45m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
JUNE 1, 2017

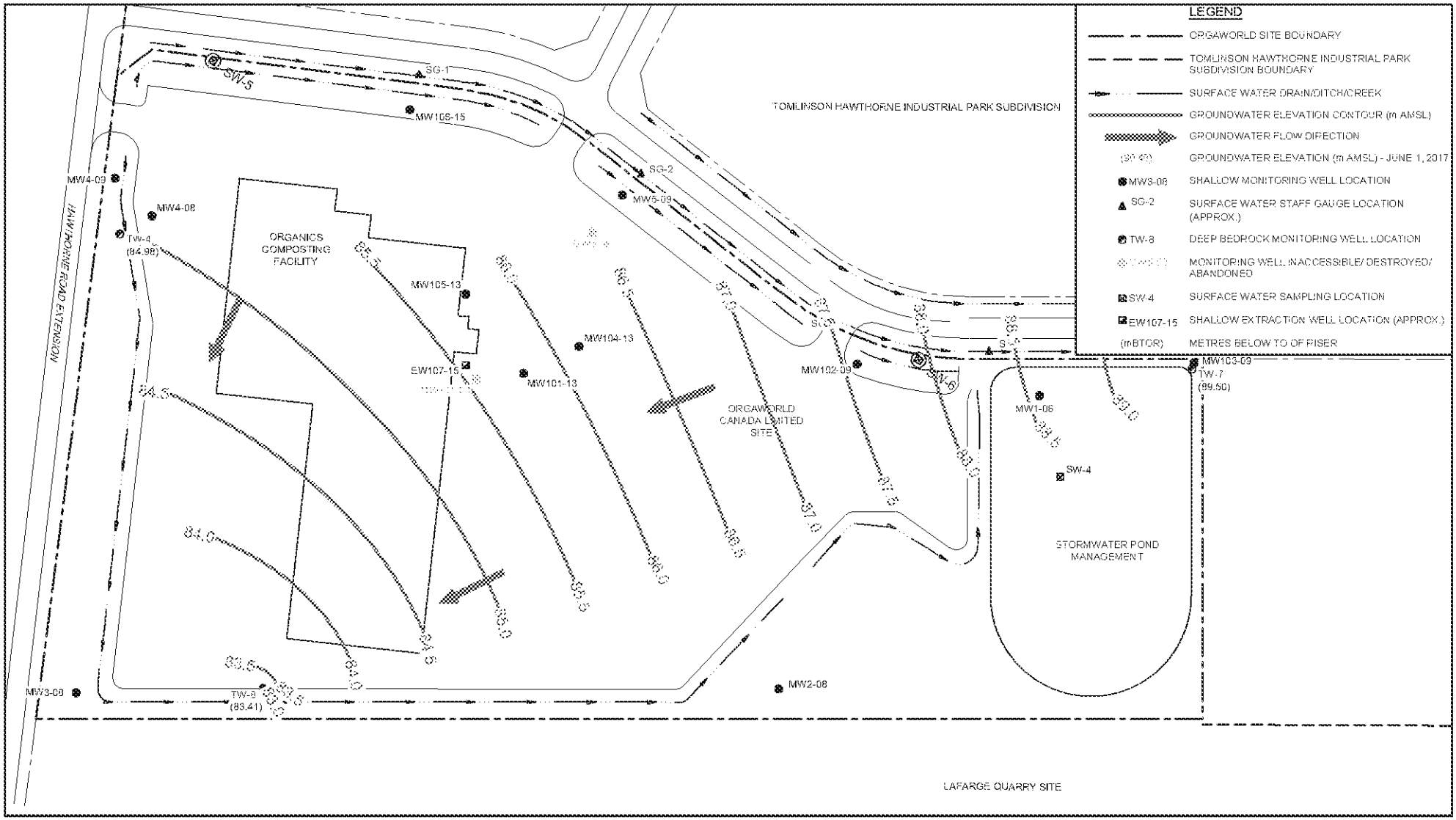
45604-58
Jan 9, 2018

figure 4.1

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(072)GN-WA004.DWG



CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(272)GN WA005.DWG



0 15 30 45m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

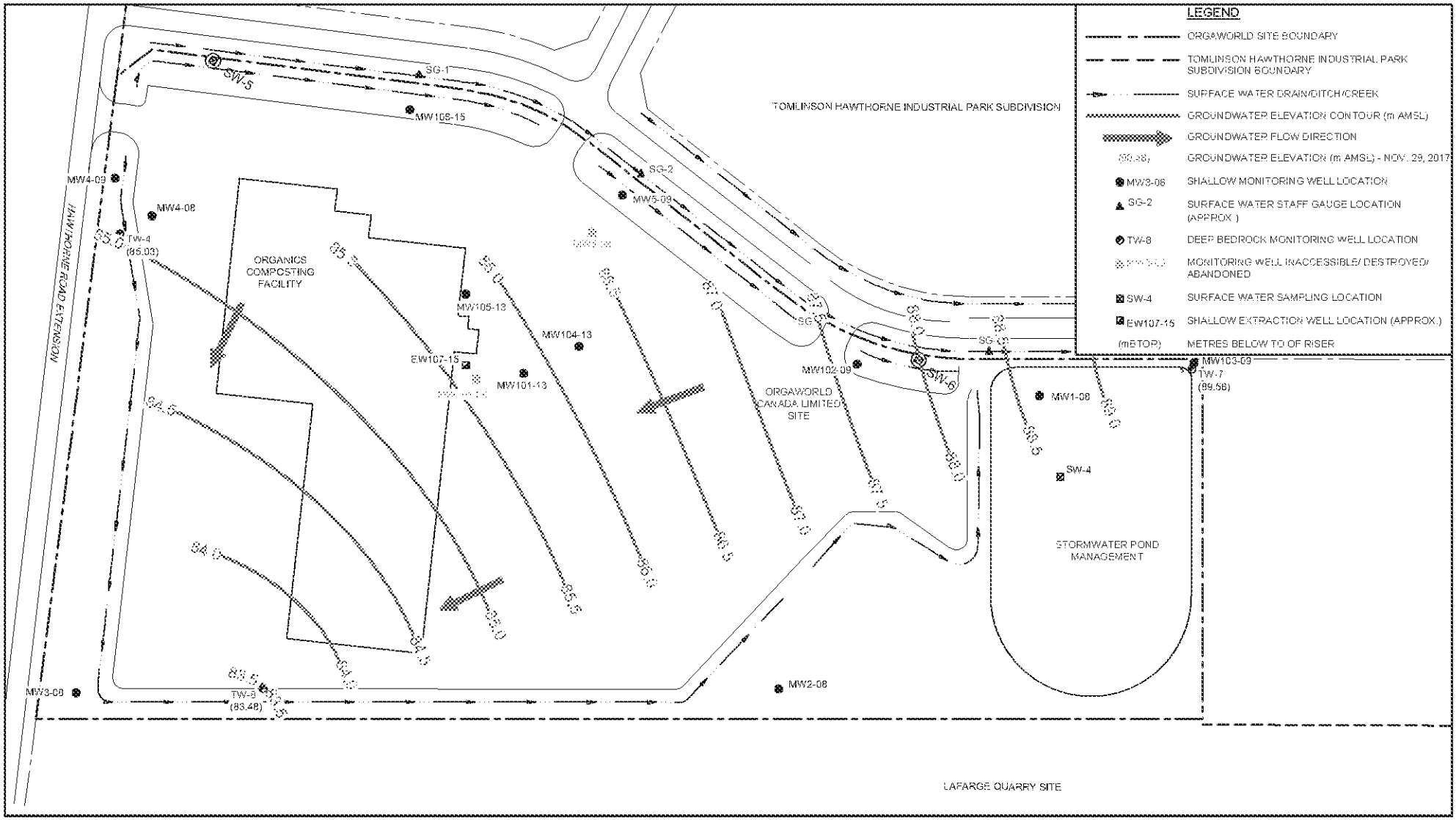
BEDROCK GROUNDWATER ELEVATIONS
JUNE 1, 2017

45604-58
Jan 9, 2018

figure 4.3

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(072)GN-WA008.DWG

002284



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

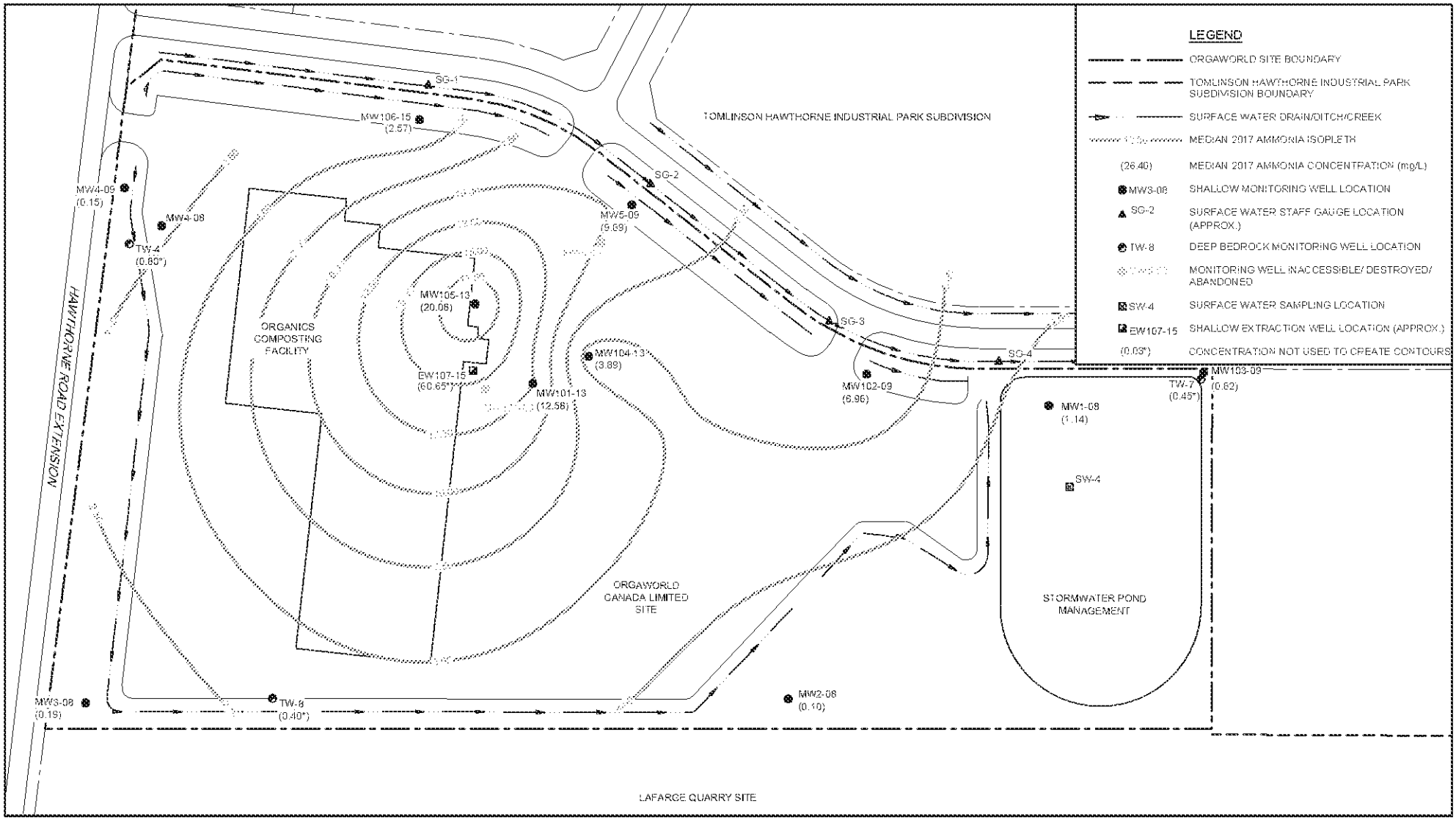
BEDROCK GROUNDWATER ELEVATIONS
NOVEMBER 29, 2017

45604-58
Jan 9, 2018

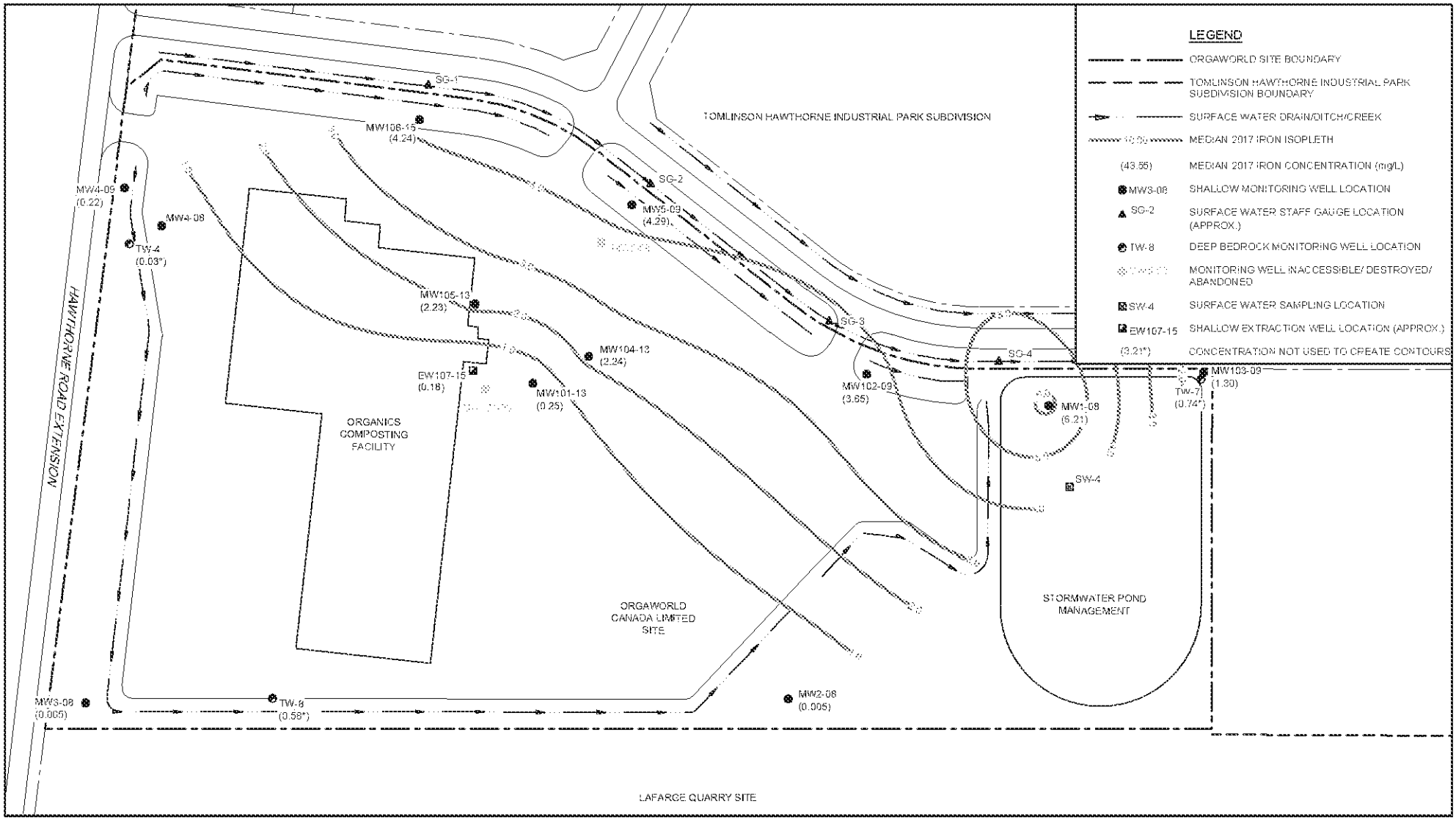
figure 4.4

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(272)GN-WA007.DWG

002285



CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(072)GIS\45804-58(072)GN-WA002.DWG

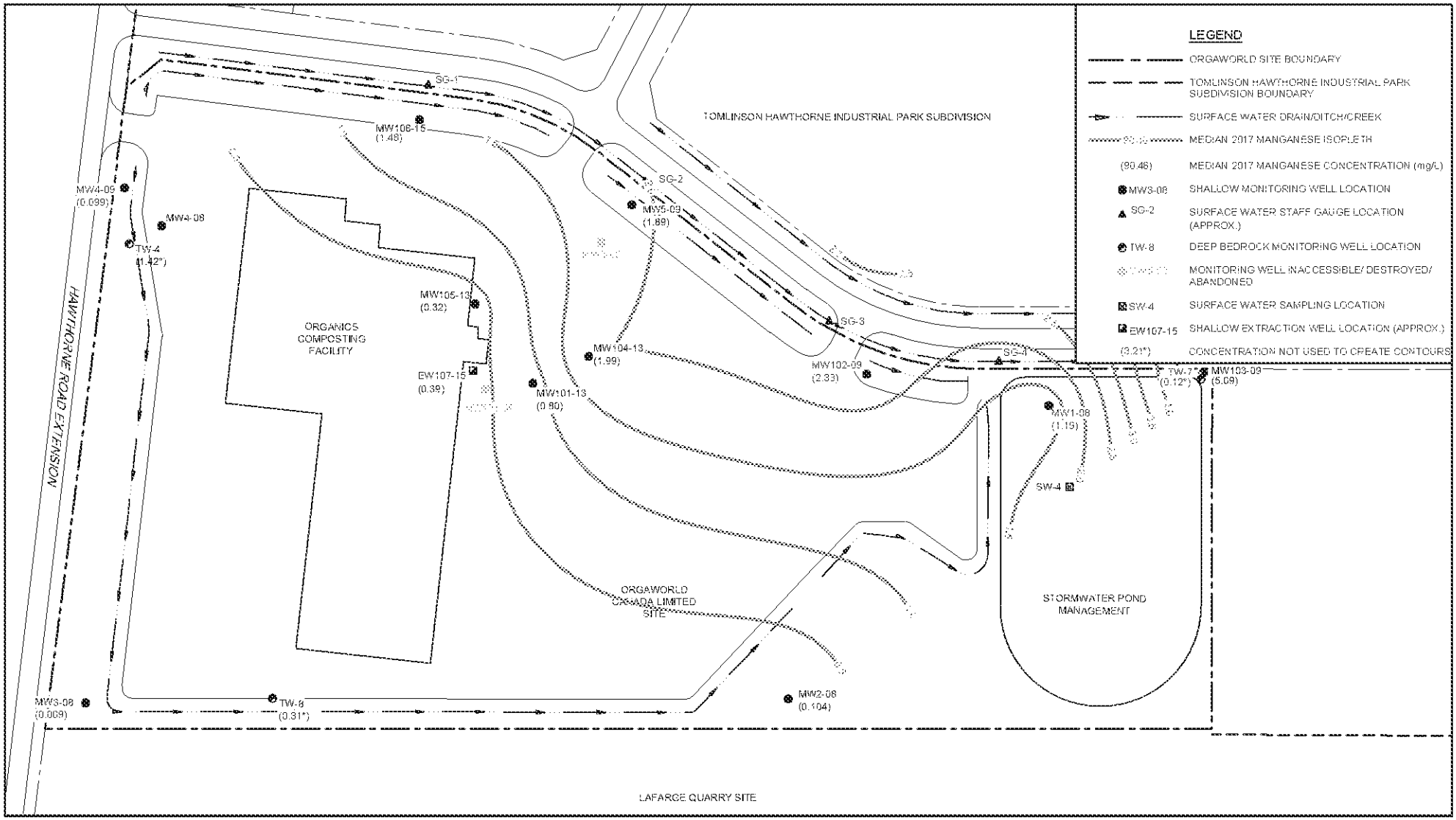


ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45604-58
Jan 11, 2018

MEDIAN 2017 DISSOLVED IRON CONCENTRATION ISOPLETHS figure 4.6

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(072)GN-WA002.DWG



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

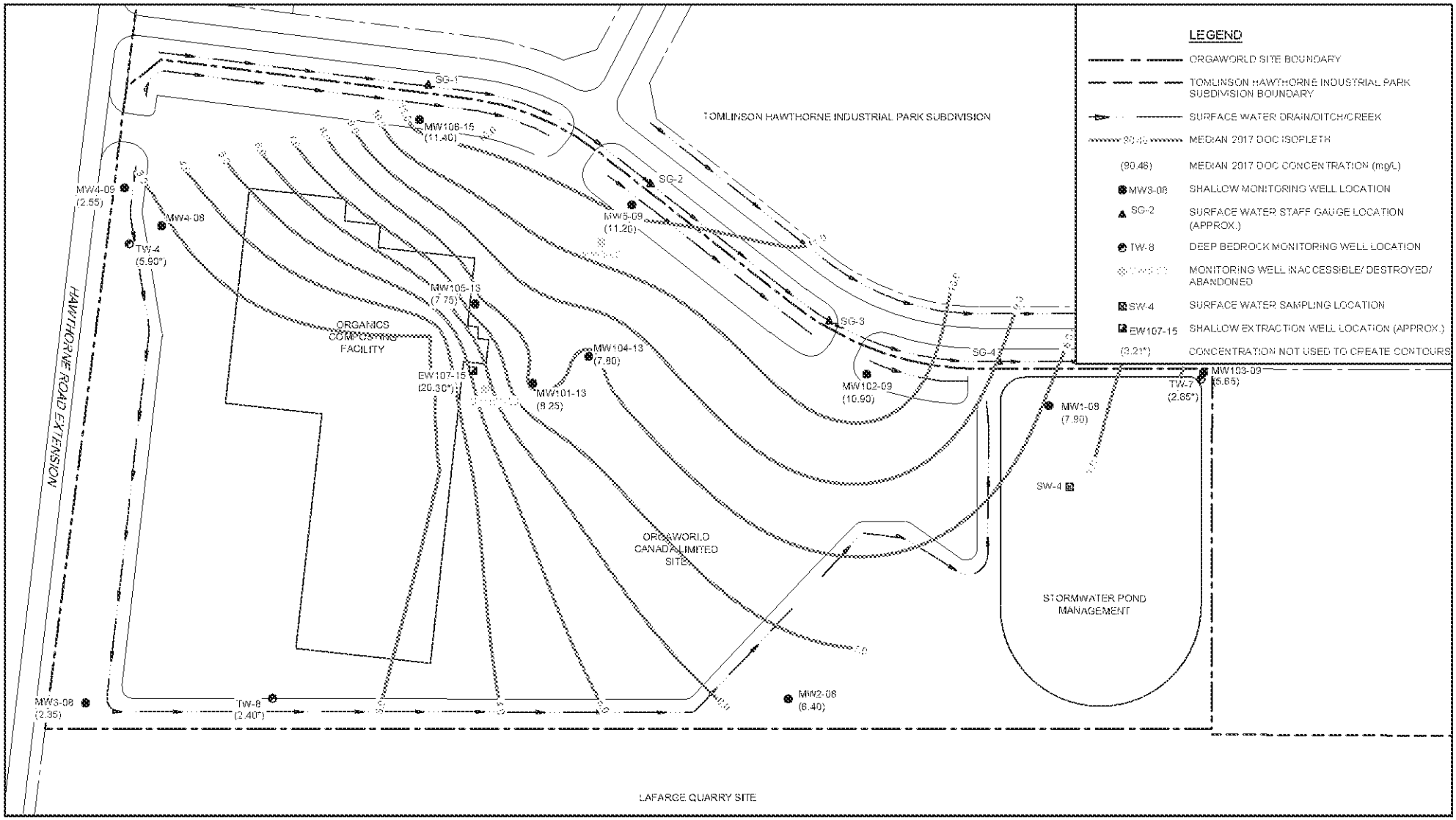
MEDIAN 2017 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS

45604-58
Jan 11, 2018

figure 4.7

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(072)GIS\45804-58(072)GN-WA010.DWG

002288



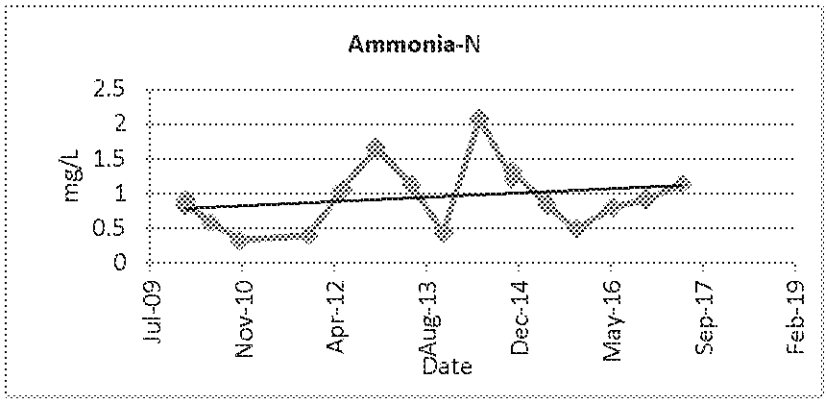
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT

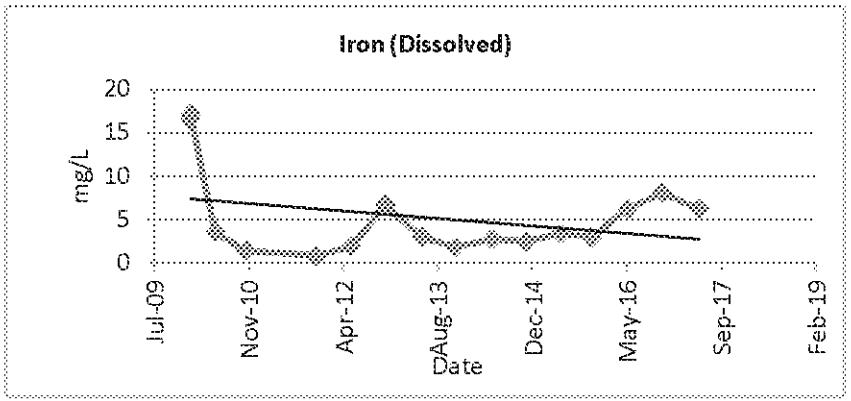
MEDIAN 2017 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS

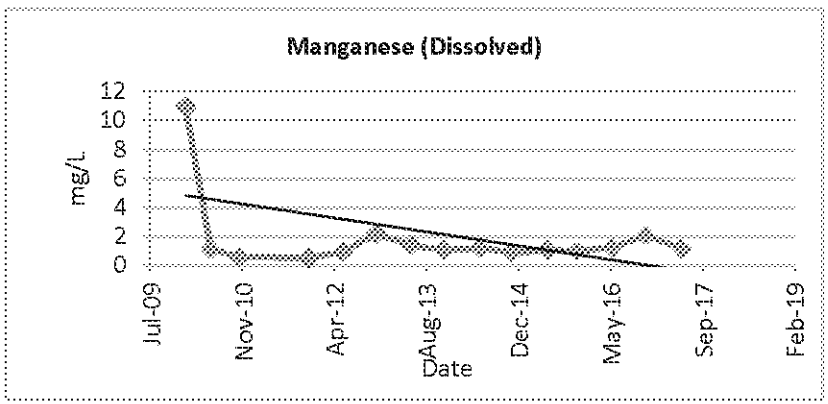
45604-58
Jan 9, 2018

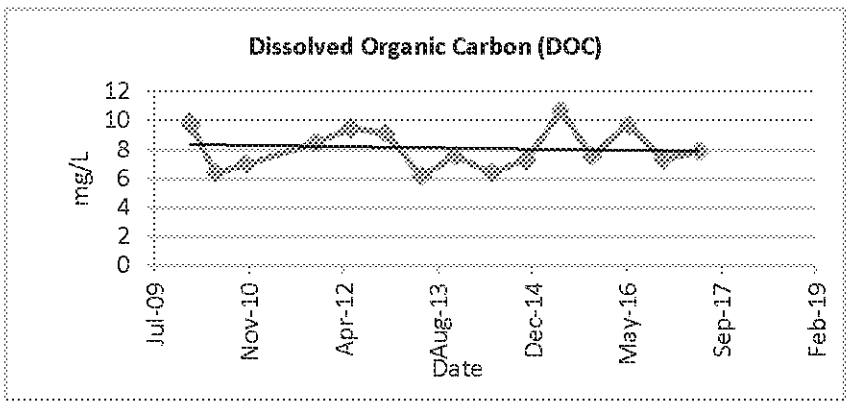
figure 4.8

CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(072)GN-WA011.DWG







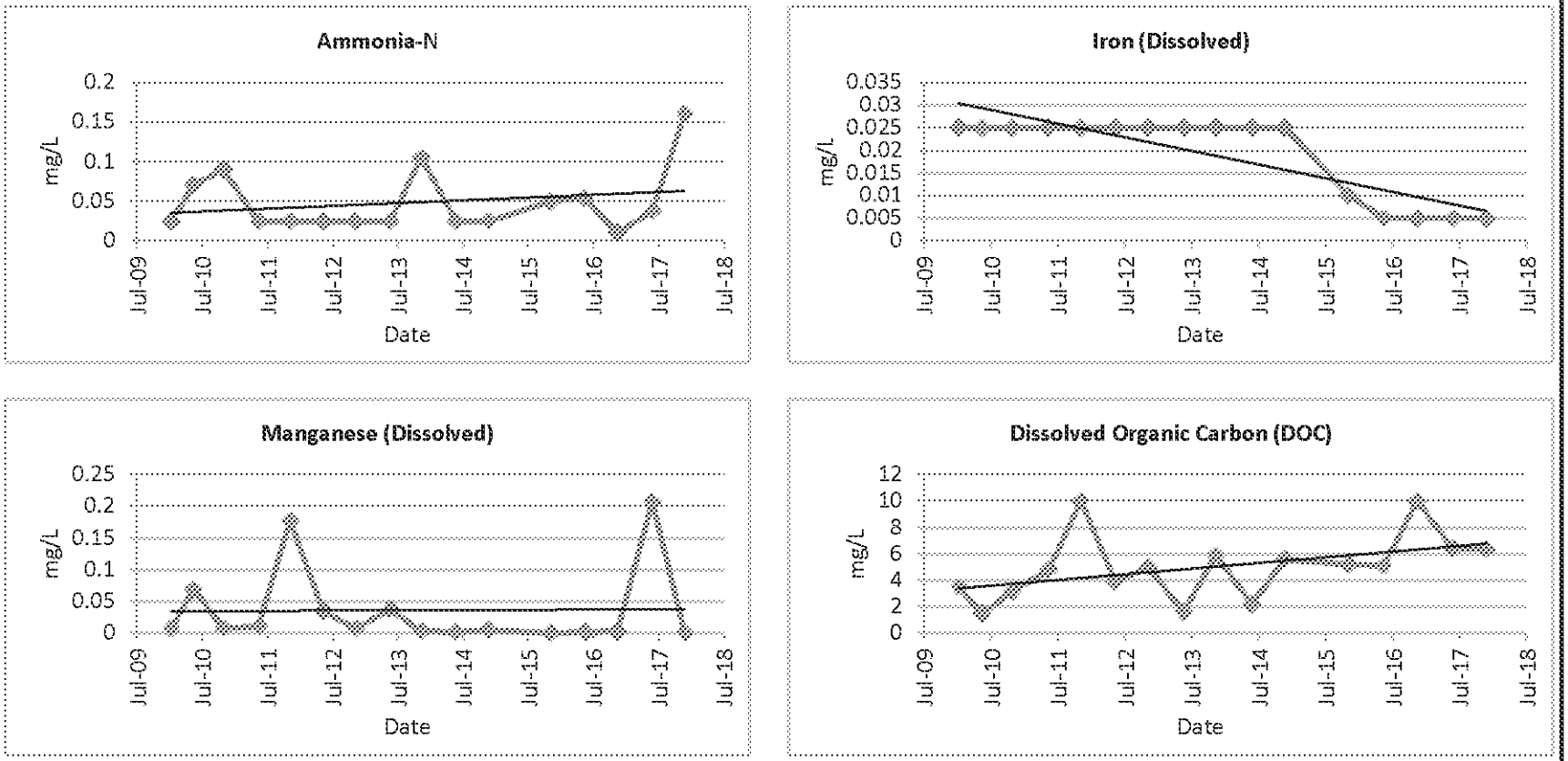


Note: ND results as 1/2 the detection limit

figure 4.9.1

TEMPORAL PLOTS - SELECTED PARAMETERS
MW1-08
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

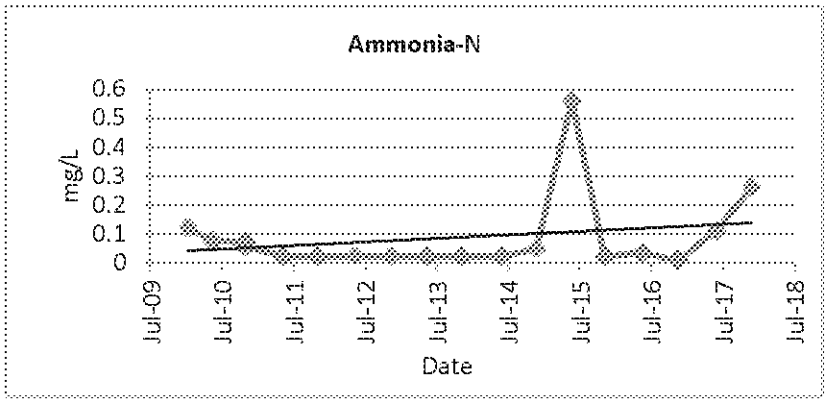
002290

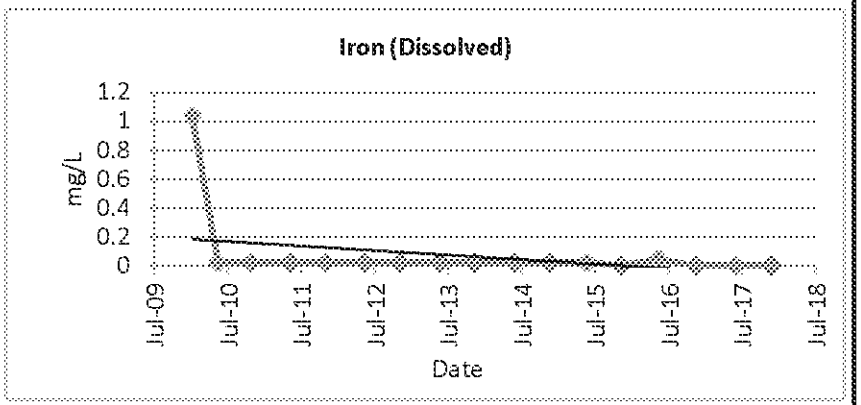


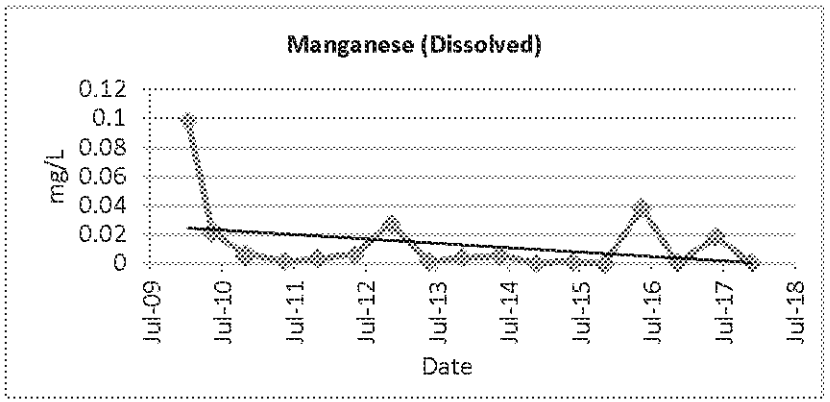
Note: ND results as 1/2 the detection limit

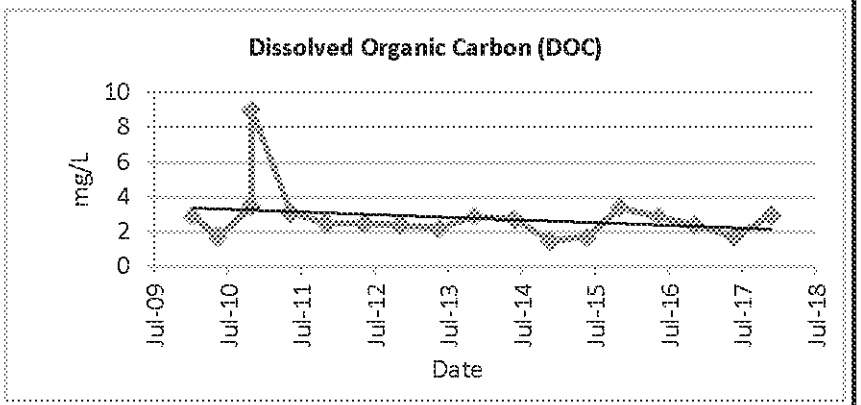
figure 4.9.2

TEMPORAL PLOTS - SELECTED PARAMETERS
MW2-08
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





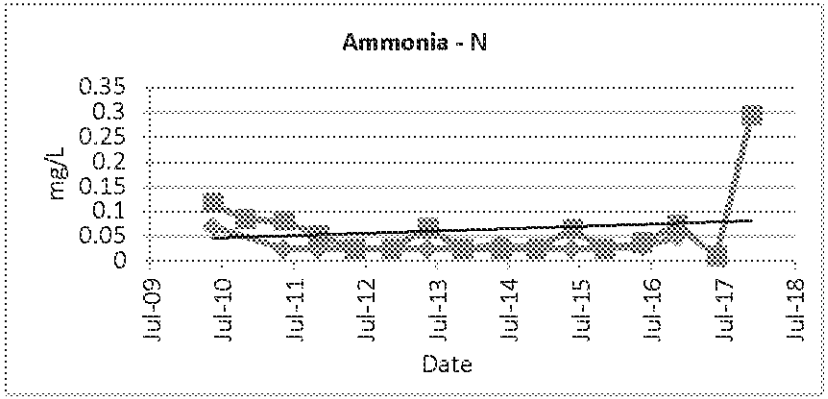


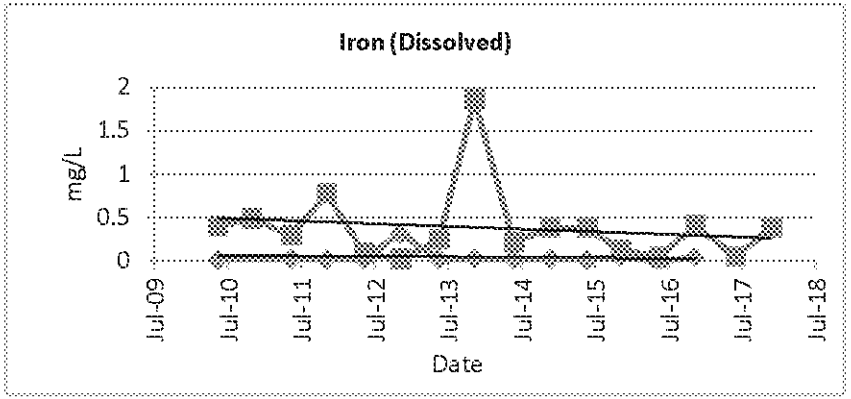


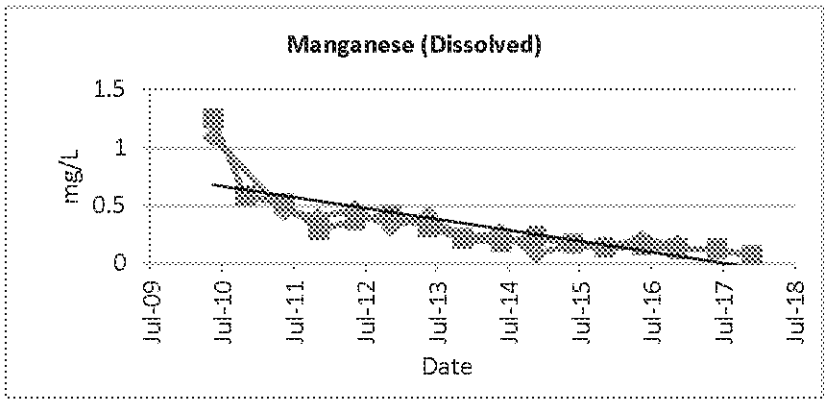
Note: ND results as 1/2 the detection limit

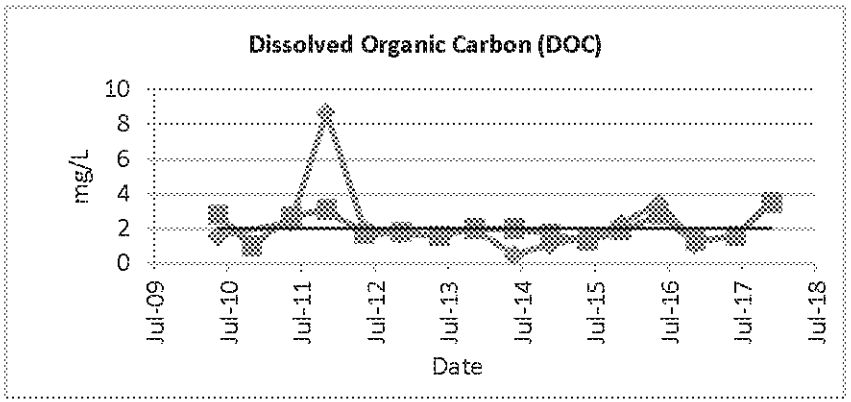
figure 4.9.3

TEMPORAL PLOTS - SELECTED PARAMETERS
MW3-08
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY







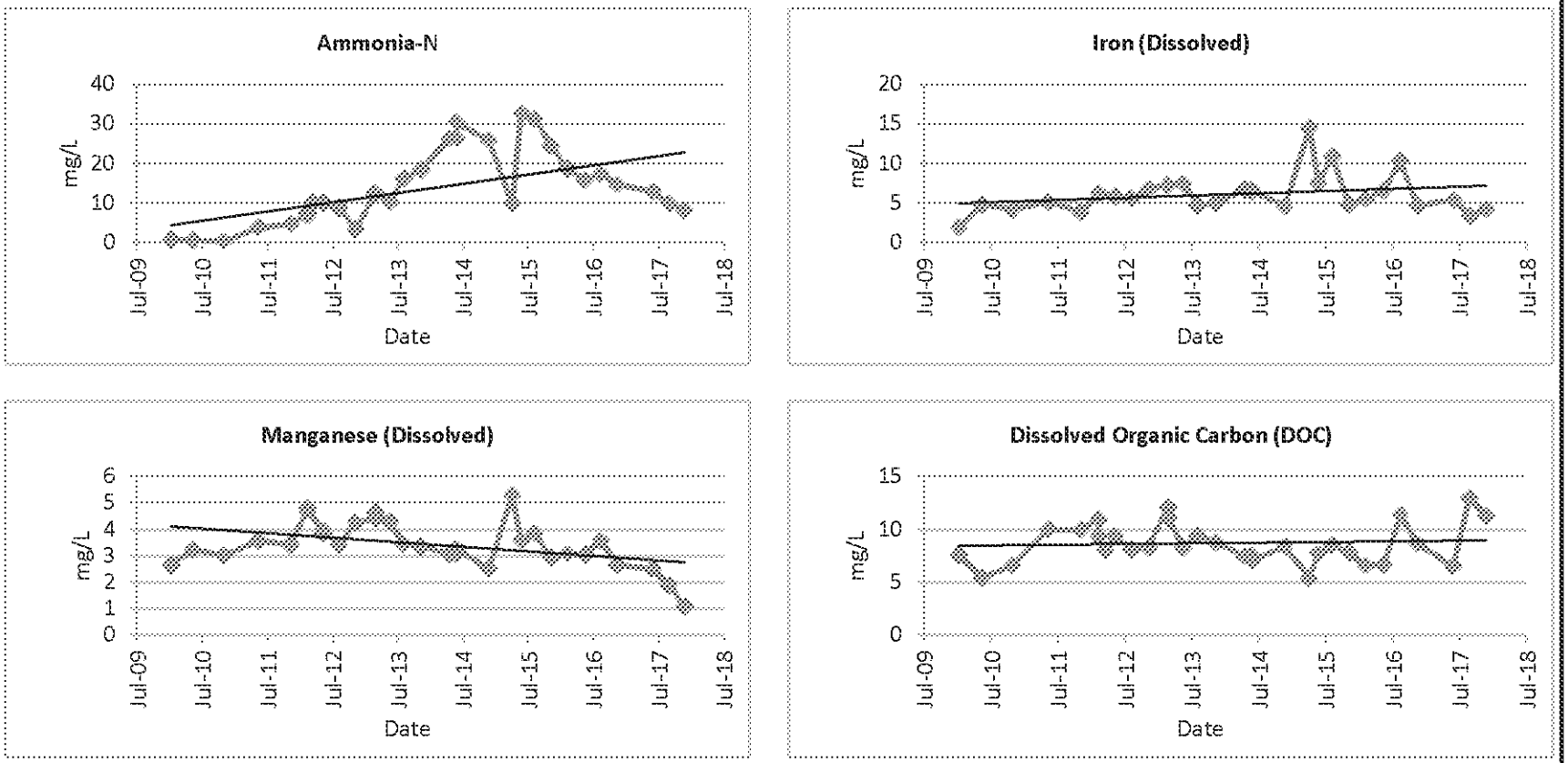


Note: ND results as 1/2 the detection limit

MW4-08
MW4-09

figure 4.9.4

TEMPORAL PLOTS - SELECTED PARAMETERS
MW4-08 & MW4-09
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

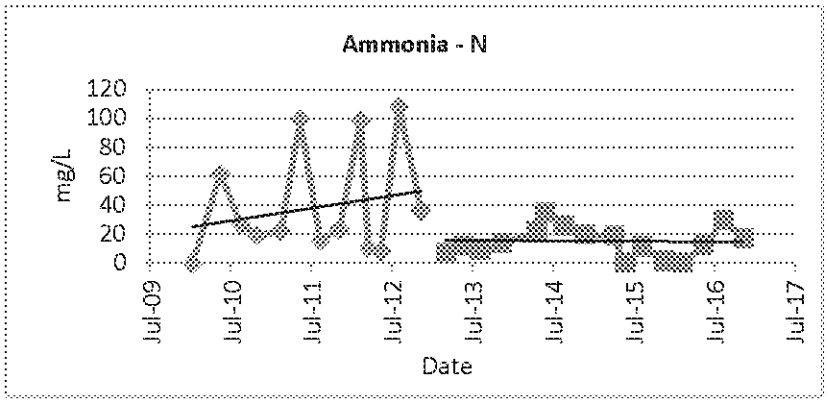


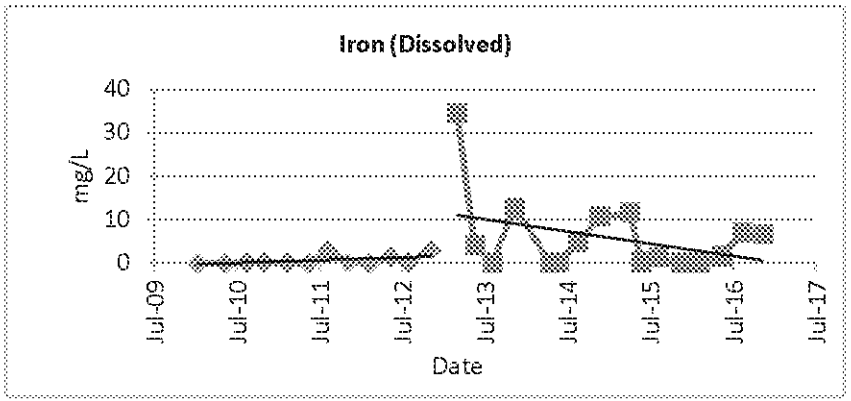
Note: ND results as 1/2 the detection limit

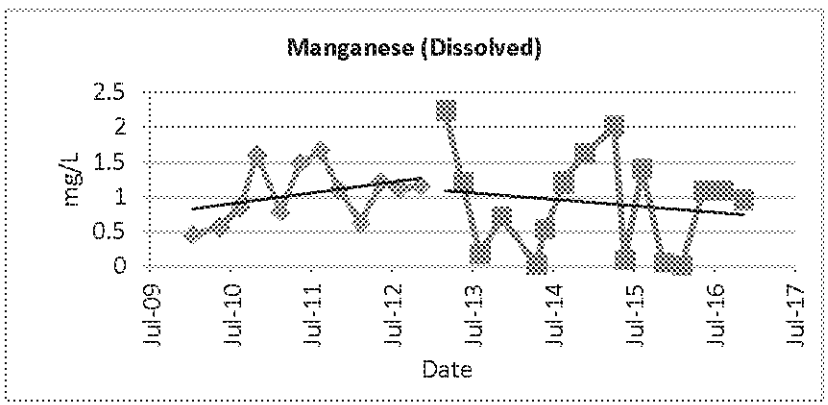
figure 4.9.5

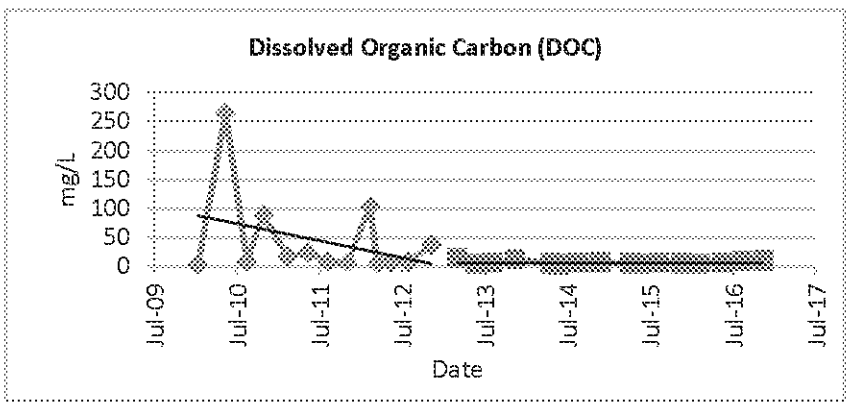
TEMPORAL PLOTS - SELECTED PARAMETERS
MW5-09
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

002294







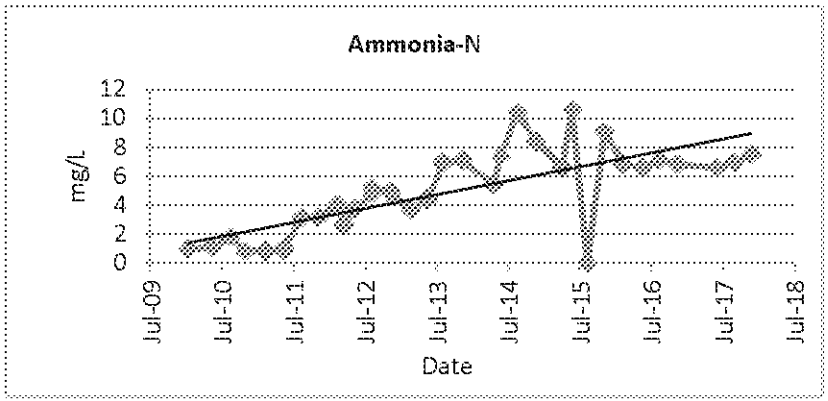


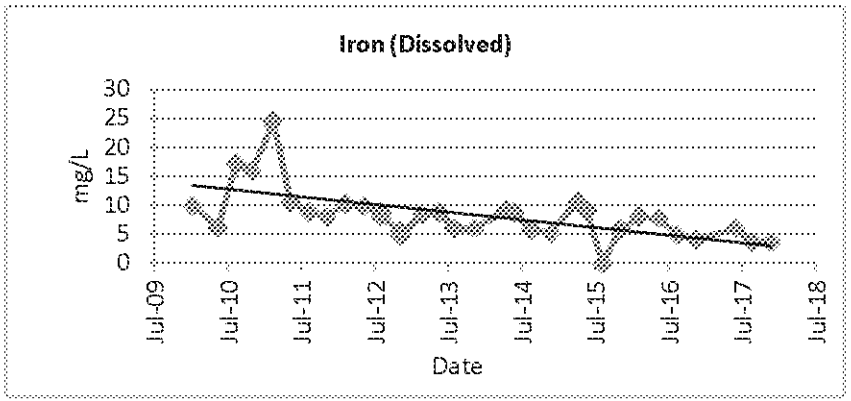
Note: ND results as 1/2 the detection limit

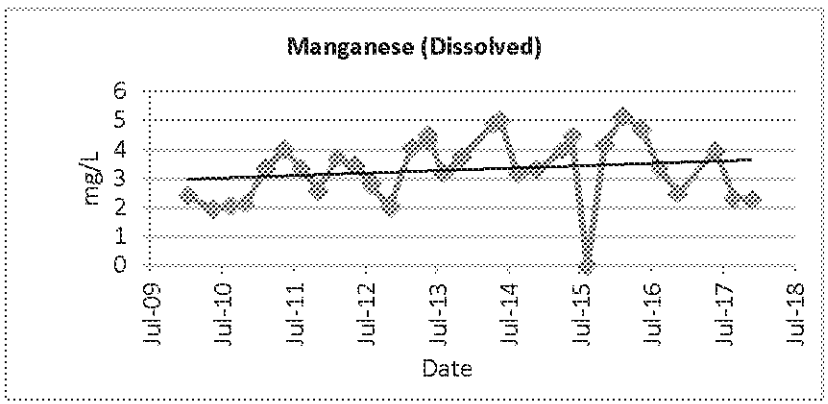
MW101-09
MW101-13

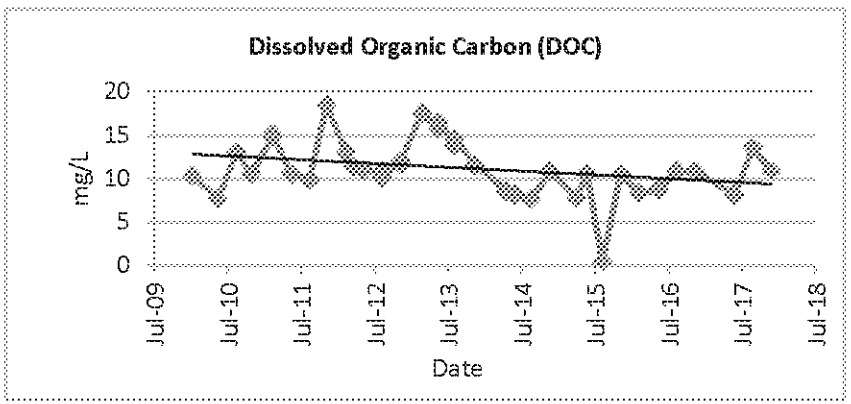
figure 4.9.6

TEMPORAL PLOTS - SELECTED PARAMETERS
MW101-09 & MW101-13
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY







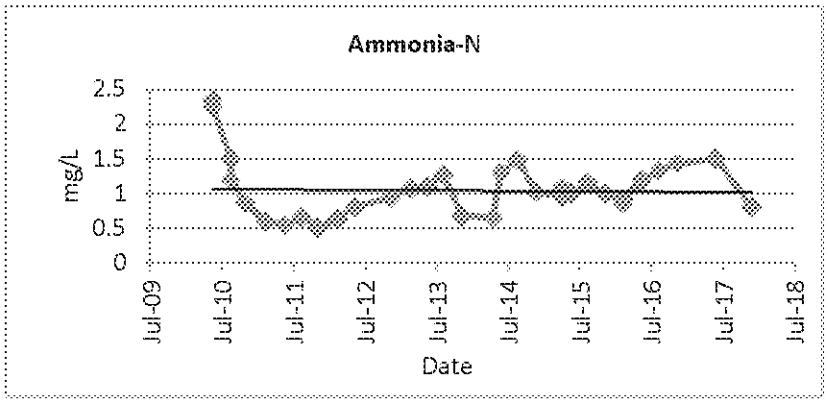


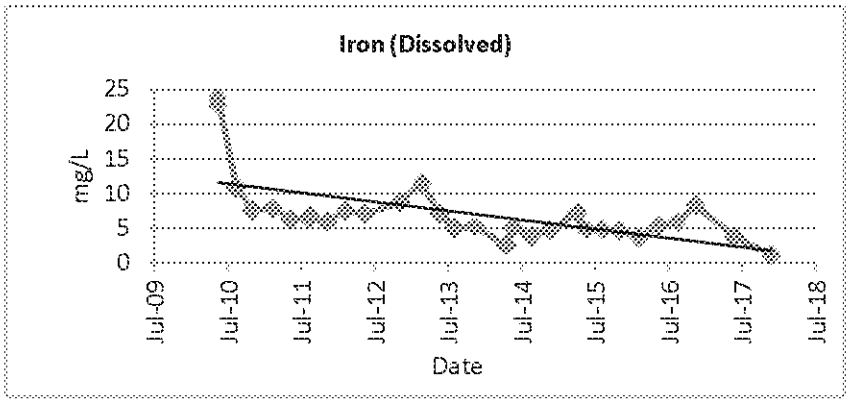
Note: ND results as 1/2 the detection limit

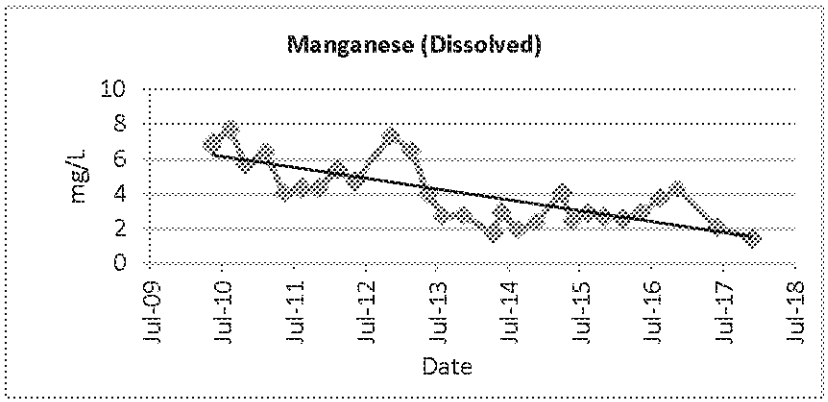
figure 4.9.7

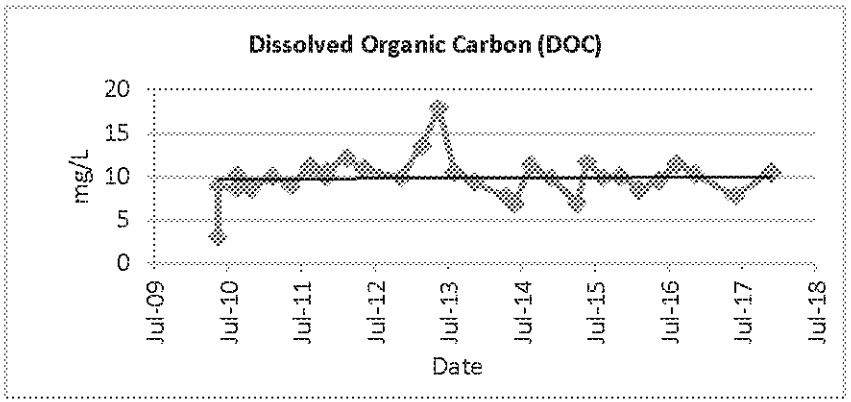
TEMPORAL PLOTS - SELECTED PARAMETERS
MW102-09
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

002296





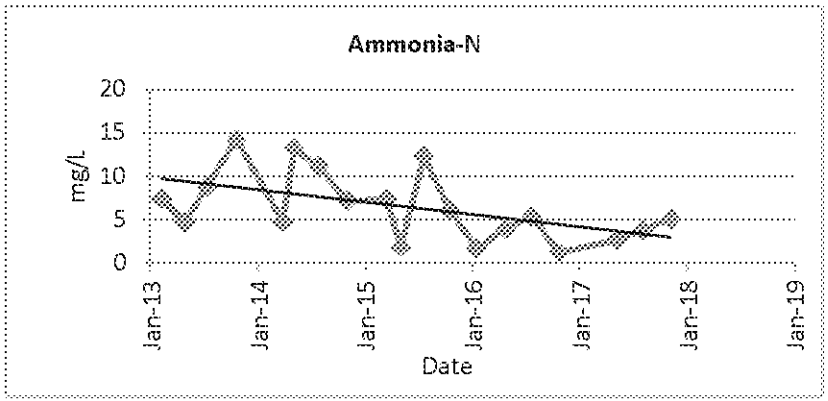


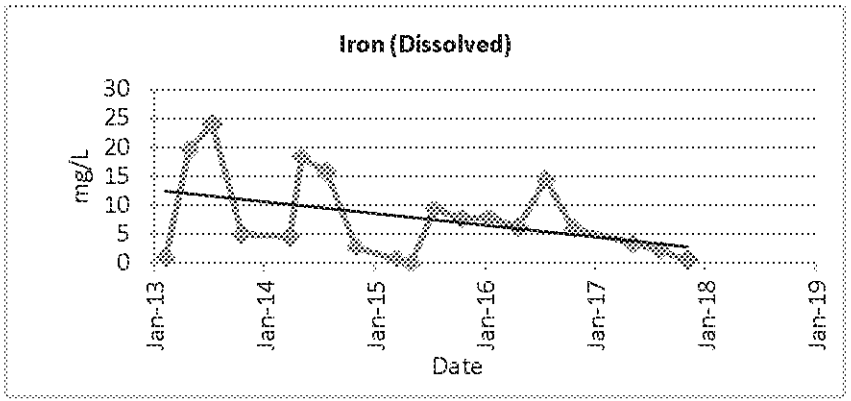


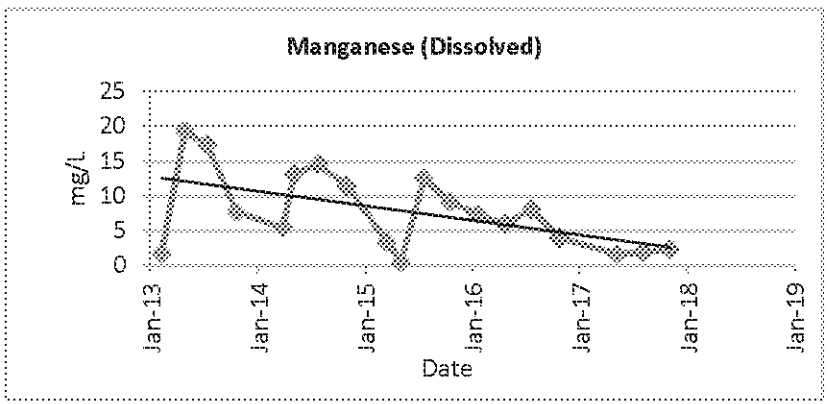
Note: ND results as 1/2 the detection limit

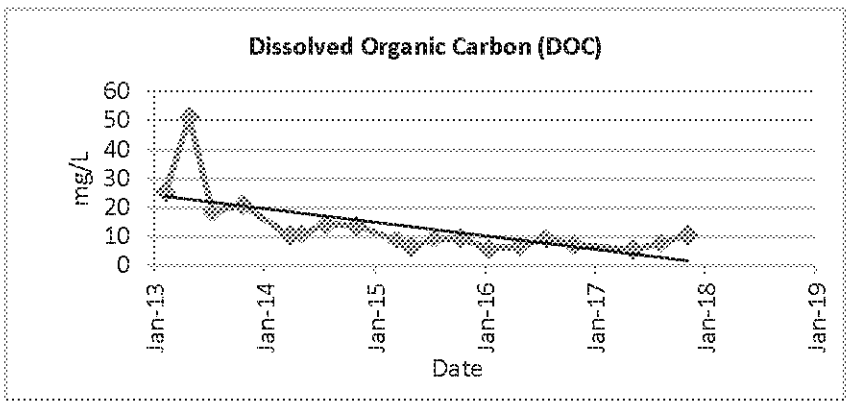
figure 4.9.8

TEMPORAL PLOTS - SELECTED PARAMETERS
MW103-09
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY







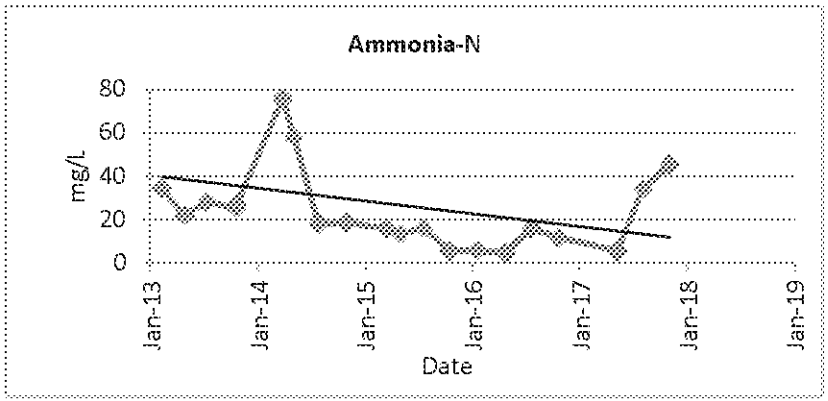


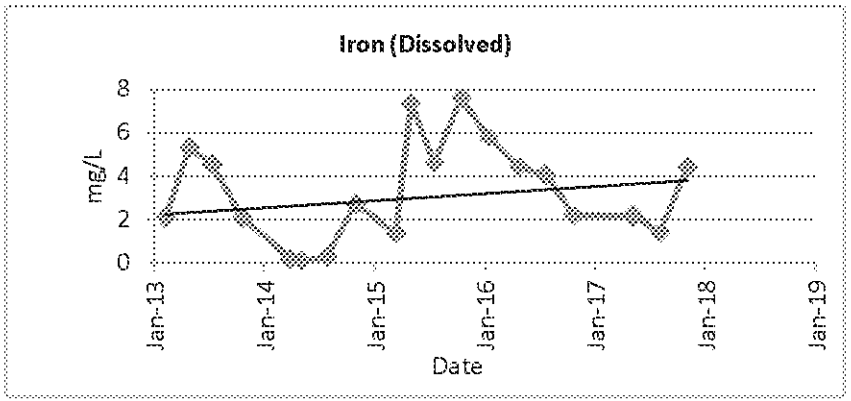
Note: ND results as 1/2 the detection limit

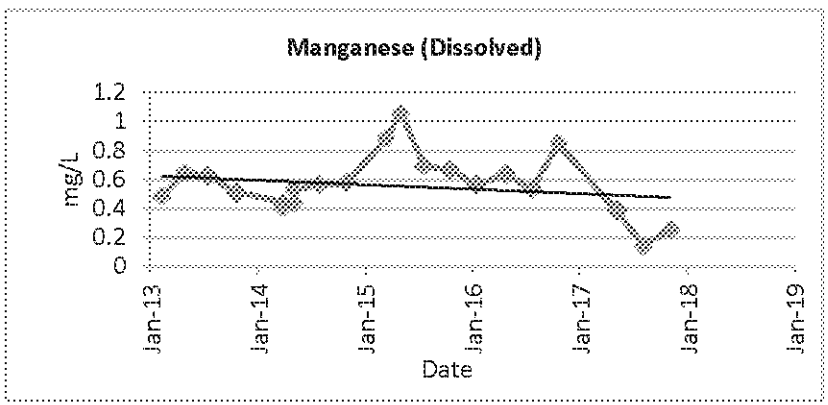
figure 4.9.9

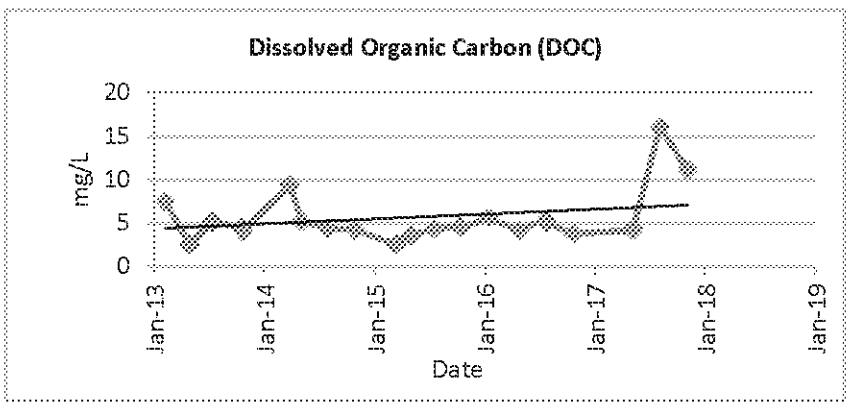
TEMPORAL PLOTS - SELECTED PARAMETERS
MW104-13
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

002298







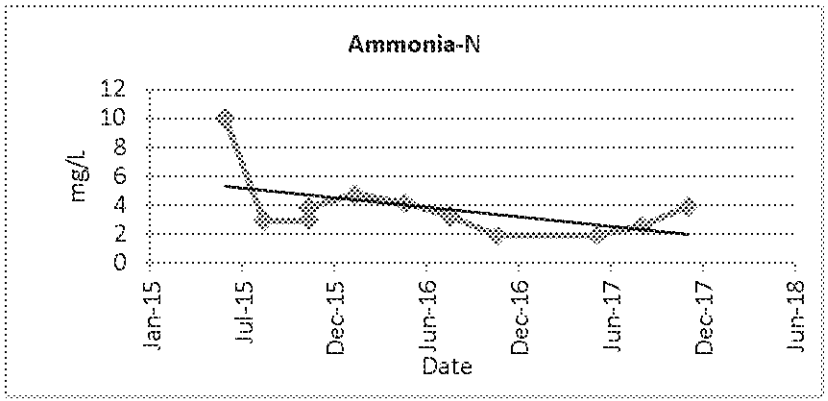


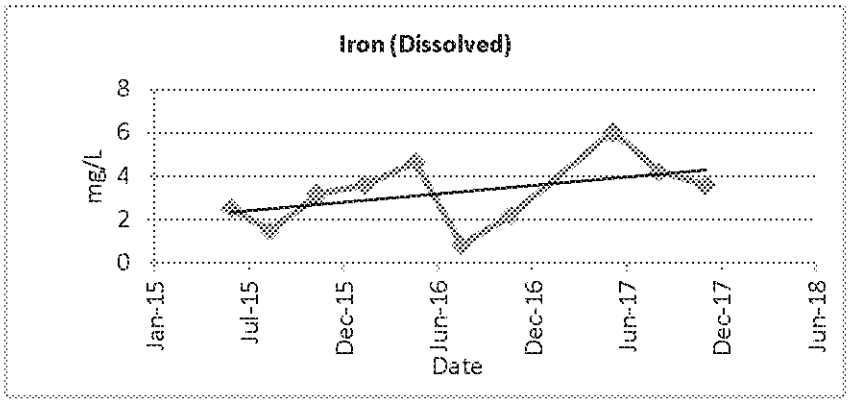
Note: ND results as 1/2 the detection limit

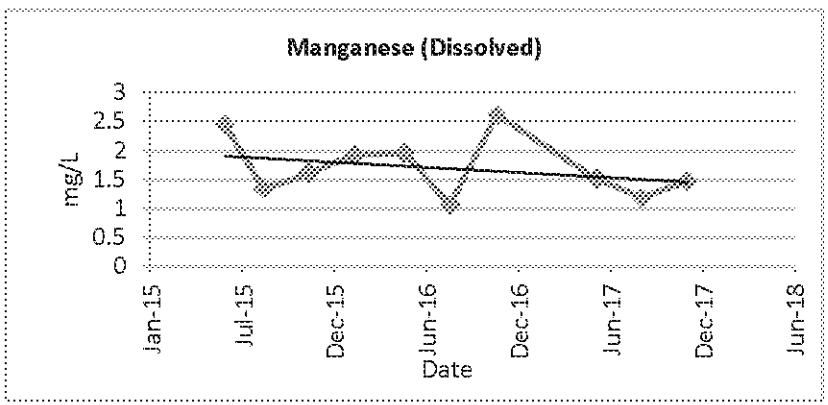
figure 4.9.10

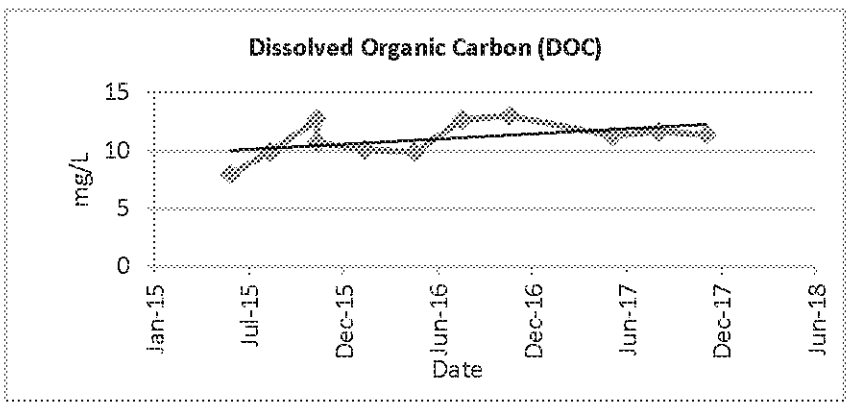
TEMPORAL PLOTS - SELECTED PARAMETERS
MW105-13
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

002299





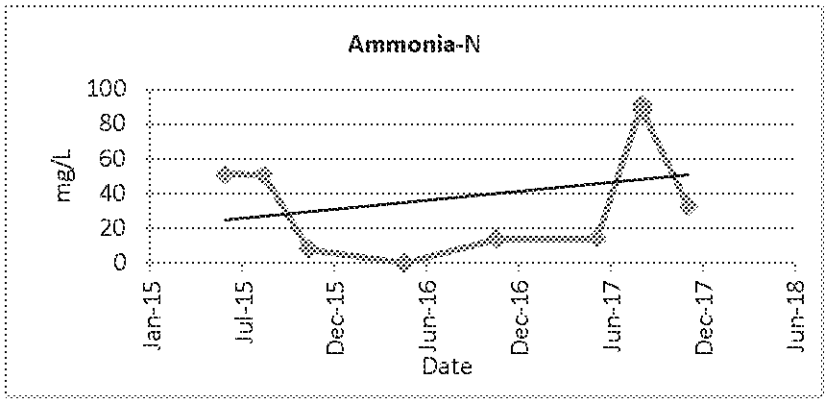


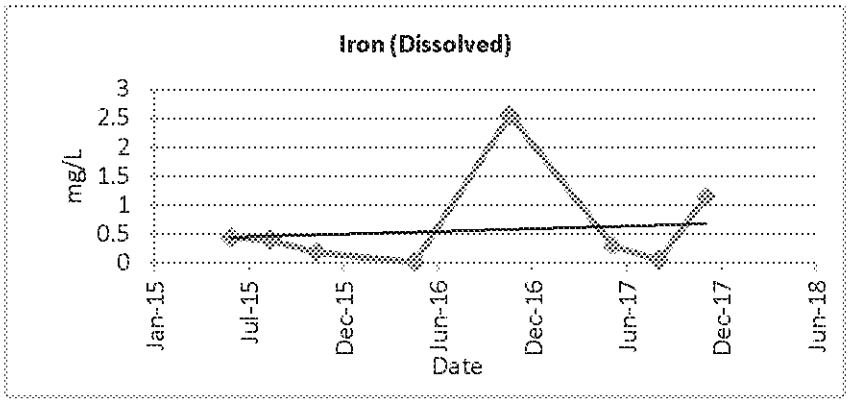


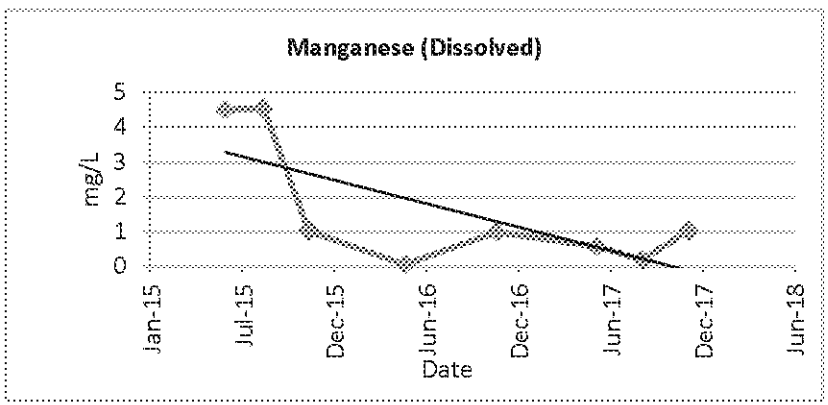
Note: ND results as 1/2 the detection limit

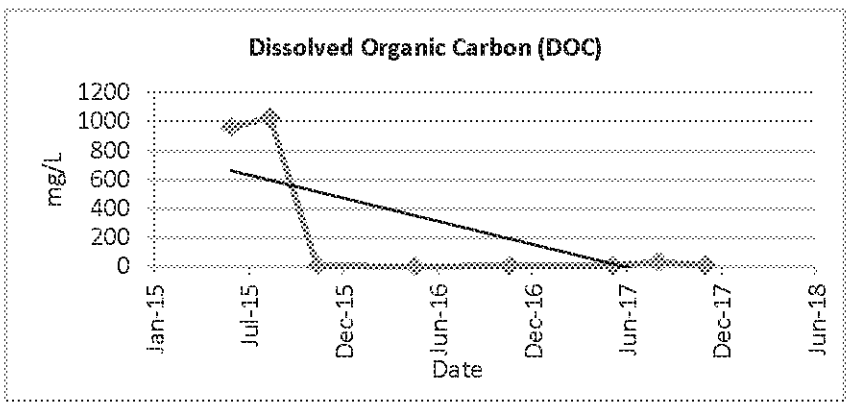
figure 4.9.11

TEMPORAL PLOTS - SELECTED PARAMETERS
MW106-15
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





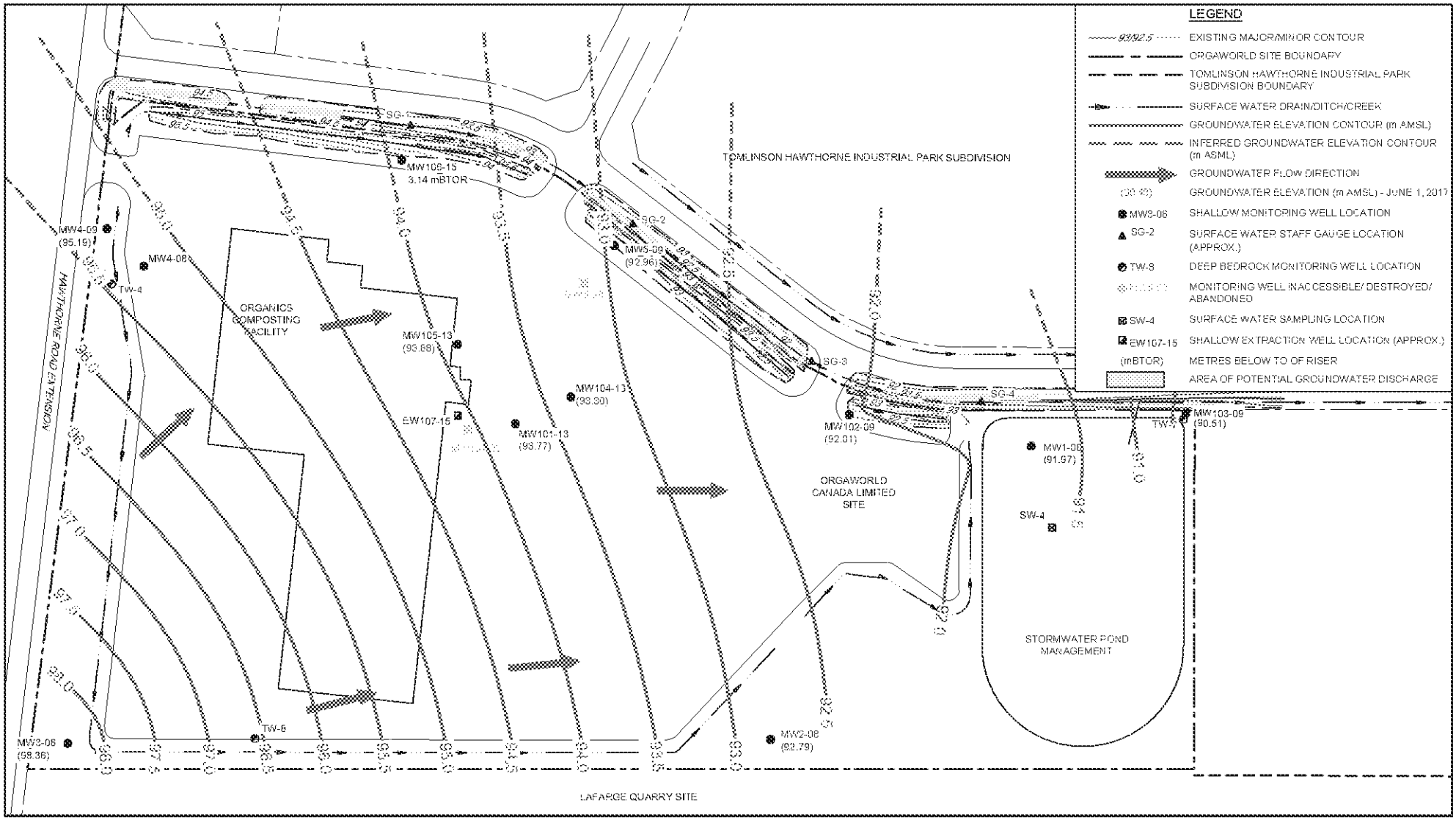




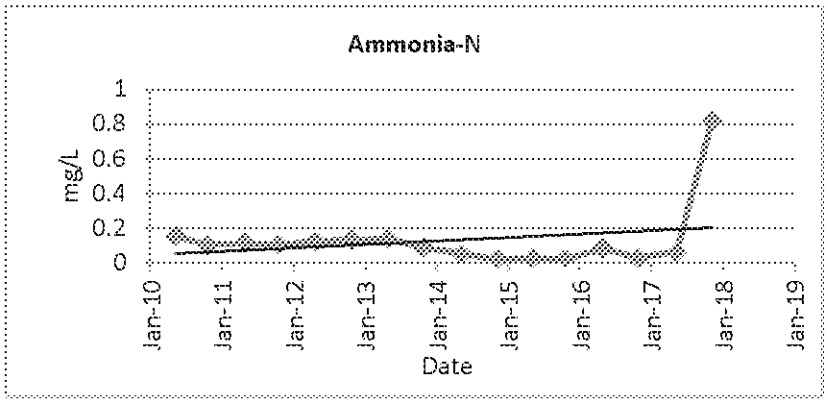
Note: ND results as 1/2 the detection limit

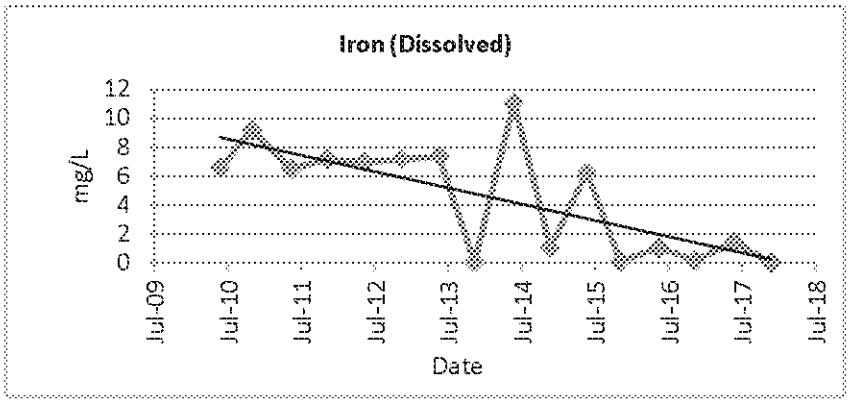
figure 4.9.12

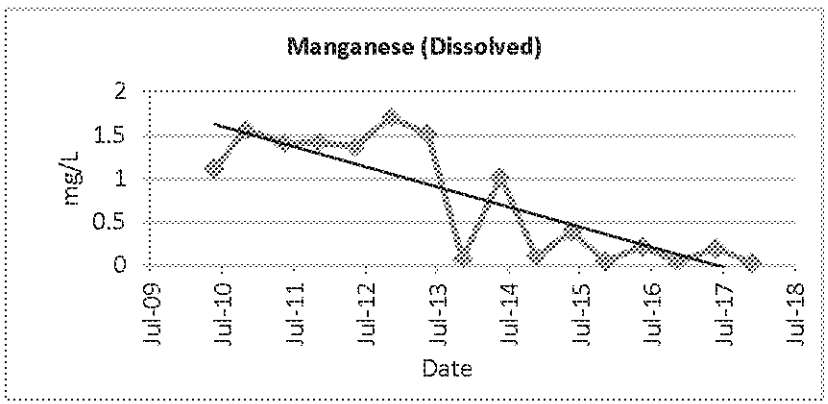
TEMPORAL PLOTS - SELECTED PARAMETERS
EW107-15
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

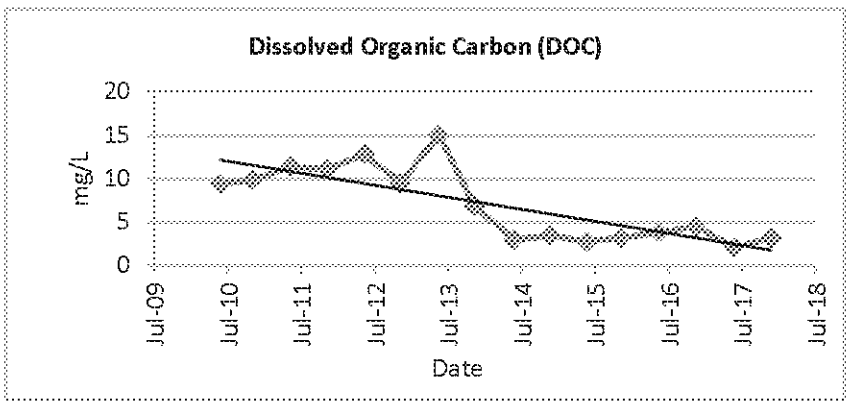


CAD File: F:\drawings\45000s\4585-4\45804-report\45204-58(072)\45804-58(572)GIS\45804-58(072)GN WA012.DWG





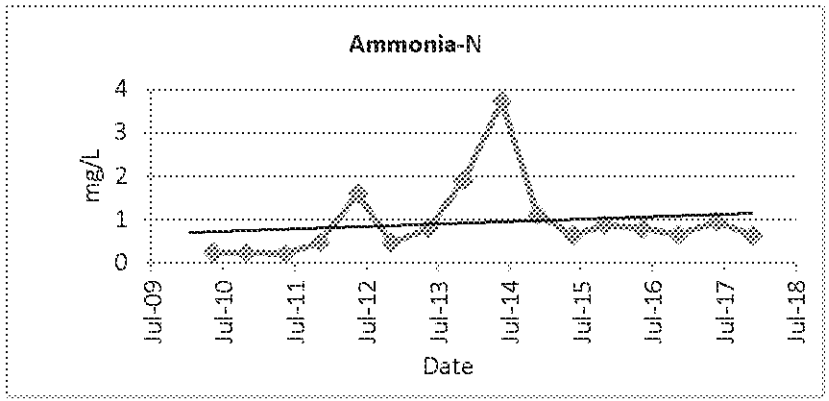


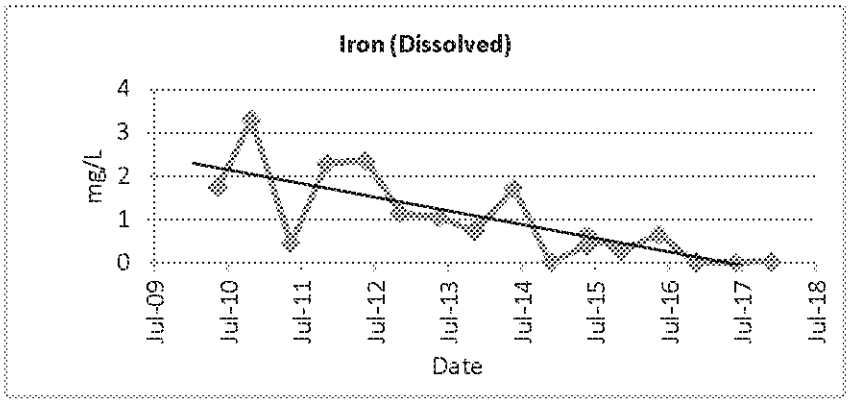


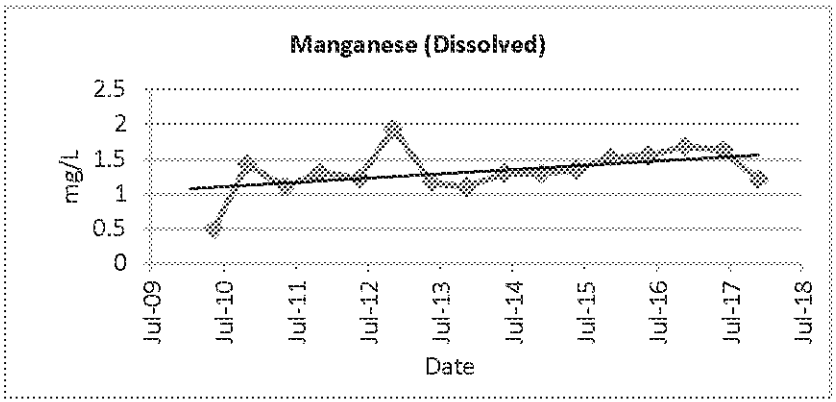
Note: ND results as 1/2 the detection limit

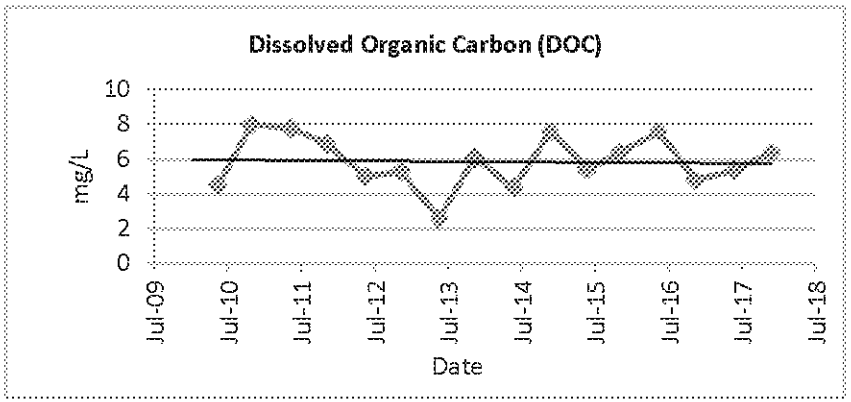
figure 4.11.1

TEMPORAL PLOTS - SELECTED PARAMETERSS
TW-7
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





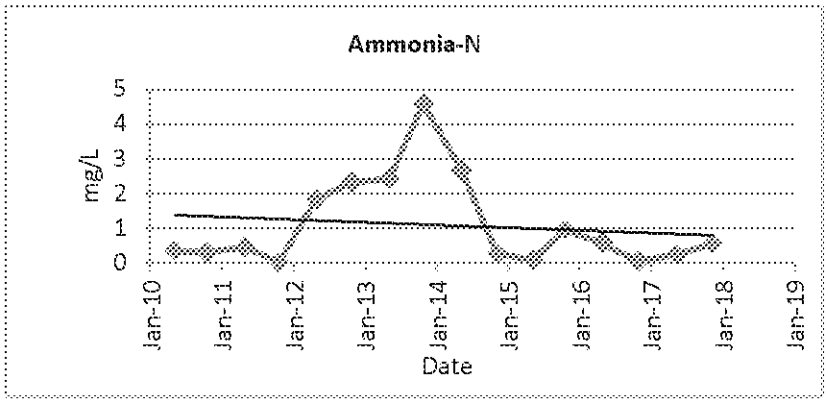


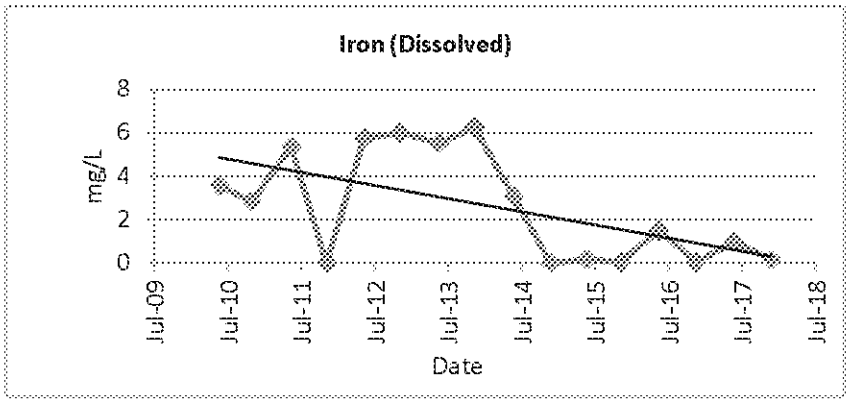


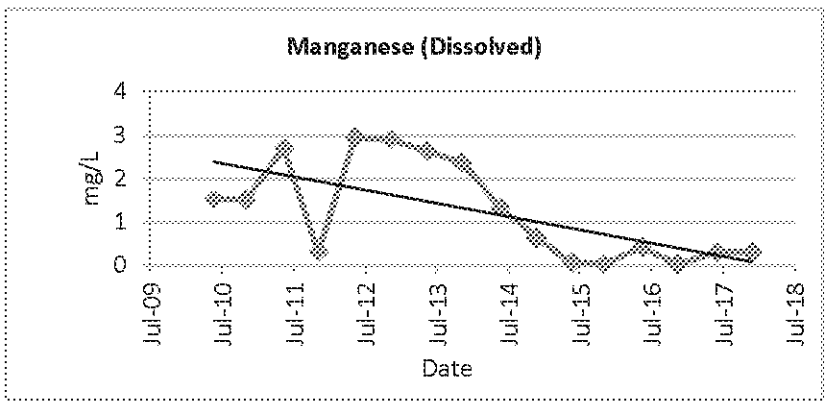
Note: ND results as 1/2 the detection limit

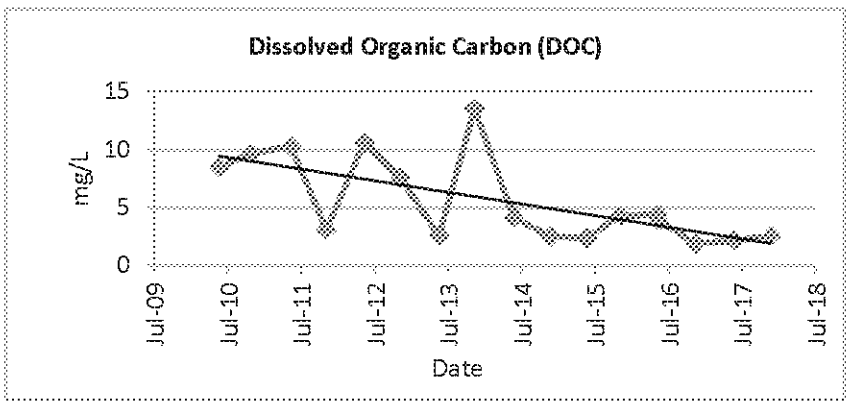
figure 4.11.2

TEMPORAL PLOTS - SELECTED PARAMETERSS
TW-4
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





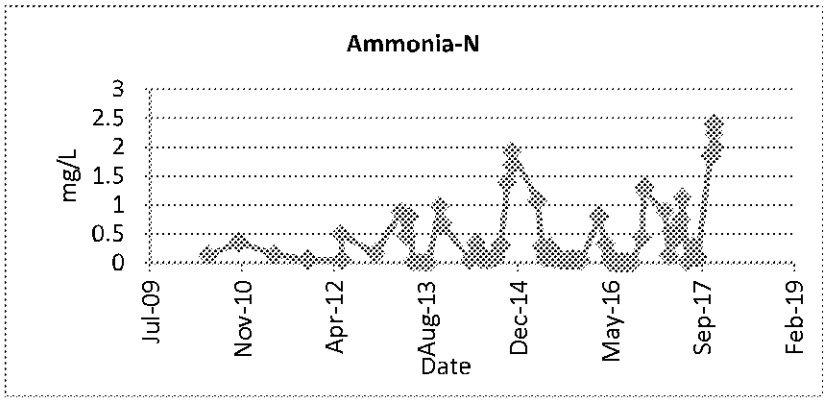


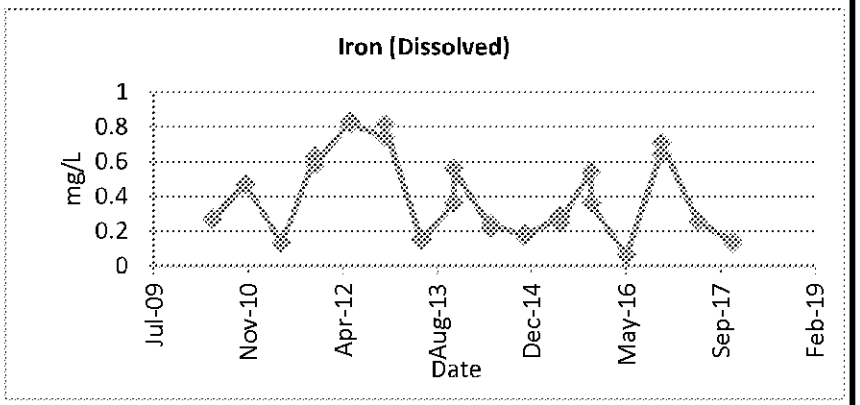


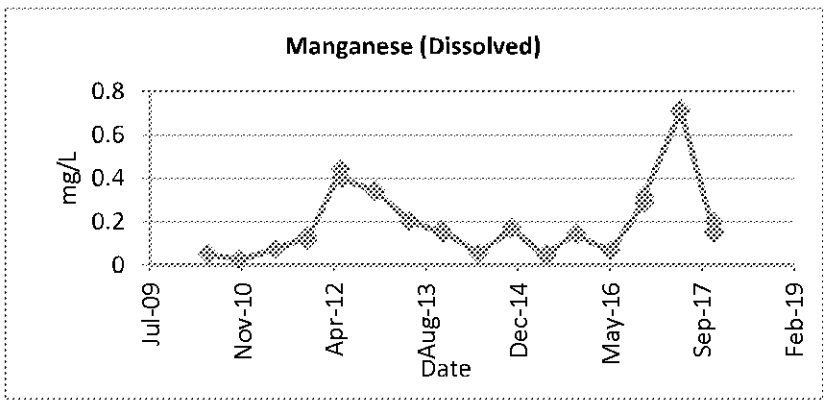
Note: ND results as 1/2 the detection limit

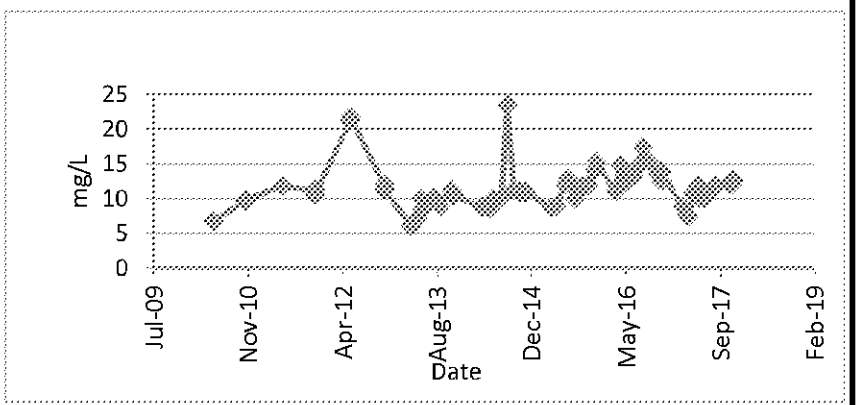
figure 4.11.3

TEMPORAL PLOTS - SELECTED PARAMETERSS
TW-8
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure 4.12

TEMPORAL PLOTS - SELECTED PARAMETERS
SW-4
2017 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

Table 2.1

Monitoring Location Details
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Shallow Water Table Wells								
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill	
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)	
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)	
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)	
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand	
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill	Decommissioned, replaced by MW05-09
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand	
MW6-08[3]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface	Decommissioned, replaced by MW05-09
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface	No access
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill	No access
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay	No access
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand	No access
MW101-09[5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill	Decommissioned, replaced by MW101-13
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay	
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand	
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel	
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel	
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel	
MW106-15	NS	NS	3.33	6.38	NS	NS	Fill and silty sand till	
Bedrock Wells								
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock	No access
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock	No access
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock	No access
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock	
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock	No access
TW-6 (2008)[4]	83.08	83.73	17.67	25.36	65.41	57.72	Competent Bedrock	No access
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock	
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock	
EW107-15	NS	NS	2.44	5.49	NS	NS	Bedrock (fractured)	

002307

Table 2.1

Monitoring Location Details
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Surface Water Staff Guages								
SG-1	NS	NS	-	-	-	-	North Drainage Ditch	
SG-2	NS	NS	-	-	-	-	North Drainage Ditch	
SG-3	NS	NS	-	-	-	-	North Drainage Ditch	
SG-4	NS	NS	-	-	-	-	North Drainage Ditch	

Notes:

m AMSL metres above mean sea level.
m bgs metres below ground surface.
NI No Information.
NS Not Surveyed.
(1) The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe, respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010.
The 2015-series wells have not yet been surveyed.
(2) Bedrock wells are open to the rock.
(3) Decommissioned, replaced by MW05-09
(4) Located on Tomlinson property; no longer accessible.
(5) Decommissioned, replaced by MW101-13

002308

Table 3.1

Monitoring Program Schedule
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd 5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters				
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	SW General Chemistry[2]	Metals[3/4]	Bacteriological Components[5]	Collection Method
Surface Water Monitoring Locations (4 locations)								
SW-1		√	√	√		√	√	grab
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Surface Water Northern Ditch Staff Guages (4 locations)								
SG-1	X							
SG-2	X							
SG-3	X							
SG-4	X							
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	√	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

(1) General chemistry parameters - alkalinity, ammonia, DOC, nitrate, phosphorus turbidity, and un-ionized ammonia
(2) Additional Surface Water General Chemistry parameters analyzed at SW-4 during monthly sampling - BOD, COD, TKN, nitrite, total phenols, TSS, oil & grease, pH, arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, zinc
(3) Metals - iron and manganese
(4) Surface water metals are total while groundwater metals are dissolved.
(5) 5 Escherichia coli (e.coli)
(6) SW-4 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)
X Samples to be collected tri-annually (spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)

002309

Groundwater Elevations
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Location	Reference Elevation [1] [2] (m AMSL)	June 1-2, 2017		August 30, 2017		November 29-30, 2017	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations							
MW1-08	93.00	1.03	91.97	NA	NA	NA	NA
MW2-08	93.78	0.99	92.79	NA	NA	0.82	92.96
MW3-08	104.22	5.86	98.36	NA	NA	5.79	98.43
MW4-09	97.45	2.26	95.19	NA	NA	2.37	95.08
MW5-09	94.50	1.55	92.96	1.76	92.74	1.78	92.72
MW101-13	94.88	1.11	93.77	1.46	93.42	NA	NA
MW102-09	93.79	1.78	92.01	1.92	91.87	1.71	92.09
MW103-09	93.33	2.82	90.51	NA	NA	2.83	90.50
MW104-13	94.55	1.25	93.30	1.45	93.11	1.34	93.22
MW105-13	94.95	1.07	93.88	1.43	93.52	1.38	93.57
MW106-15	NS	3.14	NS	3.51	NS	3.49	NS
Deep Groundwater Elevations							
TW-4	96.90	11.92	84.98	NA	NA	11.87	85.03
TW-7	92.98	3.48	89.50	NA	NA	3.42	89.56
TW-8	94.88	11.47	83.41	NA	NA	11.40	83.48
Extraction Well							
EW107-15	NS	2.28	NS	2.50	NS	2.87	NS
Surface Water Staff Gauge Locations							
SG-1	93.51	dry	dry	dry	dry	dry	dry
SG-2	92.37	dry	dry	dry	dry	dry	dry
SG-3	91.76	dry	dry	dry	dry	dry	dry
SG-4	90.97	dry	dry	dry	dry	dry	dry

Notes:

(1)	Top of Riser for MW
(2)	Top of Cap for TW and EW
m AMSL	meters above mean sea level.
NA	No access.
NS	Not surveyed.

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW101-13**	**MW101-13**
Sample ID:			**GW-45804-060117-TS-003**	**GW-45804-083017-TS-007**
Sample Date:			**6/1/2017**	**8/30/2017**
Sample Type:				
Parameters	**Units**	**TLP1**		
Metals				
Iron (dissolved)	mg/L	48.3	0.344	0.157 J
Manganese (dissolved)	mg/L	17.1	0.836	0.760 J
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	429	511 J
Ammonia-N	mg/L	4.0	9.25	15.9 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.3	11.2 J
Escherichia coli	cfu/100mL	25.6	0	0 J
Nitrate (as N)	mg/L	1.3	0.68	ND(0.020) J
Phosphorus	mg/L	7.2	0.0157	0.0365 J
Field Parameters				
Conductivity, field	mS/cm	-	1.91	1.32
Dissolved oxygen (DO), field	mg/L	-	0	0.09
Oxidation reduction potential (ORP), field	millivolts	-	-61	-33
pH, field	s.u.	-	7.09	6.98
Temperature, field	NTU	-	17.76	23.51
Turbidity, field	Deg C	-	3	0

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:			**GW-45804-060117-TS-009**	**GW-45804-083017-TS-002**	**GW-45804-112917-TS-005**
Sample Date:			**6/1/2017**	**8/30/2017**	**11/29/2017**
Sample Type:					
Parameters	**Units**	**TLP1**			
Metals					
Iron (dissolved)	mg/L	48.3	6.06	3.65 J	3.64
Manganese (dissolved)	mg/L	17.1	3.97	2.33 J	2.28
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	495	554 J	686
Ammonia-N	mg/L	4.0	6.61	6.96 J	7.54
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.2	13.6 J	10.9
Escherichia coli	cfu/100mL	25.6	0	0 J	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020) J	ND(0.020)
Phosphorus	mg/L	7.2	0.0852	0.104 J	0.0818
Field Parameters					
Conductivity, field	mS/cm	-	2.03	1.68	1.53
Dissolved oxygen (DO), field	mg/L	-	0	0.77	0
Oxidation reduction potential (ORP), field	millivolts	-	-109	-123	-92
pH, field	s.u.	-	7.04	7.24	7.31
Temperature, field	NTU	-	11.71	19.79	11.22
Turbidity, field	Deg C	-	0	0	59

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:			**GW-45804-060117-TS-007**	**GW-45804-112917-TS-002**	**GW-45804-112917-TS-003**
Sample Date:			**6/1/2017**	**11/29/2017**	**11/29/2017**
Sample Type:					**Duplicate**
Parameters	**Units**	**TLP1**			
Metals					
Iron (dissolved)	mg/L	48.3	3.76	1.24	1.30
Manganese (dissolved)	mg/L	17.1	2.11	1.43	1.46
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	347	323	332
Ammonia-N	mg/L	4.0	1.51	0.820	0.821
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.8	10.6	10.5
Escherichia coli	cfu/100mL	25.6	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	0.076	0.095
Phosphorus	mg/L	7.2	0.0258	0.0121 J	0.0079 J
Field Parameters					
Conductivity, field	mS/cm	-	0.936	0.601	--
Dissolved oxygen (DO), field	mg/L	-	2.64	0	--
Oxidation reduction potential (ORP), field	millivolts	-	-79	33	--
pH, field	s.u.	-	6.94	7.13	--
Temperature, field	NTU	-	11.14	10.06	--
Turbidity, field	Deg C	-	11.14	30.9	--

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW104-13**	**MW104-13**	**MW104-13**
Sample ID:			**GW-45804-060117-TS-004**	**GW-45804-083017-TS-001**	**GW-45804-113017-TS-009**
Sample Date:			**6/1/2017**	**8/30/2017**	**11/30/2017**
Sample Type:					
Parameters	**Units**	**TLP1**			
Metals					
Iron (dissolved)	mg/L	48.3	3.43	2.24 J	0.573
Manganese (dissolved)	mg/L	17.1	1.73	1.99 J	2.36
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	444	543 J	536
Ammonia-N	mg/L	4.0	2.62	3.89 J	5.09
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.5	7.8 J	10.7
Escherichia coli	cfu/100mL	25.6	0	0 J	0
Nitrate (as N)	mg/L	1.3	0.81	0.109 J	3.27
Phosphorus	mg/L	7.2	0.0193	0.0141 J	0.0089
Field Parameters					
Conductivity, field	mS/cm	-	1.95	1.58	0.959
Dissolved oxygen (DO), field	mg/L	-	1.44	1.39	0.44
Oxidation reduction potential (ORP), field	millivolts	-	-84	-108	--
pH, field	s.u.	-	7.13	7.16	7.33
Temperature, field	NTU	-	16.72	22.18	11.42
Turbidity, field	Deg C	-	15.1	0	73.3

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-060117-TS-001	GW-45804-060117-TS-002	GW-45804-083017-TS-006	GW-45804-112917-TS-001
Sample Date:			6/1/2017	6/1/2017	8/30/2017	11/29/2017
Sample Type:				Duplicate		
Parameters	**Units**	**TLP1**				
Metals						
Iron (dissolved)	mg/L	48.3	2.18	2.28	1.41 J	4.46
Manganese (dissolved)	mg/L	17.1	0.382	0.385	0.145 J	0.256
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	500	442	791 J	657
Ammonia-N	mg/L	4.0	5.65	5.49	34.5 J	45.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	4.2	4.3	16.0 J	11.2
Escherichia coli	cfu/100mL	25.6	0	0	0 J	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.020) J	ND(0.020)
Phosphorus	mg/L	7.2	0.0542 J	0.0211 J	0.0481 J	0.0570
Field Parameters						
Conductivity, field	mS/cm	-	1.7	--	1.84	2.12
Dissolved oxygen (DO), field	mg/L	-	3.93	--	1.7	0.91
Oxidation reduction potential (ORP), field	millivolts	-	-122	--	-106	-83
pH, field	s.u.	-	7.09	--	6.98	6.77
Temperature, field	NTU	-	18.97	--	22.17	16.47
Turbidity, field	Deg C	-	4.1	--	8.7	81

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
5.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW106-15**	**MW106-15**	**MW106-15**
Sample ID:			**GW-45804-060217-TS-013**	**GW-45804-083017-TS-003**	**GW-45804-112917-TS-007**
Sample Date:			**6/2/2017**	**8/30/2017**	**11/29/2017**
Sample Type:					
Parameters	**Units**	**TLP1**			
Metals					
Iron (dissolved)	mg/L	48.3	6.05	4.24 J	3.57
Manganese (dissolved)	mg/L	17.1	1.52	1.19 J	1.48
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	477	536 J	511
Ammonia-N	mg/L	4.0	1.96	2.57 J	3.92
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	11.3	11.7 J	11.4
Escherichia coli	cfu/100mL	25.6	ND(10)	0 J	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020) J	ND(0.020)
Phosphorus	mg/L	7.2	0.355	0.100 J	0.0671
Field Parameters					
Conductivity, field	mS/cm	-	1.69	1.66	1.78
Dissolved oxygen (DO), field	mg/L	-	0	0.74	0
Oxidation reduction potential (ORP), field	millivolts	-	-103	-119	-72
pH, field	s.u.	-	7.06	7.19	7.36
Temperature, field	NTU	-	11.41	17.49	12.02
Turbidity, field	Deg C	-	676	0	22.1

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW1-08**
Sample ID:			**GW-45804-060117-TS-008**
Sample Date:			**6/1/2017**
Sample Type:			
Parameters	**Units**	**TLP1**	
Metals			
Iron (dissolved)	mg/L	48.3	6.21
Manganese (dissolved)	mg/L	17.1	1.19
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	633	410
Ammonia-N	mg/L	4.0	1.14
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.9
Escherichia coli	cfu/100mL	25.6	0
Nitrate (as N)	mg/L	1.3	ND(0.020)
Phosphorus	mg/L	7.2	0.167
Field Parameters			
Conductivity, field	mS/cm	-	0.911
Dissolved oxygen (DO), field	mg/L	-	5.49
Oxidation reduction potential (ORP), field	millivolts	-	-122
pH, field	s.u.	-	7.11
Temperature, field	NTU	-	13.83
Turbidity, field	Deg C	-	0

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW2-08**	**MW2-08**
Sample ID:			**GW-45804-060217-TS-010**	**GW-45804-113017-TS-010**
Sample Date:			**6/2/2017**	**11/30/2017**
Sample Type:				
Parameters	**Units**	**TLP1**		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.207	0.00058
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	242	219
Ammonia-N	mg/L	4.0	ND(0.038)	ND(0.161)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	6.4	ND(6.4)
Escherichia coli	cfu/100mL	25.6	0	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	ND(0.020)
Phosphorus	mg/L	7.2	0.0276	0.0388
Field Parameters				
Conductivity, field	mS/cm	-	0.528	0.247
Dissolved oxygen (DO), field	mg/L	-	1.57	2.15
Oxidation reduction potential (ORP), field	millivolts	-	125	107
pH, field	s.u.	-	7.45	7.79
Temperature, field	NTU	-	11.2	8.08
Turbidity, field	Deg C	-	90.4	37.3

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW3-08**	**MW3-08**
Sample ID:			**GW-45804-060217-TS-015**	**GW-45804-113017-TS-012**
Sample Date:			**6/2/2017**	**11/30/2017**
Sample Type:				
Parameters	**Units**	**TLP1**		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.0185	ND(0.00050)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	270	286
Ammonia-N	mg/L	4.0	ND(0.111)	ND(0.264)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	1.7	ND(3.0)
Escherichia coli	cfu/100mL	25.6	1	1
Nitrate (as N)	mg/L	1.3	ND(0.020)	ND(0.020)
Phosphorus	mg/L	7.2	0.0134	0.0245
Field Parameters				
Conductivity, field	mS/cm	-	0.947	0.536
Dissolved oxygen (DO), field	mg/L	-	0	0
Oxidation reduction potential (ORP), field	millivolts	-	44	90
pH, field	s.u.	-	7.4	7.62
Temperature, field	NTU	-	11.21	8.56
Turbidity, field	Deg C	-	2.2	17.8

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW4-09**	**MW4-09**
Sample ID:			**GW-45804-060217-TS-014**	**GW-45804-112917-TS-008**
Sample Date:			**6/2/2017**	**11/29/2017**
Sample Type:				
Parameters	**Units**	**TLP1**		
Metals				
Iron (dissolved)	mg/L	48.3	0.055	0.38
Manganese (dissolved)	mg/L	17.1	0.127	0.0711
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	322	323
Ammonia-N	mg/L	4.0	ND(0.020)	0.294
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	1.6	3.5
Escherichia coli	cfu/100mL	25.6	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020)
Phosphorus	mg/L	7.2	0.0061	0.0156
Field Parameters				
Conductivity, field	mS/cm	-	1.57	1.09
Dissolved oxygen (DO), field	mg/L	-	0.19	0
Oxidation reduction potential (ORP), field	millivolts	-	-38	41
pH, field	s.u.	-	7.15	7.68
Temperature, field	NTU	-	13.14	10.04
Turbidity, field	Deg C	-	20.4	2.4

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

Shallow Unconfined Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW5-09**	**MW5-09**	**MW5-09**
Sample ID:			**GW-45804-060217-TS-011**	**GW-45804-083017-TS-004**	**GW-45804-112917-TS-006**
Sample Date:			**6/2/2017**	**8/30/2017**	**11/29/2017**
Sample Type:					
Parameters	**Units**	**TLP1**			
Metals					
Iron (dissolved)	mg/L	48.3	5.40	3.38 J	4.29
Manganese (dissolved)	mg/L	17.1	2.50	1.89 J	1.09
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	430	620 J	743
Ammonia-N	mg/L	4.0	13.0	9.89 J	8.11
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	6.5	13.0 J	11.2
Escherichia coli	cfu/100mL	25.6	ND(2)	0 J	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020) J	ND(0.020)
Phosphorus	mg/L	7.2	0.767	0.209 J	0.143
Field Parameters					
Conductivity, field	mS/cm	-	1.94	1.59	1.03
Dissolved oxygen (DO), field	mg/L	-	3.87	0.04	0.34
Oxidation reduction potential (ORP), field	millivolts	-	-87	-106	-71
pH, field	s.u.	-	6.81	7.22	7.11
Temperature, field	NTU	-	10.8	18.62	12.16
Turbidity, field	Deg C	-	0	0	42.8

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
ND	Not detected at the associated reporting limit.
J	Estimated concentration.
9.25	Exceedance of the Tier I Trigger Level
--	Not analyzed

MW103-09 Analytical Results- PWQO Comparison
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-060117-TS-007	GW-45804-112917-TS-002	GW-45804-112917-TS-003
Sample Date:			6/1/2017	11/29/2017	11/29/2017
Sample Type:					Duplicate
Parameters	**Units**	**PWQO1**			
Metals					
Iron (dissolved)	mg/L	0.3	3.76	1.24	1.30
Manganese (dissolved)	mg/L	-	2.11	1.43	1.46
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	347	323	332
Ammonia-N	mg/L	-	1.51	0.820	0.821
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	7.8	10.6	10.5
Escherichia coli	cfu/100mL	100	0	0	0
Nitrate (as N)	mg/L	-	ND(0.020)	0.076	0.095
Phosphorus	mg/L	0.01	0.0268	0.0121 J	0.0079 J
Field Parameters					
Conductivity, field	mS/cm	-	0.936	0.601	--
Dissolved oxygen (DO), field	mg/L	-	2.64	0	--
Oxidation reduction potential (ORP), field	millivolts	-	-79	33	--
pH, field	s.u.	6.5-8.5	6.94	7.13	--
Temperature, field	NTU	-	11.14	10.06	--
Turbidity, field	Deg C	-	11.14	30.9	--

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
ND Not detected at the associated reporting limit.
J Estimated concentration.

Deep Bedrock Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-4**	**TW-4**
Sample ID:				**GW-45804-060217-TS-016**	**GW-45804-113017-TS-013**
Sample Date:				**6/2/2017**	**11/30/2017**
Sample Type:					
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.016	ND(0.10)
Manganese (dissolved)	mg/L	2.1	0.05	1.63[b]	1.21[b]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	567[b]	528[b]
Ammonia-N	mg/L	0.2	-	0.961[a]	0.642[a]
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	5.4	ND(6.4)
Escherichia coli	cfu/100mL	5	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	0.18	0.803[a]
Phosphorus	mg/L	0.5	-	0.0030	ND(0.0030)
Field Parameters					
Conductivity, field	mS/cm	-	-	2.7	2.45
Dissolved oxygen (DO), field	mg/L	-	-	2.68	3.32
Oxidation reduction potential (ORP), field	millivolts	-	-	129	208
pH, field	s.u.	-	6.5-8.5	6.77	7.39
Temperature, field	NTU	-	15	13.89	14.79
Turbidity, field	Deg C	-	5.0	0.7	86.2[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015)
ODWQS- Ontario Drinking Water Quality Standards Technical Support
(2) Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)

ND Not detected at the associated reporting limit.

0.961[a] Exceedance of the ODWQS

567[b] Exceedance of the Tier I Trigger Level

Deep Bedrock Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-7**	**TW-7**
Sample ID:				**GW-45804-060117-TS-006**	**GW-45804-112917-TS-004**
Sample Date:				**6/1/2017**	**11/29/2017**
Sample Type:					
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	1.47[b]	ND(0.010)
Manganese (dissolved)	mg/L	2.1	0.05	0.199[b]	0.0352
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	160	86
Ammonia-N	mg/L	0.2	-	0.065	0.825[a]
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	2.1	3.2
Escherichia coli	cfu/100mL	5	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)
Phosphorus	mg/L	0.5	-	0.0031	0.0061
Field Parameters					
Conductivity, field	mS/cm	-	-	0.433	0.25
Dissolved oxygen (DO), field	mg/L	-	-	4.61	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-266	83
pH, field	s.u.	-	6.5-8.5	7.96	8.11
Temperature, field	NTU	-	15	10.12	12.08
Turbidity, field	Deg C	-	5.0	78.6[b]	79.7[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015)
ODWQS- Ontario Drinking Water Quality Standards Technical Support
(2) Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)

ND Not detected at the associated reporting limit.

0.961[a] Exceedance of the ODWQS

567[b] Exceedance of the Tier I Trigger Level

Deep Bedrock Aquifer Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-8**	**TW-8**
Sample ID:				**GW-45804-060117-TS-005**	**GW-45804-113017-TS-011**
Sample Date:				**6/1/2017**	**11/30/2017**
Sample Type:					
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	1.00[b]	0.163
Manganese (dissolved)	mg/L	2.1	0.05	0.314[b]	0.315[b]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	340	259
Ammonia-N	mg/L	0.2	-	0.240[a]	ND(0.550)
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	2.2	ND(2.6)
Escherichia coli	cfu/100mL	5	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	0.071	0.818[a]
Phosphorus	mg/L	0.5	-	0.0105	0.0150
Field Parameters					
Conductivity, field	mS/cm	-	-	0.844	0.53
Dissolved oxygen (DO), field	mg/L	-	-	4.18	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-49	33
pH, field	s.u.	-	6.5-8.5	7.55	7.31
Temperature, field	NTU	-	15	13.87	8.53
Turbidity, field	Deg C	-	5.0	135[b]	87.4[b]

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
(2)	ODWQS- Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)
ND	Not detected at the associated reporting limit.
0.961[a]	Exceedance of the ODWQS
567[b]	Exceedance of the Tier I Trigger Level

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			SW-4	SW-4	SW-4	SW-4
Sample ID:			SW-45804-053017-TS-001	SW-45804-053017-TS-002	SW-45804-112917-TS-001	SW-45804-112917-TS-002
Sample Date:			5/30/2017	5/30/2017	11/29/2017	11/29/2017
Sample Type:				Duplicate		Duplicate
Parameters	**Units**	**PWQO [1]**				
Metals						
Iron	mg/L	0.3	0.261	0.261	0.140	0.134
Manganese	mg/L		0.710	0.719	0.152	0.197
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	-	191	192	161	182
Ammonia-N	mg/L	-	0.757	0.750	2.24	2.41
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	11.4	11.9	12.8	12.2
Escherichia coli	cfu/100mL	100	12 J	8 J	1	0
Nitrate (as N)	mg/L	-	ND(0.020)	ND(0.020)	0.362 J	0.648 J
Phosphorus	mg/L	0.01	0.284	0.301	0.449	0.312
Field Parameters						
Conductivity, field	mS/cm	-	0.773	--	0.395	--
Dissolved oxygen (DO), field	mg/L	-	1.02	--	6.79	--
Oxidation reduction potential (ORP), field	millivolts	-	--	--	175	--
pH, field	s.u.	6.5-8.5	7.5	--	7.81	--
Temperature, field	NTU	-	19.87	--	4.07	--
Turbidity, field	Deg C	-	0	--	4.7	--

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
ND Not detected at the associated reporting limit.
400 Exceedance of the PWQO
J Estimated concentration.

Table 4.5
SW-4 Monthly Sampling Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:				Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-053017-TS4001	SW-45804-053017-TS4002	Storm Water Pond
Sample Type Code:				Original	Original	Original	Original	Original	Duplicate	Original
Sample Date:				3/8/2017	3/28/2017	4/9/2017	5/4/2017	5/30/2017	5/30/2017	6/9/2017
Sampler:				Orgaworld	Orgaworld	Orgaworld	Orgaworld	GHD	GHD	Orgaworld
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria [2]**							
Metals										
Arsenic	mg/L	0.005	--	0.00052	0.00041	0.00046	0.00064	--	--	0.00083
Boron	mg/L	0.2	--	0.01800	0.01800	0.01800	0.03300	--	--	0.04100
Cadmium	mg/L	0.0002	--	0.00003	0.00001	0.00002	<0.00001	--	--	<0.00001
Chromium	mg/L	0.001	--	0.00092	0.00102	0.00006	<0.0005	--	--	<0.0005
Cobalt	mg/L	0.0009	--	0.00044	-	-	-	--	--	0.00033
Copper	mg/L	0.005	--	0.00190	0.00220	0.00130	<0.001	--	--	<0.001
Iron	mg/L	0.3	--	--	--	--	--	0.261	0.261	--
Lead	mg/L	0.005	--	0.00067	0.00273	0.00028	0.00013	--	--	0.00022
Manganese	mg/L	-	--	--	--	--	--	0.710	0.719	--
Mercury	mg/L	0.0002	--	<0.00001	<0.00001	<0.00001	<0.00001	--	--	<0.00001
Nickel	mg/L	0.025	--	0.00173	0.00116	0.00165	0.00213	--	--	0.00190
Zinc	mg/L	0.03	--	0.02940	0.01850	0.01510	0.00820	--	--	0.00430
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	--	--	--	--	--	191	192	
Ammonia-N	mg/L	-	--	0.9010	0.1340	0.5200	0.4040	0.757	0.759	1.1200
Biochemical oxygen demand			--	7.5	9.6	2.7	3.5	--	--	<2.0
Biochemical oxygen demand (carbonaceous)	mg/L	-	15	7.5	6.9	2.5	4.1	--	--	<2.0
Chemical oxygen demand (COD)	mg/L	-	--	43	52	28	42	--	--	43
Chloride	mg/L	-	--	<2.0	<1.0	<1.0	<1.0	--	--	<1.0
Conductivity	mS/cm	-	--	551.0	686.0	601.0	1050.0	--	--	985.0
Dissolved organic carbon (DOC)	mg/L	-	--	8.8	8.0	7.6	10.9	11.4	11.9	10.1
Dissolved oxygen (DO)			--	6.16	11.00	6.60	10.10	--	--	9.11
Escherichia coli	cfu/100mL	100	100	84	6	12	20	12 J	8 J	4
Nitrate (as N)	mg/L	-	2.93	0.2100	0.0420	0.0430	<0.10	ND(0.020)	ND(0.020)	<0.10
Nitrite (as N)	mg/L	-	--	<0.05	<0.01	<0.01	<0.05	--	--	<0.05
Nitrite/Nitrate	mg/L	-	--	2.3300	2.2900	1.5300	2.1400	--	--	2.3300
pH, lab	s.u.	6.5-8.5	6.5-8.5	7.40	7.97	7.61	8.05	--	--	7.58
Phenolics (total)	mg/L	0.001	--	0.0053	0.0042	0.0023	<0.001	--	--	<0.001
Phosphorus	mg/L	0.01	0.4	0.211	0.341	0.0696	0.0974	0.264	0.301	0.352
Total kjeldahl nitrogen (TKN)	mg/L	-	--	2.1200	2.2500	1.4900	2.1400	--	--	2.3300
Total suspended solids (TSS)	mg/L	-	15	[illegible]	[illegible]	5.40	6.00	--	--	5.80
Un-ionized ammonia	mg/L	0.02	0.05	0.00382	0.00129	0.00239	0.00794	--	--	0.01390
Field Parameters										
Conductivity, field	mS/cm	-	--	--	--	--	--	0.773	--	--
Dissolved oxygen (DO), field	mg/L	-	--	--	--	--	--	1.02	--	--
Oxidation reduction potential (ORP), field	millivolts	-	--	--	--	--	--	--	--	--
pH, field	s.u.	6.5-8.5	6.5-8.5	--	--	--	--	7.5	--	--
Temperature, field	Deg C	-	23	6.8	0.6	1.5	7	19.87	--	15
Turbidity, field	NTU	-	--	--	--	--	--	0	--	--
Petroleum Products										
Oil and Grease	mg/L	-	--	<2.0	<1.0	<1.0	<1.0	--	--	<1.0

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZG Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
[illegible] Exceedance of the PWQO
[illegible] Exceedance of the ECA Discharge Criteria
J Estimated concentration.

Table 4.5
SW-4 Monthly Sampling Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:			Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-112917-TS-001	SW-45804-112917-TS-002	Storm Water Pond
Sample Type Code:			Original	Original	Original	Original	Original	Duplicate	Original
Sample Date:			7/6/2017	8/2/2017	9/1/2017	11/9/2017	11/29/2017	11/29/2017	12/4/2017
Sampler:			Orgaworld	Orgaworld	Orgaworld	Orgaworld	GHD	GHD	Orgaworld
Parameters	**Units**	**PWQO[1]**							
Metals									
Arsenic	mg/L	0.005	0.00072	0.00082	0.00087	0.00054	--	--	0.00062
Boron	mg/L	0.2	0.03000	<0.01	<0.01	0.01400	--	--	0.01500
Cadmium	mg/L	0.0002	<0.00001	<0.00001	<0.00001	<0.00001	--	--	<0.00001
Chromium	mg/L	0.001	<0.0005	0.00069	<0.00001	0.00062	--	--	-
Cobalt	mg/L	0.0009	-	0.00023	0.00022	-	--	--	-
Copper	mg/L	0.005	<0.001	<0.001	<0.001	<0.001	--	--	<0.001
Iron	mg/L	0.3	--	--	--	--	0.140	0.134	--
Lead	mg/L	0.005	<0.0001	<0.0001	<0.0001	<0.0001	--	--	<0.0001
Manganese	mg/L	-	--	--	--	--	0.152	0.197	--
Mercury	mg/L	0.0002	<0.00001	<0.00001	<0.00001	<0.00001	--	--	<0.00001
Nickel	mg/L	0.025	0.00134	0.00178	0.00156	0.00167	--	--	0.00267
Zinc	mg/L	0.03	<0.0030	0.00350	<0.003	0.00460	--	--	0.00910
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-					161	182	
Ammonia-N	mg/L	-	0.0320	0.2730	0.0980	1.8400	2.24	2.41	1.9800
Biochemical oxygen demand			<2.0	2.8	3.3	23.2	--	--	3
Biochemical oxygen demand (carbonaceous)	mg/L	-	<2.0	3.3	3.5	24.8	--	--	2.4
Chemical oxygen demand (COD)	mg/L	-	26	42	38	65	--	--	50
Chloride	mg/L	-	<1.0	<1.0	<1.0	<1.0	--	--	<1.0
Conductivity	mS/cm	-	855.0	699.0	743.0	604.0	--	--	785.0
Dissolved organic carbon (DOC)	mg/L	-	10.1	11.2	12.0	12.3	12.8	12.2	12.6
Dissolved oxygen (DO)			8.56	7.81	9.08	9.77	--	--	9.86
Escherichia coli	cfu/100mL	100	2	31	150	36	1	0	0
Nitrate (as N)	mg/L	-	<0.02	<0.02	<0.02	0.1760	0.362 J	0.548 J	0.6670
Nitrite (as N)	mg/L	-	<0.01	<0.01	<0.01	0.0620	--	--	0.1160
Nitrite/Nitrate	mg/L	-	0.9400	1.1600	1.4100	4.2500	--	--	4.4400
pH, lab	s.u.	6.5-8.5	8.07	7.89	7.79	8.26	--	--	8.12
Phenolics (total)	mg/L	0.001	0.0012	0.0024	<0.001	0.0017	--	--	0.0024
Phosphorus	mg/L	0.01	0.142	0.0948	0.15	0.218	0.449	0.312	0.128
Total kjeldahl nitrogen (TKN)	mg/L	-	0.9400	1.1600	1.4100	4.0100	--	--	3.6600
Total suspended solids (TSS)	mg/L	-	3.20	7.20	5.50	27.40	--	--	2.20
Un-ionized ammonia	mg/L	0.02	0.00139	0.01000	0.00244	0.0462	--	--	0.0035
Field Parameters									
Conductivity, field	mS/cm	-	--	--	--	--	0.395	--	--
Dissolved oxygen (DO), field	mg/L	-	--	--	--	--	6.79	--	--
Oxidation reduction potential (ORP), field	millivolts	-	--	--	--	--	175	--	--
pH, field	s.u.	6.5-8.5	--	--	--	--	7.81	--	--
Temperature, field	Deg C	-	17	20	18	4	4.07	--	4
Turbidity, field	NTU	-	--	--	--	--	4.7	--	--
Petroleum Products									
Oil and Grease	mg/L	-	<1.0	<1.0	<1.0	<1.0	--	--	<1.0

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
ND Not detected at the associated reporting limit.
400 Exceedance of the PWQO
J Estimated concentration.

GHD/TBW 72

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
01/01/17	--	--	--	--	--	--
01/02/17	1	0	0.000	0	0.000	0.000
01/03/17	2	0	0.000	0	0.000	0.000
01/04/17	3	0	0.000	0	0.000	0.000
01/05/17	4	0	0.000	0	0.000	0.000
01/06/17	5	0	0.000	0	0.000	0.000
01/07/17	--	--	--	--	--	--
01/08/17	--	--	--	--	--	--
01/09/17	6	0	0.000	0	0.000	0.000
01/10/17	7	0	0.000	0	0.000	0.000
01/11/17	8	0	0.000	0	0.000	0.000
01/12/17	9	0	0.000	0	0.000	0.000
01/13/17	10	0	0.000	0	0.000	0.000
01/14/17	--	--	--	--	--	--
01/15/17	--	--	--	--	--	--
01/16/17	11	0	0.000	0	0.000	0.000
01/17/17	12	0	0.000	0	0.000	0.000
01/18/17	13	0	0.000	0	0.000	0.000
01/19/17	14	0	0.000	0	0.000	0.000
01/20/17	15	0	0.000	0	0.000	0.000
01/21/17	--	--	--	--	--	--
01/22/17	--	--	--	--	--	--
01/23/17	16	0	0.000	0	0.000	0.000
01/24/17	17	0	0.000	0	0.000	0.000
01/25/17	18	0	0.000	0	0.000	0.000
01/26/17	19	0	0.000	0	0.000	0.000
01/27/17	20	0	0.000	0	0.000	0.000
01/28/17	--	--	--	--	--	--
01/29/17	--	--	--	--	--	--
01/30/17	21	0	0.000	0	0.000	0.000
01/31/17	22	0.2	0.000	0.2	0.000	0.000

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
02/01/17	23	0	0.000	0.2	0.000	0.000
02/02/17	24	0	0.000	0.2	0.000	0.000
02/03/17	25	0	0.000	0.2	0.000	0.000
02/04/17	--	--	--	--	--	--
02/05/17	--	--	--	--	--	--
02/06/17	26	0.7	0.001	0.9	0.001	0.000
02/07/17	27	0	0.000	0.9	0.001	0.000
02/08/17	28	0	0.000	0.9	0.001	0.000
02/09/17	29	0	0.000	0.9	0.001	0.000
02/10/17	30	0	0.000	0.9	0.001	0.000
02/11/17	--	--	--	--	--	--
02/12/17	--	--	--	--	--	--
02/13/17	31	0	0.000	0.9	0.001	0.000
02/14/17	32	0	0.000	0.9	0.001	0.000
02/15/17	33	0	0.000	0.9	0.001	0.000
02/16/17	34	0	0.000	0.9	0.001	0.000
02/17/17	35	0	0.000	0.9	0.001	0.000
02/18/17	--	--	--	--	--	--
02/19/17	--	--	--	--	--	--
02/20/17	36	0	0.000	0.9	0.001	0.000
02/21/17	37	0	0.000	0.9	0.001	0.000
02/22/17	38	0	0.000	0.9	0.001	0.000
02/23/17	39	0	0.000	0.9	0.001	0.000
02/24/17	40	0	0.000	0.9	0.001	0.000
02/25/17	--	--	--	--	--	--
02/26/17	--	--	--	--	--	--
02/27/17	41	0	0.000	0.9	0.001	0.000
02/28/17	42	0	0.000	0.9	0.001	0.000
03/01/17	43	0	0.000	0.9	0.001	0.000
03/02/17	44	0	0.000	0.9	0.001	0.000
03/03/17	45	0	0.000	0.9	0.001	0.000

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
03/04/17	--	--	--	--	--	--
03/05/17	--	--	--	--	--	--
03/06/17	46	0	0.000	0.9	0.001	0.000
03/07/17	47	0	0.000	0.9	0.001	0.000
03/08/17	48	0	0.000	0.9	0.001	0.000
03/09/17	49	0	0.000	0.9	0.001	0.000
03/10/17	50	0	0.000	0.9	0.001	0.000
03/11/17	--	--	--	--	--	--
03/12/17	--	--	--	--	--	--
03/13/17	51	0	0.000	0.9	0.001	0.000
03/14/17	52	0	0.000	0.9	0.001	0.000
03/15/17	53	0	0.000	0.9	0.001	0.000
03/16/17	54	0	0.000	0.9	0.001	0.000
03/17/17	55	0	0.000	0.9	0.001	0.000
03/18/17	--	--	--	--	--	--
03/19/17	--	--	--	--	--	--
03/20/17	56	0	0.000	0.9	0.001	0.000
03/21/17	57	0	0.000	0.9	0.001	0.000
03/22/17	58	0	0.000	0.9	0.001	0.000
03/23/17	59	0	0.000	0.9	0.001	0.000
03/24/17	60	0	0.000	0.9	0.001	0.000
03/25/17	--	--	--	--	--	--
03/26/17	--	--	--	--	--	--
03/27/17	61	0	0.000	0.9	0.001	0.000
03/28/17	62	0	0.000	0.9	0.001	0.000
03/29/17	63	0	0.000	0.9	0.001	0.000
03/30/17	64	0	0.000	0.9	0.001	0.000
03/31/17	65	0	0.000	0.9	0.001	0.000
04/01/17	--	--	--	--	--	--
04/02/17	--	--	--	--	--	--
04/03/17	66	0	0.000	0.9	0.001	0.000

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
04/04/17	67	0	0.000	0.9	0.001	0.000
04/05/17	68	0	0.000	0.9	0.001	0.000
04/06/17	69	0	0.000	0.9	0.001	0.000
04/07/17	70	0	0.000	0.9	0.001	0.000
04/08/17	--	--	--	--	--	--
04/09/17	--	--	--	--	--	--
04/10/17	71	0	0.000	0.9	0.001	0.000
04/11/17	72	0	0.000	0.9	0.001	0.000
04/12/17	73	0	0.000	0.9	0.001	0.000
04/13/17	74	0	0.000	0.9	0.001	0.000
04/14/17	75	0	0.000	0.9	0.001	0.000
04/15/17	--	--	--	--	--	--
04/16/17	--	--	--	--	--	--
04/17/17	76	0	0.000	0.9	0.001	0.000
04/18/17	77	0	0.000	0.9	0.001	0.000
04/19/17	78	0	0.000	0.9	0.001	0.000
04/20/17	79	0	0.000	0.9	0.001	0.000
04/21/17	80	0	0.000	0.9	0.001	0.000
04/22/17	--	--	--	--	--	--
04/23/17	--	--	--	--	--	--
04/24/17	81	0	0.000	0.9	0.001	0.000
04/25/17	82	0	0.000	0.9	0.001	0.000
04/26/17	83	0	0.000	0.9	0.001	0.000
04/27/17	84	0	0.000	0.9	0.001	0.000
04/28/17	85	0	0.000	0.9	0.001	0.000
04/29/17	--	--	--	--	--	--
04/30/17	--	--	--	--	--	--
05/01/17	86	0.3	0.000	1.2	0.001	0.000
05/02/17	87	0.2	0.000	1.4	0.001	0.000
05/03/17	88	0.1	0.000	1.5	0.002	0.000
05/04/17	89	0	0.000	1.5	0.002	0.000

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
05/05/17	90	0	0.000	1.5	0.002	0.000
05/06/17	--	--	--	--	--	--
05/07/17	--	--	--	--	--	--
05/08/17	91	0	0.000	1.5	0.002	0.000
05/09/17	92	0	0.000	1.5	0.002	0.000
05/10/17	93	0	0.000	1.5	0.002	0.000
05/11/17	94	0	0.000	1.5	0.002	0.000
05/12/17	95	0	0.000	1.5	0.002	0.000
05/13/17	--	--	--	--	--	--
05/14/17	--	--	--	--	--	--
05/15/17	96	0	0.000	1.5	0.002	0.000
05/16/17	97	0	0.000	1.5	0.002	0.000
05/17/17	98	0	0.000	1.5	0.002	0.000
05/18/17	99	0	0.000	1.5	0.002	0.000
05/19/17	100	0	0.000	1.5	0.002	0.000
05/20/17	--	--	--	--	--	--
05/21/17	--	--	--	--	--	--
05/22/17	101	0	0.000	1.5	0.002	0.000
05/23/17	102	0	0.000	1.5	0.002	0.000
05/24/17	103	0	0.000	1.5	0.002	0.000
05/25/17	104	0	0.000	1.5	0.002	0.000
05/26/17	105	0	0.000	1.5	0.002	0.000
05/27/17	--	--	--	--	--	--
05/28/17	--	--	--	--	--	--
05/29/17	106	0	0.000	1.5	0.002	0.000
05/30/17	107	0	0.000	1.5	0.002	0.000
05/31/17	108	0	0.000	1.5	0.002	0.000
06/01/17	109	0	0.000	1.5	0.002	0.000
06/02/17	110	0	0.000	1.5	0.002	0.000
06/03/17	--	--	--	--	--	--
06/04/17	--	--	--	--	--	--

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
06/05/17	111	371	0.371	372.5	0.373	0.003
06/06/17	112	146.7	0.147	519.2	0.519	0.005
06/07/17	113	21897.3	21.897	22416.5	22.417	0.198
06/08/17	114	0	0.000	22416.5	22.417	0.197
06/09/17	115	0	0.000	22416.5	22.417	0.195
06/10/17	--	--	--	--	--	--
06/11/17	--	--	--	--	--	--
06/12/17	116	0	0.000	22416.5	22.417	0.193
06/13/17	117	0	0.000	22416.5	22.417	0.192
06/14/17	118	0	0.000	22416.5	22.417	0.190
06/15/17	119	0	0.000	22416.5	22.417	0.188
06/16/17	120	173.5	0.174	22590	22.590	0.188
06/17/17	--	--	--	--	--	--
06/18/17	--	--	--	--	--	--
06/19/17	121	0	0.000	22590	22.590	0.187
06/20/17	122	1378.5	1.379	23968.5	23.969	0.196
06/21/17	123	37.9	0.038	24006.4	24.006	0.195
06/22/17	124	10	0.010	24016.4	24.016	0.194
06/23/17	125	0	0.000	24016.4	24.016	0.192
06/24/17	--	--	--	--	--	--
06/25/17	--	--	--	--	--	--
06/26/17	126	0	0.000	24016.4	24.016	0.191
06/27/17	127	6645.2	6.645	30661.6	30.662	0.241
06/28/17	128	0	0.000	30661.6	30.662	0.240
06/29/17	129	678.7	0.679	31340.3	31.340	0.243
06/30/17	130	2422	2.422	33762.3	33.762	0.260
07/01/17	--	--	--	--	--	--
07/02/17	--	--	--	--	--	--
07/03/17	131	38836.5	38.837	72598.8	72.599	0.554
07/04/17	132	18306.4	18.306	90905.2	90.905	0.689
07/05/17	133	8177.7	8.178	99082.9	99.083	0.745

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
07/06/17	134	0	0.000	99082.9	99.083	0.739
07/07/17	135	0	0.000	99082.9	99.083	0.734
07/08/17	--	--	--	--	--	--
07/09/17	--	--	--	--	--	--
07/10/17	136	4435.4	4.435	103518.3	103.518	0.761
07/11/17	137	0	0.000	103518.3	103.518	0.756
07/12/17	138	0	0.000	103518.3	103.518	0.750
07/13/17	139	216	0.216	103734.3	103.734	0.746
07/14/17	140	23350	23.350	127084.3	127.084	0.908
07/15/17	--	--	--	--	--	--
07/16/17	--	--	--	--	--	--
07/17/17	141	22852	22.852	149936.3	149.936	1.063
07/18/17	142	34603.4	34.603	184539.7	184.540	1.300
07/19/17	143	0	0.000	184539.7	184.540	1.290
07/20/17	144	0	0.000	184539.7	184.540	1.282
07/21/17	145	0	0.000	184539.7	184.540	1.273
07/22/17	--	--	--	--	--	--
07/23/17	--	--	--	--	--	--
07/24/17	146	0	0.000	184539.7	184.540	1.264
07/25/17	147	0	0.000	184539.7	184.540	1.255
07/26/17	148	0	0.000	184539.7	184.540	1.247
07/27/17	149	0	0.000	184539.7	184.540	1.239
07/28/17	150	157.6	0.158	184697.3	184.697	1.231
07/29/17	--	--	--	--	--	--
07/30/17	--	--	--	--	--	--
07/31/17	151	6161.6	6.162	190858.9	190.859	1.264
08/01/17	152	9299.6	9.300	200158.5	200.159	1.317
08/02/17	153	544.4	0.544	200702.9	200.703	1.312
08/03/17	154	8811.8	8.812	209514.7	209.515	1.360
08/04/17	155	6375.6	6.376	215890.3	215.890	1.393
08/05/17	--	--	--	--	--	--

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
08/06/17	--	--	--	--	--	--
08/07/17	156	13876	13.876	229766.3	229.766	1.473
08/08/17	157	8	0.008	229774.3	229.774	1.464
08/09/17	158	0	0.000	229774.3	229.774	1.454
08/10/17	159	0	0.000	229774.3	229.774	1.445
08/11/17	160	1563	1.563	231337.3	231.337	1.446
08/12/17	--	--	--	--	--	--
08/13/17	--	--	--	--	--	--
08/14/17	161	3869.2	3.869	235206.5	235.207	1.461
08/15/17	162	962.6	0.963	236169.1	236.169	1.458
08/16/17	163	0	0.000	236169.1	236.169	1.449
08/17/17	164	39.9	0.040	236209	236.209	1.440
08/18/17	165	876.6	0.877	237085.6	237.086	1.437
08/19/17	--	--	--	--	--	--
08/20/17	--	--	--	--	--	--
08/21/17	166	4480.7	4.481	241566.3	241.566	1.455
08/22/17	167	0.9	0.001	241567.2	241.567	1.447
08/23/17	168	0	0.000	241567.2	241.567	1.438
08/24/17	169	0	0.000	241567.2	241.567	1.429
08/25/17	170	1352.1	1.352	242919.3	242.919	1.429
08/26/17	--	--	--	--	--	--
08/27/17	--	--	--	--	--	--
08/28/17	171	0.4	0.000	242919.7	242.920	1.421
08/29/17	172	3123.3	3.123	246043	246.043	1.430
08/30/17	173	0	0.000	246043	246.043	1.422
08/31/17	174	1380	1.380	247423	247.423	1.422
09/01/17	175	0	0.000	247423	247.423	1.414
09/02/17	--	--	--	--	--	--
09/03/17	--	--	--	--	--	--
09/04/17	176	1704.3	1.704	249127.3	249.127	1.415
09/05/17	177	0	0.000	249127.3	249.127	1.407

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
09/06/17	178	0	0.000	249127.3	249.127	1.400
09/07/17	179	37007	37.007	286134.3	286.134	1.599
09/08/17	180	8.7	0.009	286143	286.143	1.590
09/09/17	--	--	--	--	--	--
09/10/17	--	--	--	--	--	--
09/11/17	--	--	--	--	--	--
09/12/17	181	4.9	0.005	286147.9	286.148	1.581
09/13/17	182	0	0.000	286147.9	286.148	1.572
09/14/17	183	0	0.000	286147.9	286.148	1.564
09/15/17	184	0	0.000	286147.9	286.148	1.555
09/16/17	--	--	--	--	--	--
09/17/17	--	--	--	--	--	--
09/18/17	185	0	0.000	286147.9	286.148	1.547
09/19/17	186	0	0.000	286147.9	286.148	1.538
09/20/17	187	0	0.000	286147.9	286.148	1.530
09/21/17	188	0	0.000	286147.9	286.148	1.522
09/22/17	189	0	0.000	286147.9	286.148	1.514
09/23/17	--	--	--	--	--	--
09/24/17	--	--	--	--	--	--
09/25/17	190	0	0.000	286147.9	286.148	1.506
09/26/17	191	0	0.000	286147.9	286.148	1.498
09/27/17	192	14093	14.093	300240.9	300.241	1.564
09/28/17	193	0	0.000	300240.9	300.241	1.556
09/29/17	194	5151.8	5.152	305392.7	305.393	1.574
09/30/17	--	--	--	--	--	--
10/01/17	--	--	--	--	--	--
10/02/17	195	1459.6	1.460	306852.3	306.852	1.574
10/03/17	196	0	0.000	306852.3	306.852	1.566
10/04/17	197	0.9	0.001	306853.2	306.853	1.558
10/05/17	198	0	0.000	306853.2	306.853	1.550
10/06/17	199	2543.1	2.543	309396.3	309.396	1.555

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
10/07/17	--	--	--	--	--	--
10/08/17	--	--	--	--	--	--
10/09/17	200	0	0.000	309396.3	309.396	1.547
10/10/17	201	0.2	0.000	309396.5	309.397	1.539
10/11/17	202	0	0.000	309396.5	309.397	1.532
10/12/17	203	0	0.000	309396.5	309.397	1.524
10/13/17	204	0	0.000	309396.5	309.397	1.517
10/14/17	--	--	--	--	--	--
10/15/17	--	--	--	--	--	--
10/16/17	205	0	0.000	309396.5	309.397	1.509
10/17/17	206	0	0.000	309396.5	309.397	1.502
10/18/17	207	513.5	0.514	309910	309.910	1.497
10/19/17	208	18.8	0.019	309928.8	309.929	1.490
10/20/17	209	0	0.000	309928.8	309.929	1.483
10/21/17	--	--	--	--	--	--
10/22/17	--	--	--	--	--	--
10/23/17	210	0	0.000	309928.8	309.929	1.476
10/24/17	211	0	0.000	309928.8	309.929	1.469
10/25/17	212	0	0.000	309928.8	309.929	1.462
10/26/17	213	0	0.000	309928.8	309.929	1.455
10/27/17	214	0	0.000	309928.8	309.929	1.448
10/28/17	--	--	--	--	--	--
10/29/17	--	--	--	--	--	--
10/30/17	215	0	0.000	309928.8	309.929	1.442
10/31/17	216	29.3	0.029	309958.1	309.958	1.435
11/01/17	217	12.2	0.012	309970.3	309.970	1.428
11/02/17	218	0	0.000	309970.3	309.970	1.422
11/03/17	219	0.6	0.001	309970.9	309.971	1.415
11/04/17	--	--	--	--	--	--
11/05/17	--	--	--	--	--	--
11/06/17	220	1.4	0.001	309972.3	309.972	1.409

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
11/07/17	221	0	0.000	309972.3	309.972	1.403
11/08/17	222	20.5	0.021	309992.8	309.993	1.396
11/09/17	223	0	0.000	309992.8	309.993	1.390
11/10/17	224	0	0.000	309992.8	309.993	1.384
11/11/17	--	--	--	--	--	--
11/12/17	--	--	--	--	--	--
11/13/17	225	0	0.000	309992.8	309.993	1.378
11/14/17	226	0	0.000	309992.8	309.993	1.372
11/15/17	227	0	0.000	309992.8	309.993	1.366
11/16/17	228	0	0.000	309992.8	309.993	1.360
11/17/17	229	0	0.000	309992.8	309.993	1.354
11/18/17	--	--	--	--	--	--
11/19/17	--	--	--	--	--	--
11/20/17	230	554.9	0.555	310547.7	310.548	1.350
11/21/17	231	0.1	0.000	310547.8	310.548	1.344
11/22/17	232	0	0.000	310547.8	310.548	1.339
11/23/17	233	0	0.000	310547.8	310.548	1.333
11/24/17	234	0	0.000	310547.8	310.548	1.327
11/25/17	--	--	--	--	--	--
11/26/17	--	--	--	--	--	--
11/27/17	235	23.5	0.024	310571.3	310.571	1.322
11/28/17	236	0	0.000	310571.3	310.571	1.316
11/29/17	237	0.3	0.000	310571.6	310.572	1.310
11/30/17	238	0	0.000	310571.6	310.572	1.305
12/01/17	239	37.7	0.038	310609.3	310.609	1.300
12/02/17	--	--	--	--	--	--
12/03/17	--	--	--	--	--	--
12/04/17	240	32.7	0.033	310642	310.642	1.294
12/05/17	241	21.4	0.021	310663.4	310.663	1.289
12/06/17	242	0	0.000	310663.4	310.663	1.284
12/07/17	243	0	0.000	310663.4	310.663	1.278

EW107-15 Daily Pumping Log
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
12/08/17	244	0	0.000	310663.4	310.663	1.273
12/09/17	--	--	--	--	--	--
12/10/17	--	--	--	--	--	--
12/11/17	245	0	0.000	310663.4	310.663	1.268
12/12/17	246	0	0.000	310663.4	310.663	1.263
12/13/17	247	0	0.000	310663.4	310.663	1.258
12/14/17	248	0	0.000	310663.4	310.663	1.253
12/15/17	249	0	0.000	310663.4	310.663	1.248
12/16/17	--	--	--	--	--	--
12/17/17	--	--	--	--	--	--
12/18/17	250	0	0.000	310663.4	310.663	1.243
12/19/17	251	0.1	0.000	310663.5	310.664	1.238
12/20/17	252	0	0.000	310663.5	310.664	1.233
12/21/17	253	0	0.000	310663.5	310.664	1.228
12/22/17	254	0	0.000	310663.5	310.664	1.223
12/23/17	--	--	--	--	--	--
12/24/17	--	--	--	--	--	--
12/25/17	--	--	--	--	--	--
12/26/17	255	0	0.000	310663.5	310.664	1.218
12/27/17	256	0	0.000	310663.5	310.664	1.214
12/28/17	257	0	0.000	310663.5	310.664	1.209
12/29/17	258	0	0.000	310663.5	310.664	1.204
12/30/17	--	--	--	--	--	--
12/31/17	--	--	--	--	--	--

	Total Available Pumping Days	Total Days Pumping	Percent of Days with pumping	Total Volume Pumped (m^3)	Average Daily Volume Pumped over Total Available Days (m^3)	Average Daily Volume Pumped over Total Days Pumping (m^3)
2017 TOTALS	**258**	**67**	**25.97%**	**310.664**	**1.204**	**4.637**

Appendices

Appendix A
Environmental Compliance Approval
(No. 7251-8GKRPD and No. 2844-9YNGZC)

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2844-9YNGZC
Issue Date: February 1, 2017

Orgaworld Canada Ltd.
150 Kent Street
London, Ontario
N6A 1L3

Site Location: Source Separated Organics Processing Facility
5123 Hawthorne Road South
Part of West Half of Lot 27, Concession 6
City of Ottawa
K1G 3Y3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters

below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	**Elevation** (metre)	**Storage Volume** (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

    - inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

    - overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide

over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water

and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

all in accordance with supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Application" means the application for an environmental compliance approval submitted to the Ministry for approval by or on behalf of the Owner and dated March 11, 2015;

"Approval" means this entire document and any schedules attached to it, and the Application;

"BOD_5"(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"$CBOD_5$"means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"COD" means Chemical Oxygen Demand;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"DOC" means Dissolved Organic Carbon;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the *Environmental Protection Act, R.S.O. 1990, c.E.19* , as amended;

"Leachate Contaminated Sewage"means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Orgaworld Canada Ltd., and its successors and assignees;

"OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

"Substantial Completion" has the same meaning as "substantial performance" in the *Construction Lien Act* ; and

"Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these terms and conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with this Approval.

(3) Where there is a conflict between a provision of this environmental compliance approval and any document submitted by the Owner, the conditions in this environmental compliance approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Owner, the Application shall take precedence unless it is clear that the purpose of the document was to amend the Application

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The terms and conditions of this Approval are severable. If any term and condition of this environmental compliance approval, or the application of any requirement of this environmental compliance approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation

to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of address of Owner or operating authority;

(b) change of Owner or operating authority or both, including address of new Owner or operating authority, or both;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* ; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the "Initial Return" or "Notice of Change" filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this environmental compliance approval.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the Substantial Completion of the Works,a set of as-built drawings showing the Works as "constructed" shall be completed and submitted by the Owner to the District Manager.These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works or at operational office of the Owner for the operational life of the Works.

(2) The Owner shall inform in writing to the District Manager when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The Owner shall inform the District Manager of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after **two (2) years** of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

5. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the Owner shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 4.(2). The Owner shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the Owner shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 5.(2) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the Owner shall ensure that the contents of the SWM Pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner.

(8) The Owner shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to.

(9) Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

(10) The Owner shall notify the District Manager orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(13) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or Owner's operational headquarters for inspection by the Ministry.The logbook shall include the following:

(a) the name of the Works;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The Owner shall not store any end-product, including leaves and yard waste outdoors until the Owner prepares a Conditions Assessment and implementation plan approved by the District Manager. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

PART IV - GENERAL

7. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall

include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the Owner.

9. GROUNDWATER MONITORING

Groundwater Monitoring Program

(1) The Owner shall, upon the issuance of this Approval, carry out the following groundwater monitoring program. Samples shall be collected from the specified groundwater monitoring wells at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Groundwater Monitoring

Unconfined Shallow Aquifer

MW1-08*, MW2-08*, MW3-08*, MW4-09*, & MW103-09*.

MW5-09**, MW101-13**, MW102-09**, MW104-13**, MW105-13**, MW106-15** & EW107-15**.

Deep Bedrock Aquifer

TW-4*, TW-7* & TW-8*.

Frequency	*Semi Annual (i.e. two times in a year) ** Tri-Annual (i.e. three time in a year)
Sample Type	Grab
Parameters	Alkalinity, Total Ammonia Nitrogen, Dissolved Organic Carbon, *E-coli* , Iron, Manganese, Nitrate-N, and Total Phosphorous.

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after three (3) years of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall compare analytical monitoring results obtained pursuant to Subsection (1) Table 3 - Groundwater Monitoring with the trigger level concentrations for the trigger parameter listed in Tables 4 and 5.

Table 4
Trigger Level Concentrations
Unconfined Shallow Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	633
Total Ammonia Nitrogen	4.0
Dissolved Organic Carbon	34.6
E-coli	25.6 CFU/100 mL
Iron	48.3
Manganese	17.1
Nitrate-N	1.3
Total Phosphorous	7.2

Table 5
Trigger Parameters
Deep Bedrock Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	996
Total Ammonia Nitrogen	0.2
Dissolved Organic Carbon	18.4
E-coli	5.0 CFU/100 mL
Iron	10.6
Manganese	2.1
Nitrate-N	0.5
Total Phosphorous	0.5

(5) The trigger level program shall be implemented using the following three (3) Tiers to verify the results and direct potential contingency implementation:

Tier I (Routine Monitoring Program)

Tier I Routine Monitoring Program (RMP) involves the sampling of all on-site groundwater monitoring wells at the frequency specified in Table 3. All groundwater monitoring activities completed at the site will be considered Tier I RMP unless two (2) or more trigger parameters exceed there respective trigger levels in a simple sample.

Tier II (Confirmation Monitoring Program)

If during a single monitoring event, two (2) or more trigger parameters exceed the established (see Tables 4 and 5) Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring Program (CMP) shall be implemented.

The Tier II CMP consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next schedule monitoring event in order to confirm the Tier I exceedance of the two (2) or more trigger parameters.

If the concentrations reported in the duplicate sample return to below their respective trigger levels, then Tier I RMP will resume.

If the Tier I exceedance is confirmed, then the next step shall be a re-evaluation of the degree, nature, and potential source(s) of the trigger level impact(s) identified in Tier I including the implication of the exceedance in terms of the potential for impacts to down-gradient off-site water users.

If the Tier II CMP and the subsequent evaluation indicate that the facility operations are having a detrimental effect on water quality migrating off-site, then Tier III Contingency Measures and Compliance Monitoring Program shall be implemented.

Tier III (Contingency Measures and Compliance Monitoring Program)

Tier III Contingency Measures and Compliance Monitoring Program (CMCMP) involves assessment and implementation of contingency measures in the event of imminent off-site groundwater quality impairment.

Contingency measures to be evaluated should include extraction of impacted groundwater and/or surface water for on-site treatment or off-site disposal, or acquisition of groundwater rights and registration of a contaminated attenuation zone (CAZ) on title of adjacent lands.

Tier III CMCMP should also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented.

The Tier III CMCMP details should be determined in conjunction with the development and implementation of preferred contingency measure(s).

The compliance monitoring parameters, locations, and monitoring frequency should be determined at the time of implementation of contingency measures.

Lastly, appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed.

(6) The Owner shall notify the District Manager orally, as soon as possible, and in writing within

seven (7) days in the event a trigger exceedance occurs.

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the District Manager requires from time to time.

SCHEDULE 'A'

1. Environmental Compliance Approval Application for Industrial Sewage Works submitted by Ben Constable, Conestoga-Rovers & Associates (CRA), and signed by Mike Rooke, Compliance Officer, Orgaworld Canada Ltd., dated March 11, 2015, and all supporting documentation and information.

2. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

3. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

4. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

5. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

6. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

7. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

8. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

9. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

10. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

11. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla,

P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

12. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

13. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

14. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

15. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

16. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.(6) is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works"as constructed" are maintained for future references.

4. Conditions 4 and 8 are included to enable the Owner to evaluate and demonstrate the performance of the Works,on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

5. Conditions 5, 6 and 7 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry.

6. Condition 9 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7251-8GKRPD issued on May 30, 2011.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2017

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AA/
c: District Manager, MOECC Ottawa District Office
Ben Constable, Conestoga-Rovers & Associates (CRA)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part 1 Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

CONTENT COPY OF ORIGINAL

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate.*

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner* shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* prepared in accordance with Condition (8) is submitted to the *District Manager* for comments and concurrance;

(2) Upon commencement of operation of the *Works*, the *Owner* shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

(4) The *Owner* shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner*shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner*shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works*to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

CONTENT COPY OF ORIGINAL

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works*, the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,*the *Owner*shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

CONTENT COPY OF ORIGINAL

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit:

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works*, the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works*and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager*requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works*are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate*and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate*the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works*are constructed, the *Works*will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry*records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works*are made aware of the *Certificate*and continue to operate the *Works*in compliance with it.

4. Condition 4 is included to ensure that the *Works*are constructed in accordance with the approval and that record drawings of the *Works*"as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner*to evaluate and demonstrate the performance of the *Works,*on a continual basis, so that the *Works*are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate*and that the *Works*does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works*be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry*is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,*so that the *Ministry*can work with the *Owner*in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

CONTENT COPY OF ORIGINAL

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Appendix B
Background Correspondence

Appendix B1
Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Ministry of the Environment
and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action
en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

January 3, 2017

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

MINISTRY OF THE ENVIRONMENT
JAN 11 2017
OTTAWA

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
2015 Groundwater and Surface Water Monitoring Report
Trigger Level Program
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the above noted report signed by Conestoga Rovers & Associates March 31, 2016 describing groundwater impacts related to the Orgaworld Organics Facility in Ottawa. The report also provides the Trigger Level Program (TLP) to protect groundwater from the impact of this new facility.

The consultant provides an assessment of the physical hydrogeology of the site. A shallow aquifer exists at the bedrock overburden interface. Water level monitoring has confirmed the inferred groundwater flow direction in the upper unconfined aquifer is to the east with some level of limited discharge to ditches located along the north site boundary. The Surface Water Unit should review this report as groundwater that does not meet Provincial Water Quality Objectives for ammonia may at times discharge to these ditches.

A deep aquifer exists in sandstone. Based on in-situ hydraulic testing the consultant has deemed there is no hydraulic connection between the deep aquifer and the unconfined shallow aquifer. Inferred groundwater flow in the deep aquifer is to the west. Contaminants of concerns identified are ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater quality mapping of ammonia, DOC, iron and manganese confirm that a plume extends in the shallow aquifer northeastward, originating in and around the northeast corner of the Organic Composting Facility. Some impacts have been detected in the deep aquifer.

A TLP has been proposed recognizing that past site activities and up gradient water quality issues exist and that an alternative method has been developed to assess the net impact of this new facility, bearing in mind that groundwater impairment must not occur. I have reviewed the proposed TLP and find it is acceptable to me.

I find the monitoring program rationalization acceptable to me.

In general, I agree with the conclusion and recommendations made by the consultant. Current remediation efforts must continue to improve groundwater quality at all down gradient monitoring wells relative to facility start up and any additional work as per the TLP. If a Tier III trigger is reached I should be consulted.

Robert W. Holland, P.Geo.
RWH/dv

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

Appendix B2
Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

ISO 9001

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

Location	*Field Test Parameters*			*Laboratory Test Parameters*							
	Water Level	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3,4]	*PAHs* [5]	*Expanded PAHs* [6]	*PHC (F1 - F4)*	*Bacteriological Components* [7]	*Collection Method*
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4[8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

002390

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3/4]	*Bacteriological Components* [5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix B3
Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

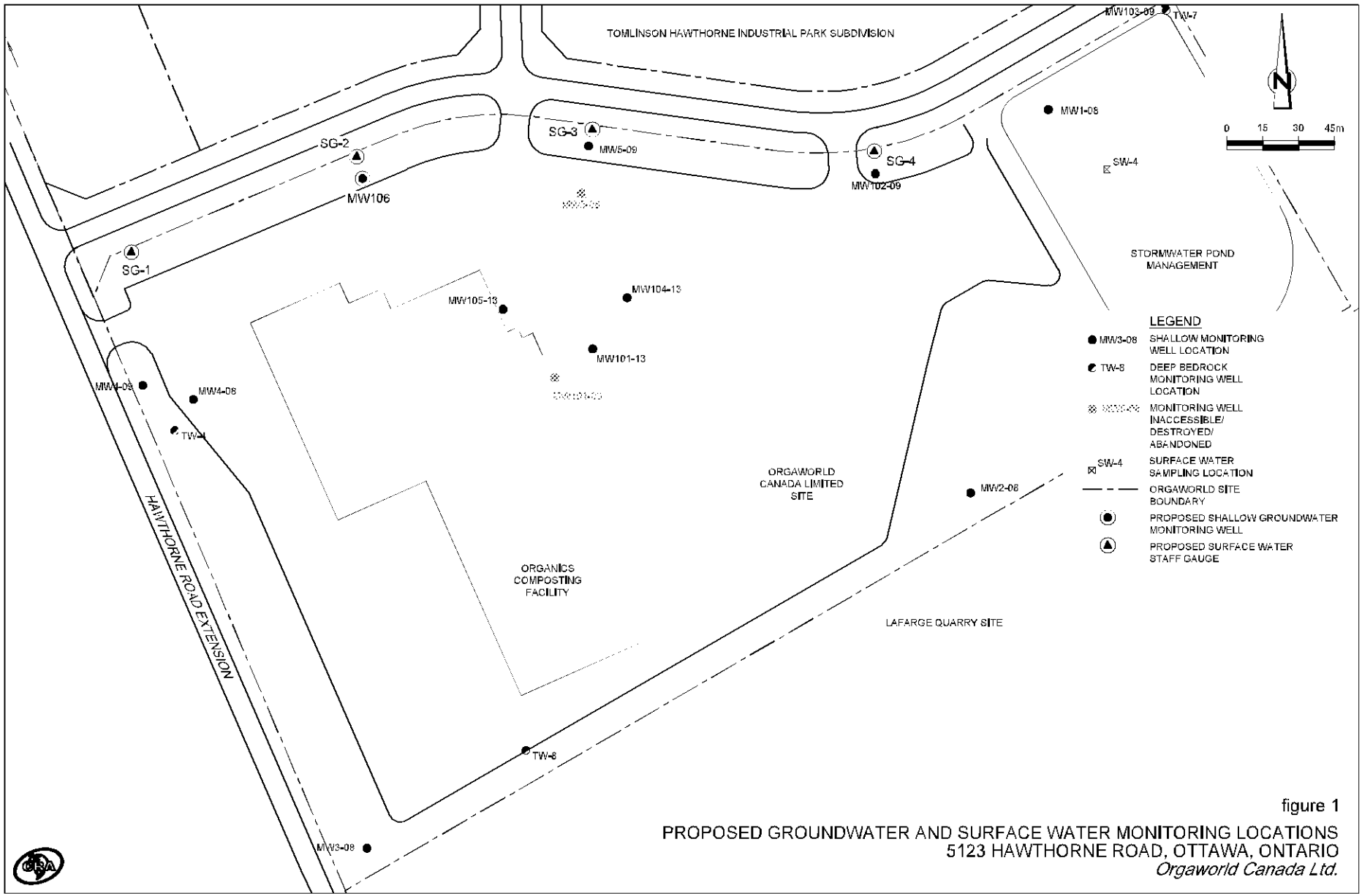


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

002398

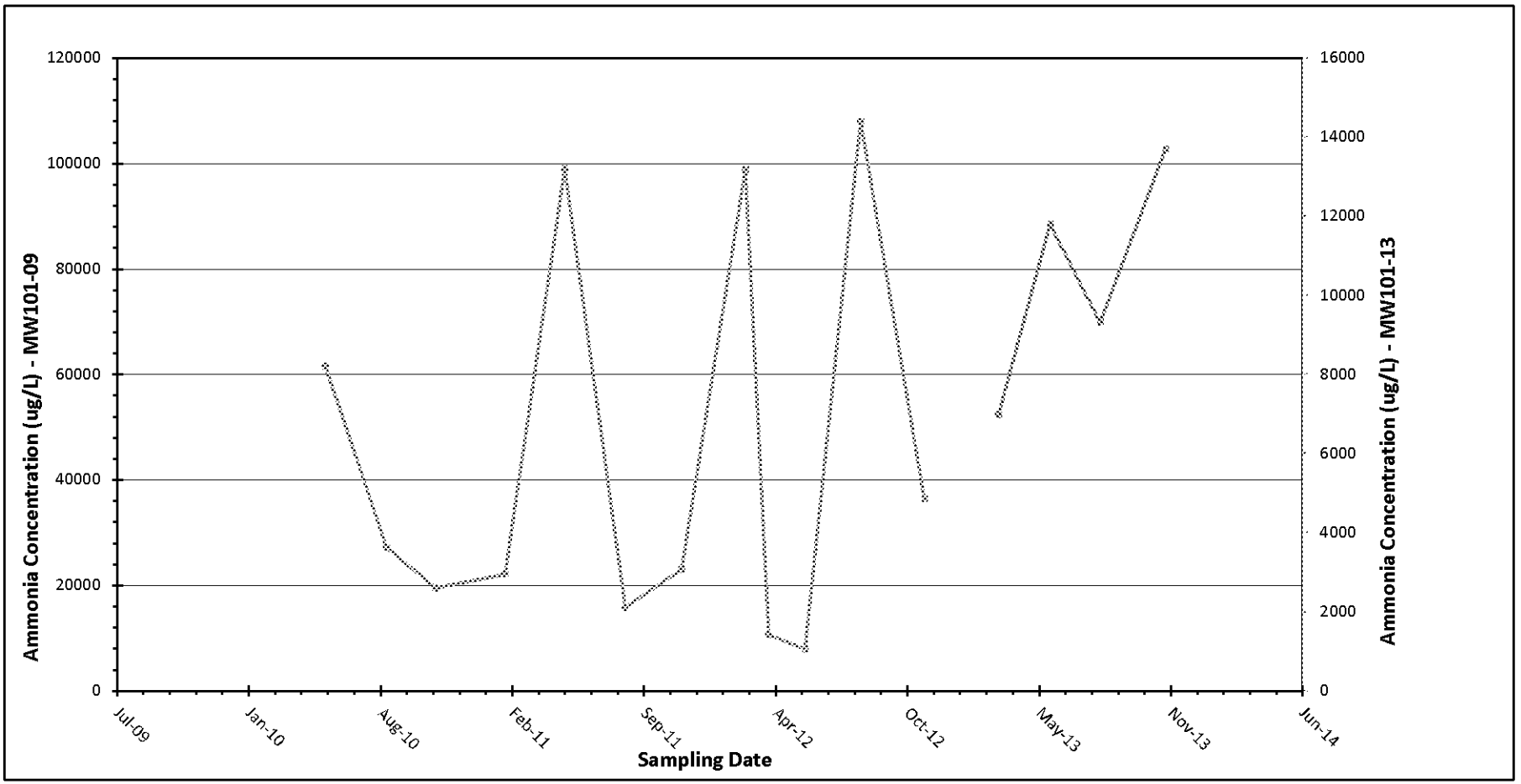


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

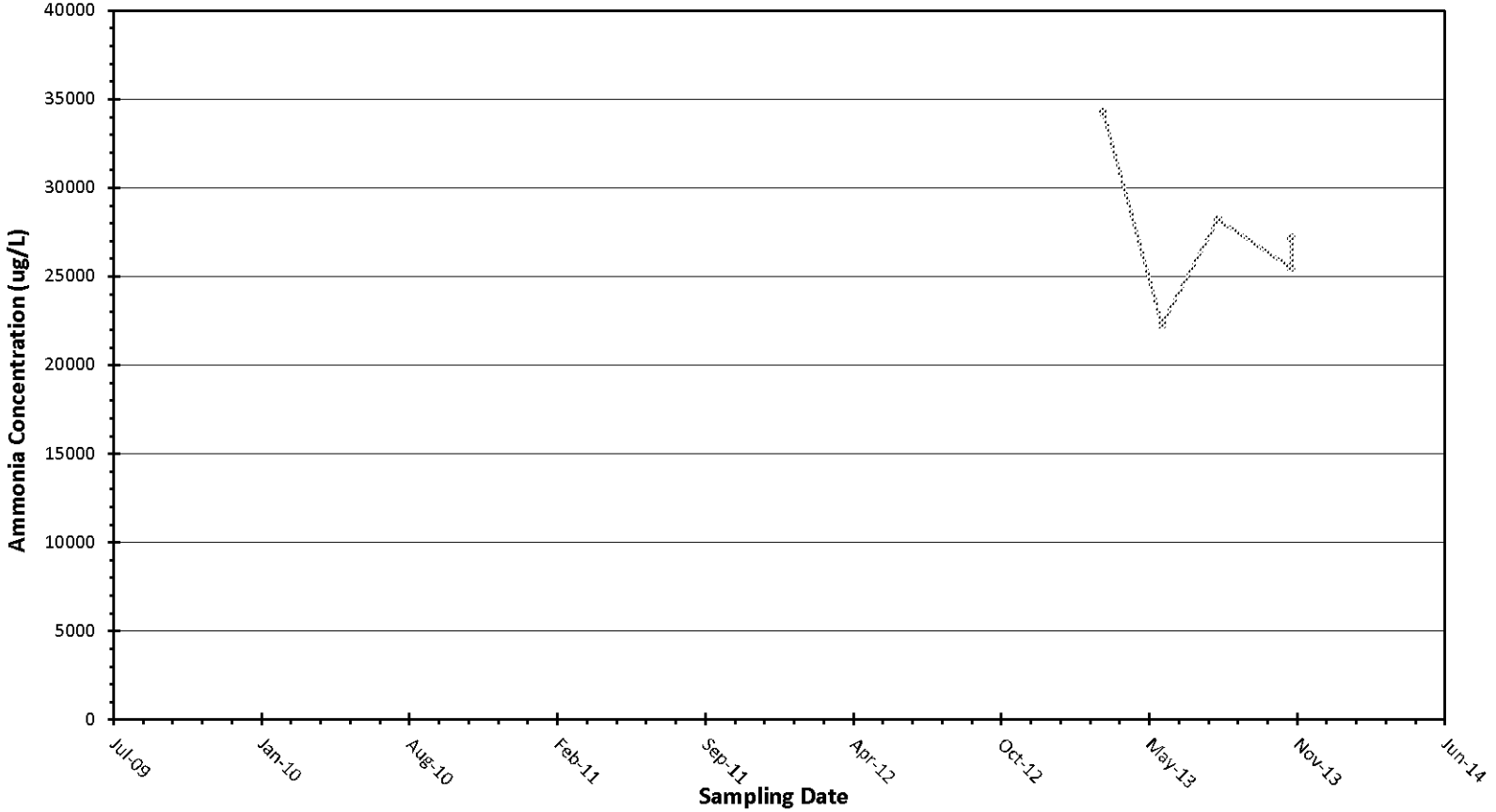


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

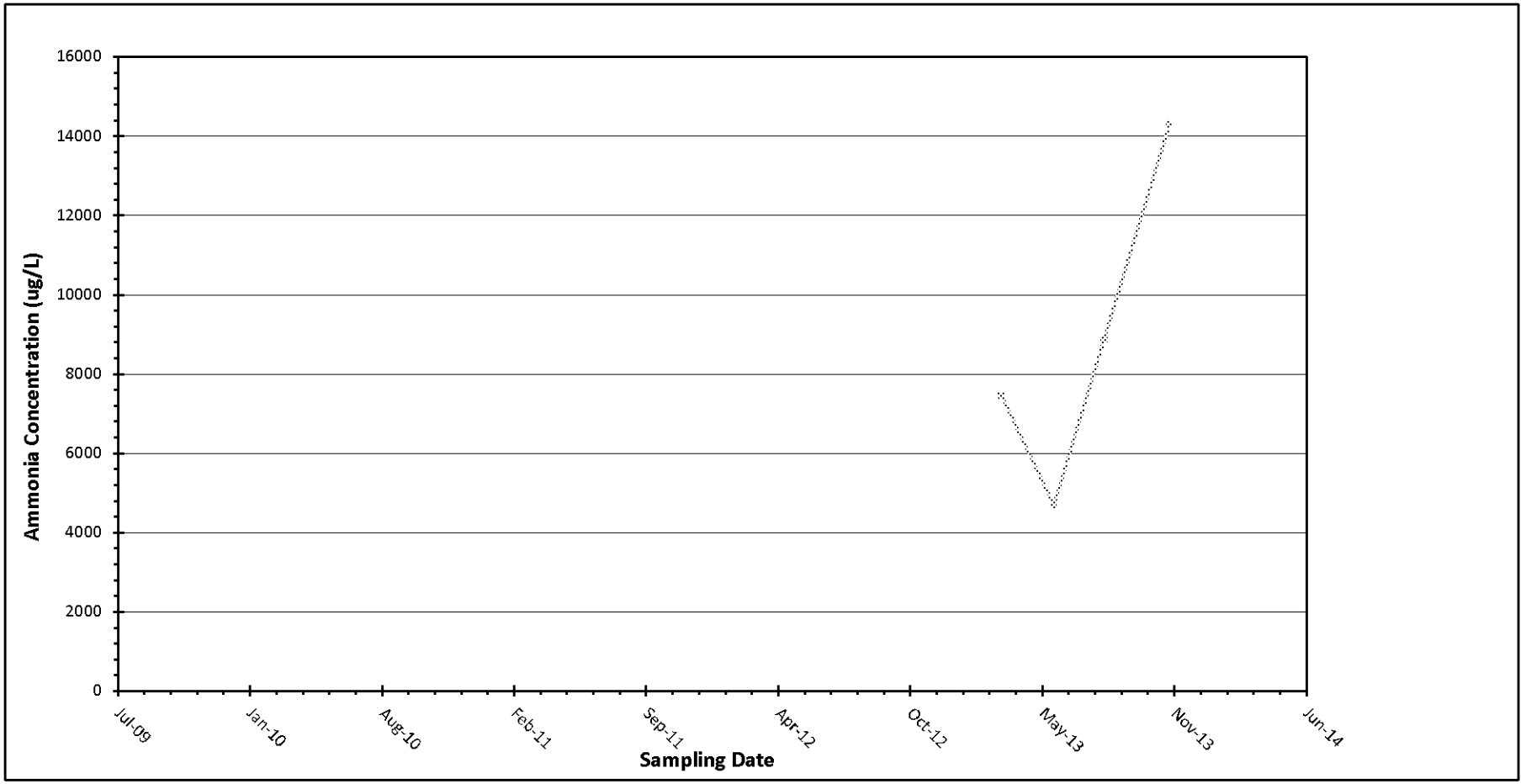


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

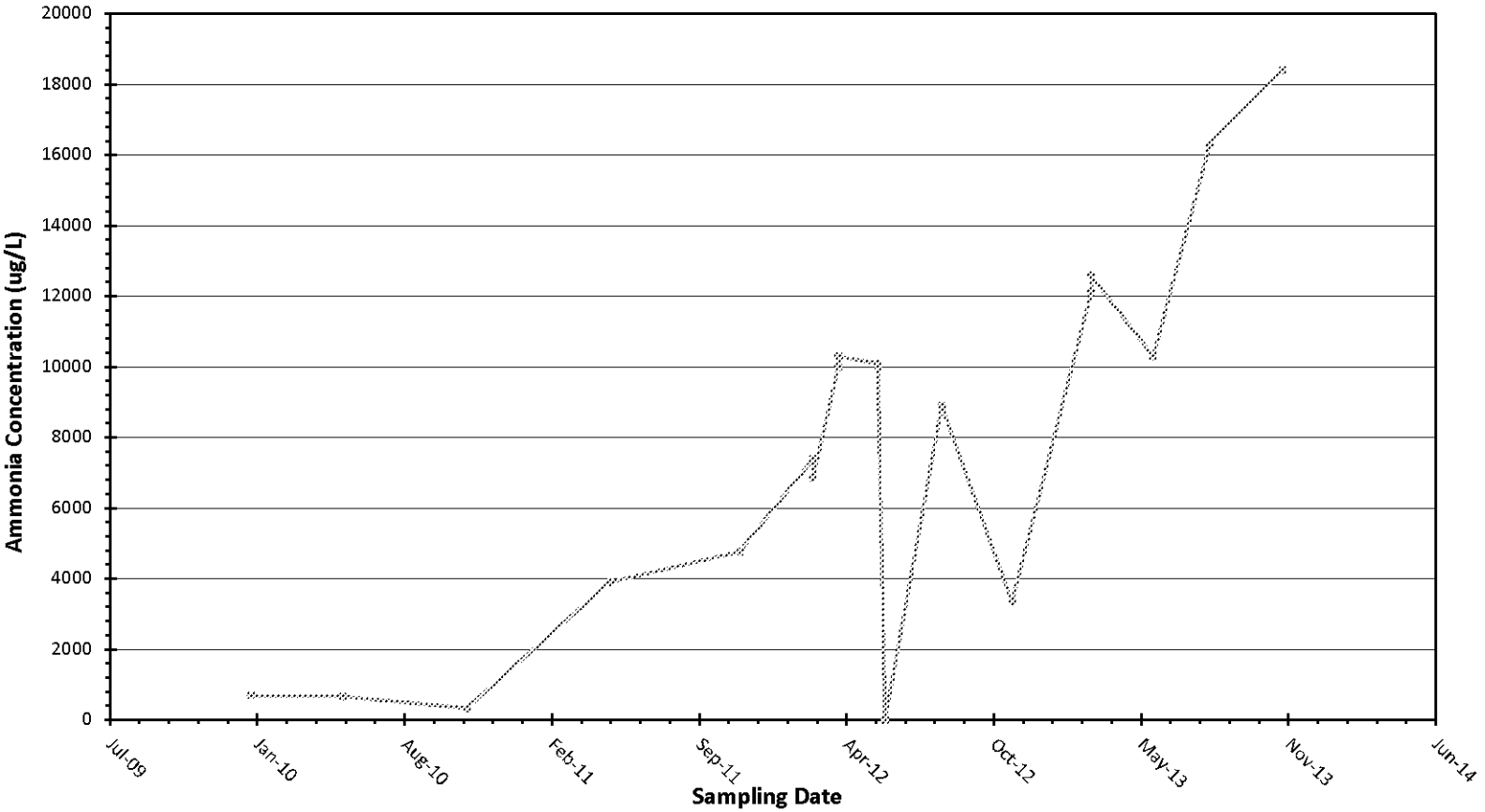


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

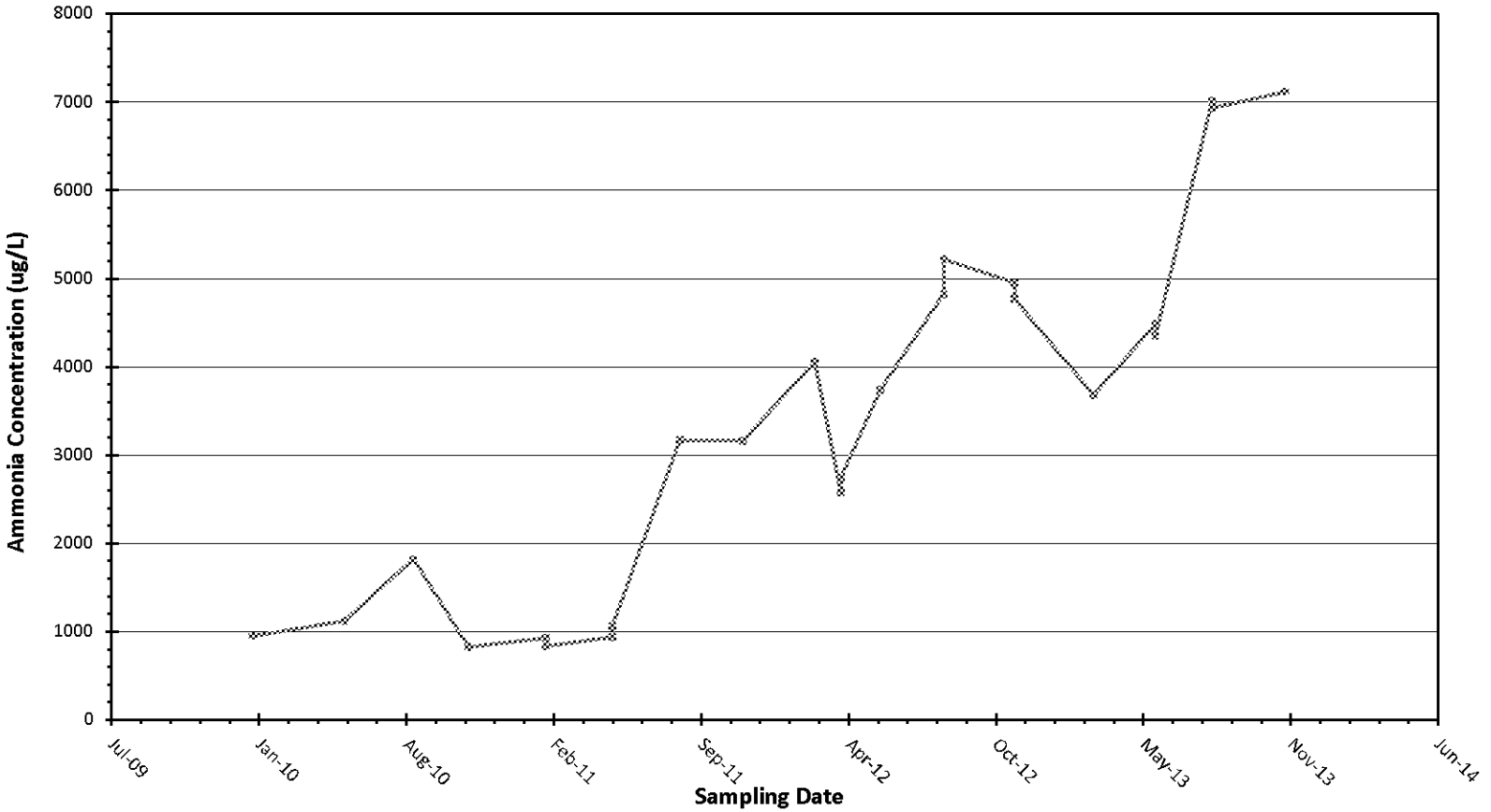


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

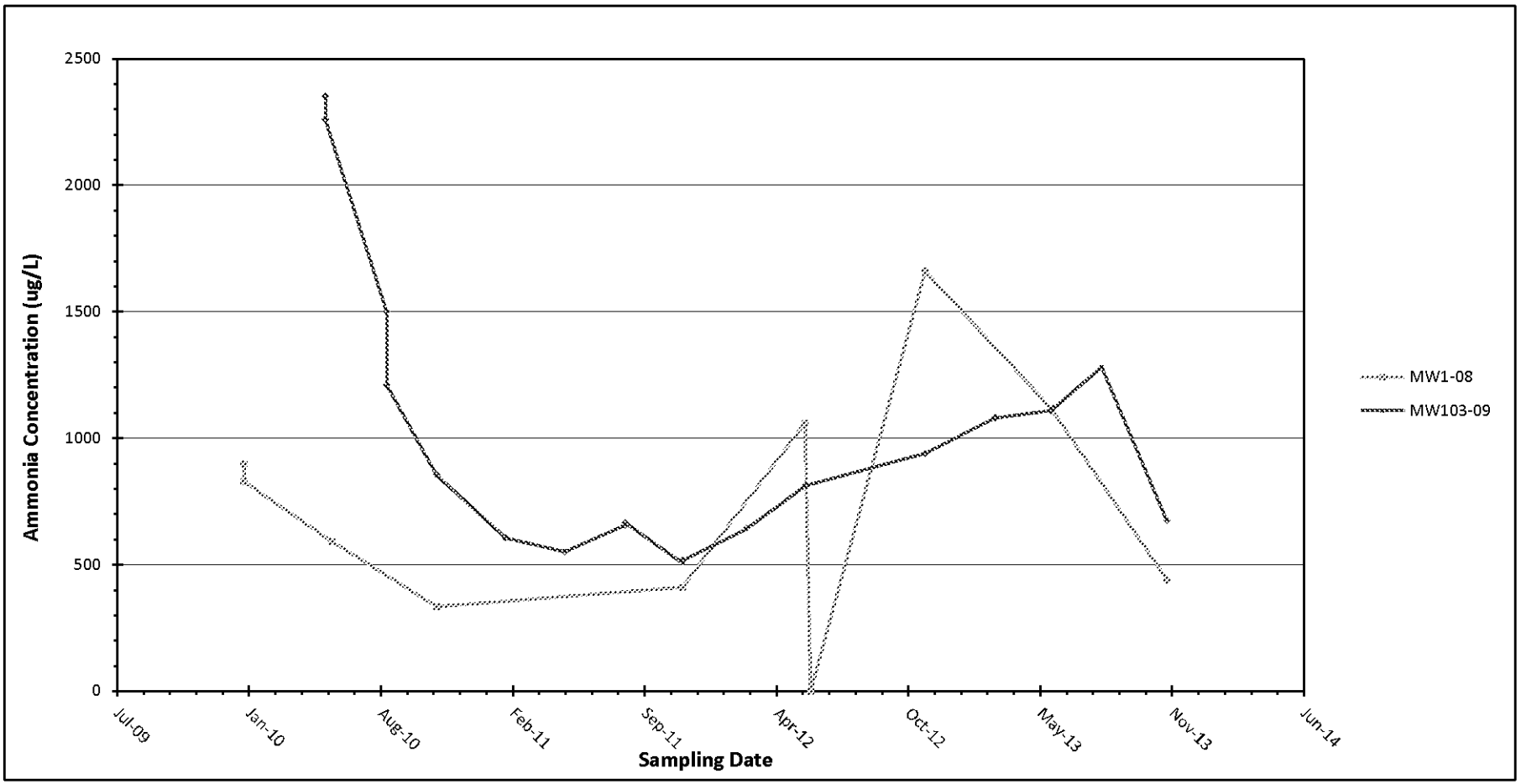


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

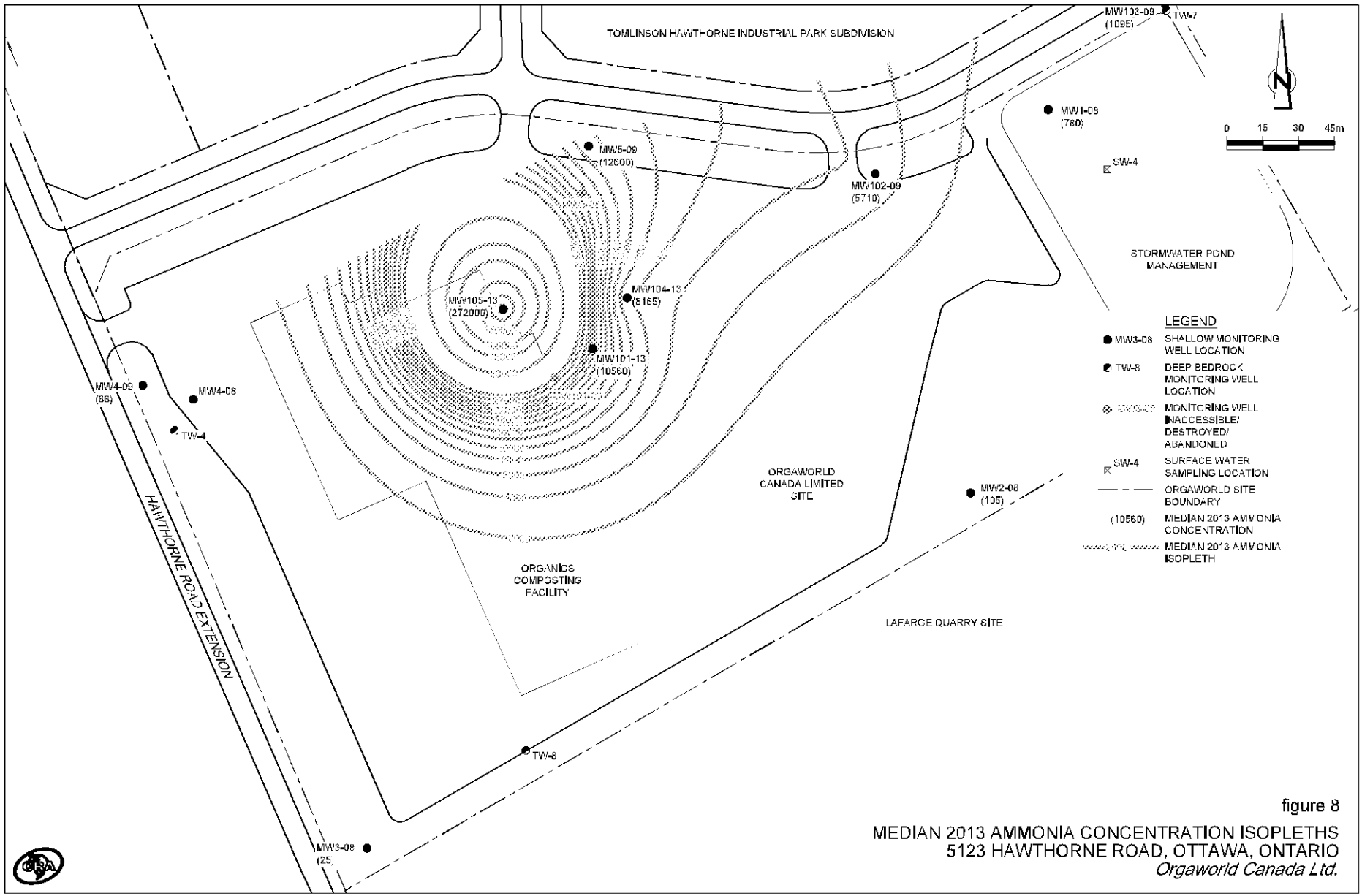


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

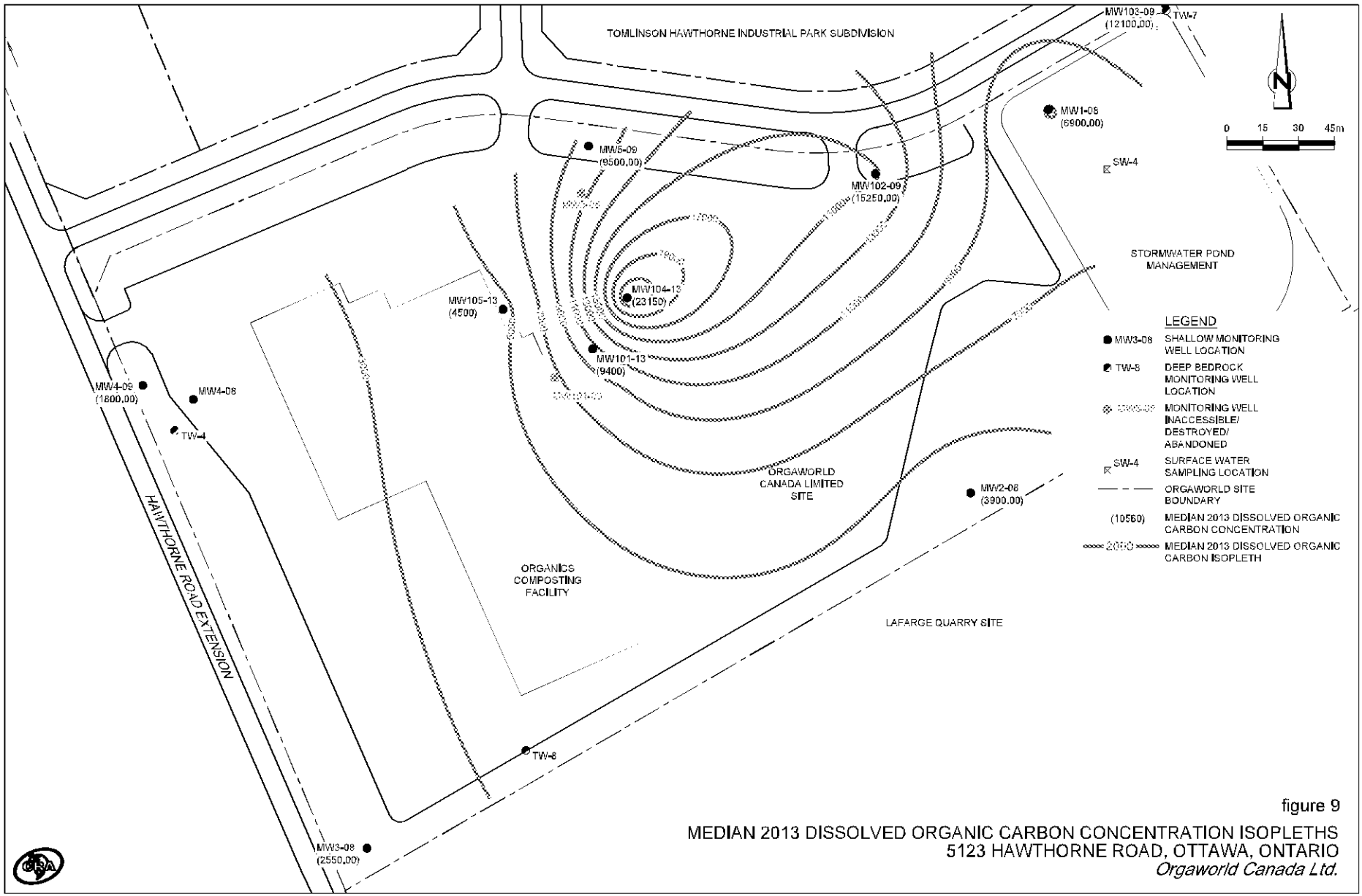


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

002406

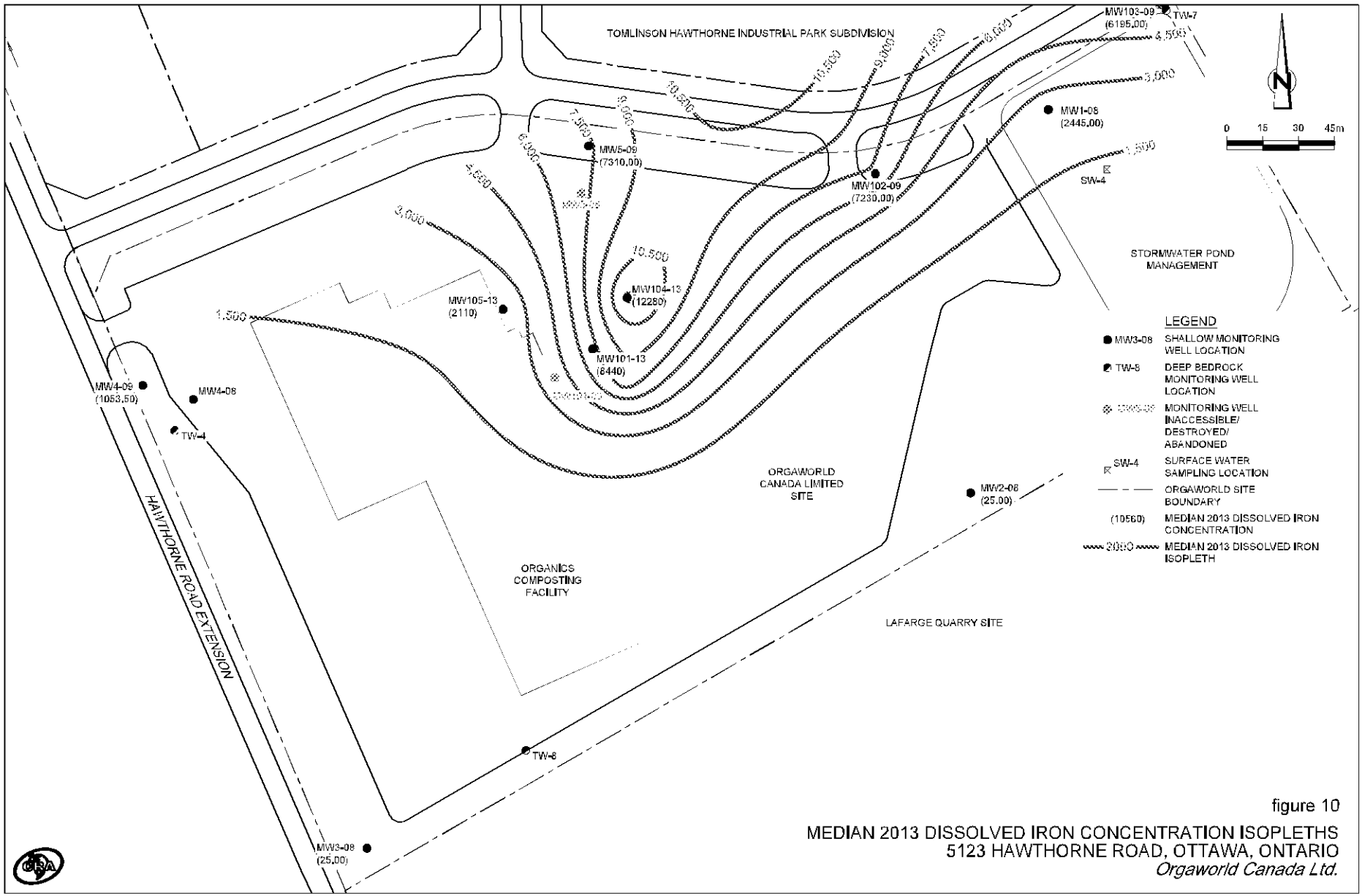


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

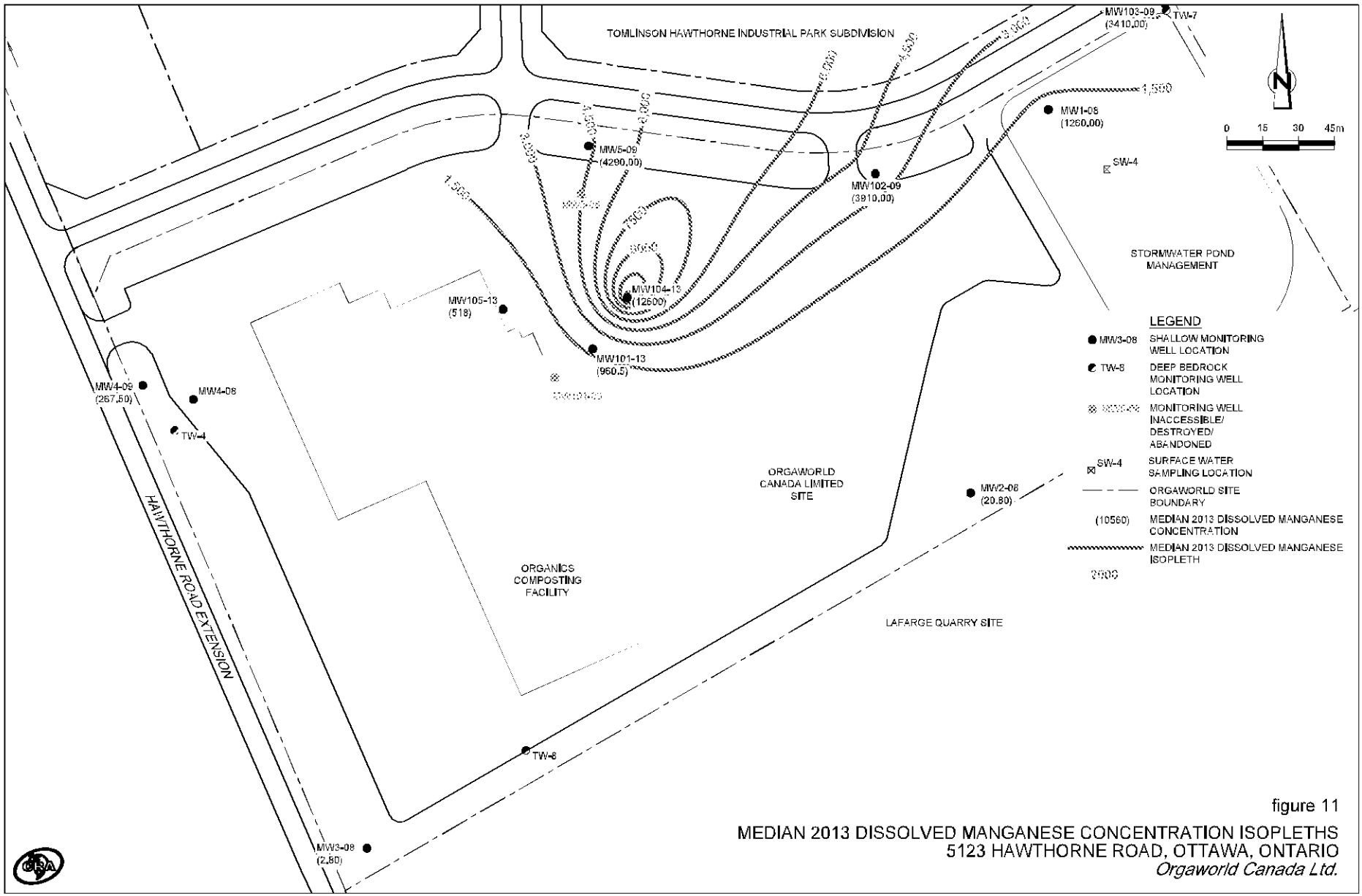


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

Appendix C
Stratigraphic and Instrumentation Logs

Appendix C1
Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.06 93.00 91.89						
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug					
1	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS1	X	35		0.0
2				SS2	X	27		0.0
3	END OF BOREHOLE @ 2.97m BGS	88.92	Well Screen					
	Auger Refusal On Assumed Bedrock							

WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

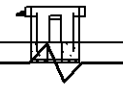
OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002411

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17					
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40	WELL DETAILS Screened interval: 92.54 to 90.40m 0.63 to 2.77m BGS Length: 2.13m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.02 to 92.71m 0.15 to 0.46m BGS Material: Bentonite Sand Pack: 92.71 to 90.40m 0.46 to 2.77m BGS Material: Silica Sand			
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

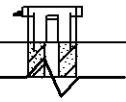
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1
2
3
4
5
6
7
8
9
10
11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug				
	BEDROCK - fractured limestone						
1							
2							
3							
4							
5							
6							
7							
8							
9			Filter Sand				
10			Well Screen				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
12							
13							
14							
15							
16							
17							
	END OF BOREHOLE @ 17.37m BGS	86.18					
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand				
19							
20							
21							
22							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002417

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
2	- becoming very dense at 1.68m BGS	93.28	Filter Sand Well Screen	RC1	93	63
	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth					
3	END OF BOREHOLE @ 2.84m BGS	92.22				
4						
5						
6						
7						
8						
9						
10						
11						
12						

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 97.54 TOP OF RISER 97.45 GROUND SURFACE 96.58							
0	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist		BENTONITE SAND	1SS		33		0.
0.5								
1.0			5.08cm PVC WELL CASING	2SS		33	11	10.0
1.5	- coarse sand, wood pieces, roots at 1.12m BGS		15.24cm BOREHOLE					
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS		BENTONITE	3SS		54	86	0.1
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29		4SS		67	55	0.2
3.0			5.08cm PVC WELL SCREEN					
3.5	- REFUSAL at 3.50m BGS BEDROCK	93.07		5SS		8		0.1
4.0			SAND PACK					
4.5	END OF BOREHOLE @ 4.11m BGS	92.46						
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.99 to 92.45m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack:
94.29 to 92.45m
2.29 to 4.11m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug	SS1		54	13
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS2		83	74
2			Filter Sand Well Screen	SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4							
5							
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
93.12 to 91.59m
1.24 to 2.77m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.06 to 93.42m
0.30 to 0.94m BGS
Material: Bentonite
Sand Pack:
93.42 to 91.59m
0.94 to 2.77m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 94.57 TOP OF RISER 94.50 GROUND SURFACE 93.36							
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay		BENTONITE SAND 5.08cm PVC WELL CASING 15.24cm BOREHOLE	1SS		54	14	0.0
0.5								
1.0				2SS		54	12	0.1
1.5	- red silty sand (or covered brick) at 1.68m BGS - spoon wet at 1.83m BGS			3SS		29	13	0.0
2.0								
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92	BENTONITE	4SS		71	25	0.1
3.0								
3.5	- increasing clay, becoming wet at 3.51m BGS		5.08cm PVC WELL SCREEN	5SS		25	8	0.0
4.0								
4.5	- cobble, rootmat, black at 4.24m BGS END OF BOREHOLE @ 4.42m BGS	88.94	SAND PACK	6SS		29	6	0.0
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.98 93.83						
0	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist							
1	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07	Bentonite Hole Plug	SS1		83	43	13.1
2				SS2		86		17.1
3				SS3		75	29	21.3
4			Filter Sand	SS4		33	16	23.9
5	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	89.26	Well Screen	SS5		17	7	2.3
6	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.89		SS6		100	20	0.0
7				SS7		83	26	0.0
8	END OF BOREHOLE @ 7.62m BGS	86.21		SS8		57		0.0
9								
10								
11								

WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002422

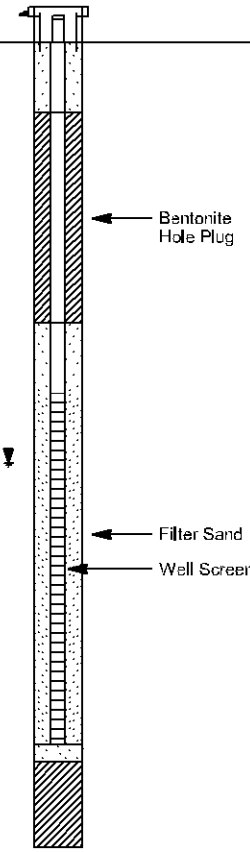
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF RISER	94.82
	GROUND SURFACE	93.81
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist	
3.65	- becoming wet at 3.65m BGS	
5.49	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32
6.98	END OF BOREHOLE @ 6.98m BGS	86.83

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
90.76 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
SS1		50	38	0.0
SS2		35		4.6
SS3		50	13	0.0
SS4		25	15	4.3
SS5		100		
SS6		42	54	0.0
SS7		50	15	0.0
SS8		100		1.5
SS9		100		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
5	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002424

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.96						
	GROUND SURFACE	82.94						
	TOPSOIL	82.79	Bentonite Hole Plug					
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft			SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand					
2			Well Screen	SS2		100	3	0.0
				SS3		100		0.0
3								
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	84.00 83.10						
0	TOPSOIL	82.95	Bentonite Hole Plug					
1	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS			SS1		83	15	0.0
2	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS	81.42	Filter Sand Well Screen	SS2		50	25	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20		SS3		100	27	0.0

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS3)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.23 96.15 95.67						
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE	1SS		58	7	0.1
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND					
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE					
2.0			BENTONITE	3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0			WELL DETAILS Screened interval: 93.54 to 92.01m 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 0.010 Material: PVC Seal: 94.15 to 93.84m 1.52 to 1.83m BGS Material: BENTONITE Sand Pack: 93.84 to 92.01m 1.83 to 3.66m BGS Material: #2 SAND					
4.5								
5.0								
5.5								
6.0								
6.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.90 93.79 92.99						
0.5	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick) - increasing sand at 0.66m BGS		BENTONITE SAND	1SS		25		0.0
1.0			5.08cm PVC WELL CASING	2SS		75	24	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0	- 0.43m coarse beige sand at 1.98m BGS - wet at 2.29m BGS			3SS		67	19	0.1
2.5	- ~2.54cm root mat at 2.74m BGS			4SS		83	24	0.1
3.0	CL/ML-SILTY CLAY, soft, grey, wet	90.09	5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		63	4	0.2
4.0	END OF BOREHOLE @ 3.66m BGS	89.33						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.45m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.15 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.42 93.33 92.38						
0	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist		BENTONITE 5.08cm PVC WELL CASING SAND	1SS		29	6	0.1
0.5								
1.0			BENTONITE	2SS		38	16	0.1
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29						
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01	15.24cm BOREHOLE	3SS		83	26	0.0
2.0								
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS		5.08cm PVC WELL SCREEN	4SS		50		0.2
3.0	- REFUSAL at 3.05m BGS	89.33	SAND PACK					
	END OF BOREHOLE @ 3.05m BGS			5SS		4		0.1
3.5								
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.63					
	TOP OF RISER	94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0			▽				
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0							
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.92 to 91.40m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.23 to 94.60m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.23 to 91.40m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOP OF RISER	-0.46
	TOP OF CASING	-0.61
0	GRASS AND TOPSOIL	0.05
	FILL - concrete, red brick, ashphalt, sand, gravel, moist	
4	- wet at 4.27m BGS	
5	- concrete at 4.95m BGS	
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18
6	END OF BOREHOLE @ 6.38m BGS	6.38

MONITOR INSTALLATION

WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		12	
2		10	64
3		15	13
4		4	
5		13	38
6		13	59
7		12	
8		14	26
9		6	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-GT006.GPJ CRA_CORP.GDT 3/10/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOPSOIL - sandy, medium brown, dry	
1	rock fragments	1.07
	SILTY SAND - medium brown	1.22
	CLEARSTONE - dry	1.37
2	rock fragments	1.68
	LIMESTONE - grey	2.13
3		
4		
5	- highly fractured at 5.18m BGS	
	END OF BOREHOLE @ 5.49m BGS	5.49
6		
7		
8		
9		
10		
11		

MONITOR INSTALLATION

WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

SAMPLE				
NUMBER	INTERVAL	REC (%)	'N' VALUE	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-OT006.GPJ CRA_CORP.GDT 2/23/16

002434

Appendix C2
Deep Bedrock Water Well and Stratigraphic Logs

OCT 07 '93 08:09 BEAVER ROAD BUILDERS

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

SURVEY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
Ottawa Carleton	Gloucester	6		26

OWNER'S SURNAME FIRST	ADDRESS	DATE COMPLETED
ver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DAY 19 MO. 4 YR. 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
y	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	DEPTH - FEET FROM	TO
☐ FRESH ☐ SULPHUR ☐ MINERAL ☐ GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL ☐ GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL ☐ GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL ☐ GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL ☐ GAS ☐ SALTY		

CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	TO
6 1/4	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC	.188	0	31
6 1/8	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		31	75
6	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		75	135

SCREEN

MAKE OF WELLPOINT (IF USED)	DIAMETER	LENGTH
	INCHES	FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN	FEET

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, CLAY, PACKER, ETC.)
31	0	Grouted - Cement (18)

METHOD OF CONSTRUCTION	WELL USE	STATUS OF WELL
☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☒ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER	☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED	☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED ☐ DEWATERING

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	15-20 USGPM	1 HOURS MINUTES

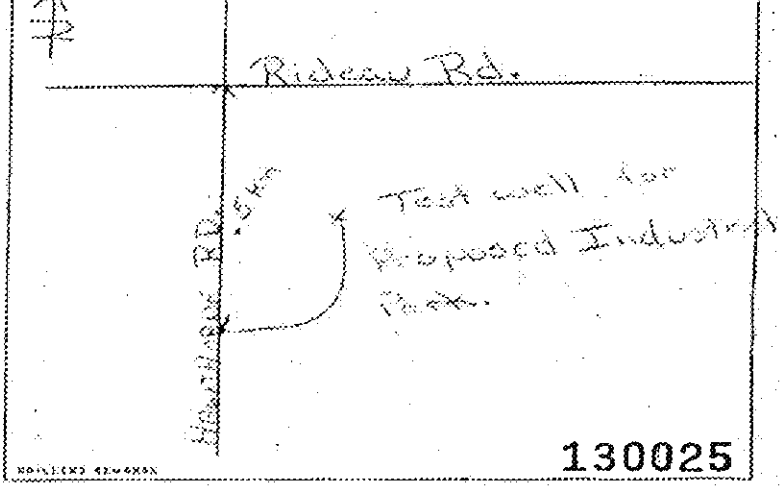
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☒ RECOVERY			
		10 MINUTES	20 MINUTES	45 MINUTES	60 MINUTES
31 FEET	130 FEET	40 FEET	33 FEET	31 FEET	31 FEET

FINAL OPEN FLOW RATE	HOURS OPEN FLOW WAS TAKEN	WATER AT END OF TEST
GPM		☐ CLEAR ☐ CLOUDY

PUMP INTAKE SET AT	ALLOWANCE MADE FOR SUBMERGENCE	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	125 FEET	5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



COUNTY OR DISTRICT: Ottawa Carleton
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: Gloucester
CON.: 6
LOT: 26

130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1556

ADDRESS OF WELL CONTRACTOR	
P.O. Box 450 Stittsville, Ontario	K2S 1A5

NAME OF WELL TECHNICIAN (PRINT)	WELL TECHNICIAN'S LICENCE NUMBER
S. Miller	10087

SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
	DAY 20 MO. 7 YR. 93

OFFICE USE

OWNER'S COPY

FORM NO. 0506 (11/86) FORM 9

002436

Ministry of the Environment
Ontario

WATER WELL RECORD

The Ontario Water Resources Act

TEST WELL TW-2

County or District: Ottawa Carleton
Township, Borough, City, Town or Village: Gloucester
Lot: 6
Concession: 26
Name of Owner: Beaver Road Builders
Address: P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2
Date Completed: 16 / 8 / 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (See Instructions)

General Colour	Most common material	Other materials	General description	From	To
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

Kind of Water: NOT TESTED

CASING & OPEN HOLE RECORD

Inside Diameter	Material and Type	Weight	From	To
6 1/4	Steel	.188	0	39
5 15/16	Steel		39	100

SCREEN

PLUGGING & SEALING RECORD

From	To	Material and Type
37.5	0	Cement - Grouted

Pump: X
Water Level: 20
Pumping Rate: 1

Static Level	Water Level End of Pumping	Pumping Level (ft)	Pumping Level (m)	Recommended Pump Rate (ft)	Recommended Pump Rate (m)
7'6"	14'6"	13'11"	14	14'4"	14'6"

Recommended Pump Depth: 50
Recommended Pump Rate: 5

Final Status of Well: X Water Supply
Water Use: X Domestic
Method of Construction: X Air Percussion

LOCATION OF WELL

Overburden and Bedrock: 135946

Contractor's Licence Number: 1558
Name of Well Contractor: Capital Water Supply Ltd.
Address: 490 Russelville, Ontario K2S 1A6
Name of Well Technician: Miller/T. Harrison
Technician's Licence Number: T0097/T2251

OFFICE USE ONLY

Owner's Copy

FORM NO. 0506 (11/87) FORM 6

002437

Ministry of the Environment

Ontario

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton	Gloucester	6	26
Beaver Road Builders	P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2	Oct 16 / 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Gray & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: FRESH / SALTY / UNKNOWN / MINERAL / GAS

NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	Steel	.188	0	22
6 1/16	Open hole		22	100

SCREEN

PLUGGING & SEALING RECORD

DIAMETER	DEPTH FROM	MATERIAL AND TYPE
20'8"	0	Grouted cement (3)

PUMP	BAILER	15-20	3
STATIC LEVEL	WATER LEVEL END OF PUMPING	PUMPING RATE	DURATION OF PUMPING
21'6"	24'4"	23'6" / 24	24'4" / 24'4"
RECOMMENDED PUMP TYPE: SHALLOW / DEEP		PUMP INTAKE SET AT: 40	RECOMMENDED PUMP SETTING: 50
		METER: YES	CLOSED

LOCATION OF WELL

Rideau Road

Hawthorne Road

250 meters

135944

FINAL STATUS OF WELL	WATER SUPPLY; OBSERVATION WELL; TEST HOLE; RECHARGE WELL; ABANDONED, INSUFFICIENT SUPPLY; ABANDONED, POOR QUALITY; DEWATERING
WATER USE	DOMESTIC; STOCK; IRRIGATION; INDUSTRIAL; COMMERCIAL; MUNICIPAL; PUBLIC SUPPLY; COOLING OR AIR CONDITIONING; NOT USED
METHOD OF CONSTRUCTION	CABLE TOOL; ROTARY (CONVENTIONAL); ROTARY (REVERSE); ROTARY (AIR); AIR PERCUSSION; BORING; DIAMOND; JETTING; DRIVING

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd. — WELL CONTRACTOR'S LICENCE NUMBER: 1550

ADDRESS: Box 490 Stittsville, Ontario K2S 1A6

NAME OF WELL TECHNICIAN: S. Miller/T. Harrison — WELL TECHNICIAN'S LICENCE NUMBER: 0097/T2251

SIGNATURE OF TECHNICIAN/CONTRACTOR

DATE SUBMITTED: Nov 18 / 93

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO. 0506 (3) '90

002438

Ontario Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068332

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/0 651 Colby Drive	Waterloo	Ontario	N2V1C2	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse Air) [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify: Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	13.10

Status of Well

[ ] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
26.51	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	
	[ ] Fresh [ ] Untested	[ ]	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[ ] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

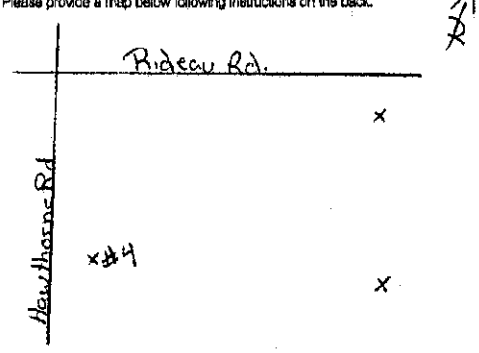
Well production (l/min / GPM):

Disinfected? [X] Yes [ ] No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15			
1	15.97	1	16.76	
2	16.98	2	15.74	
3	17.30	3	15.20	
4	17.43	4	15.	
5	17.50	5	14.91	
10	17.88	10	14.71	
15		15		
20	18.16	20	14.54	
25	18.23	25	14.51	
30	18.26	30	14.47	
40	18.34	40	14.41	
50	18.39	50	14.38	
60	18.41	60	14.35	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2009 09 09

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only: Audit No. 8041

Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002439

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below) A068335 **A 068336**

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K 2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457043	5016848		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
27.12 (m/ft) [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify			
(m/ft) [ ] Gas	Water found at Depth [ ] Fresh [ ] Untested [ ] Other, specify	0	12.80	15.7
(m/ft) [ ] Gas	Water found at Depth [ ] Fresh [ ] Untested [ ] Other, specify	12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

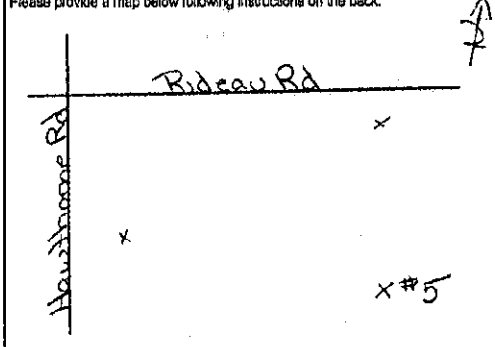
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

	Drew Down Time (min)	Drew Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		6.85		
1		8.03	1	8.97
2		8.35	2	8.69
3		8.60	3	8.55
4		8.76	4	8.46
5		8.88	5	8.40
10		9.20	10	8.23
15			15	
20		9.49	20	8.04
25		9.62	25	7.99
30		9.68	30	7.93
40		9.82	40	7.84
50		9.91	50	7.77
60		9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2008 10 20

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [X] No	2008 10 20	Audit No. Z 844140
	Date Work Completed: 2008 08 26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002440

Ontario | Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 6600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457102	5017600		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium-Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☒ Rotary (Reverse) Air ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Industrial ☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

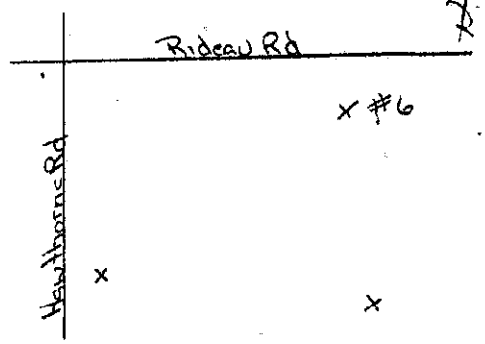
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	3.18		
1	3.24	1	
2	4.23	2	
3	5.19	3	
4		4	
5	6.53	5	
10	8.06	10	
15	9.99	15	22.80
20	11.53	20	19.40
25	12.92	25	17.12
30	14.08	30	15.13
40		40	11.82
50		50	9.47
60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361765	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008/09/26

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	2008/09/26	Audit No. Z 084110
	Date Work Completed: 2008/09/26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002441

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
0	FILL, sand and gravel, packed, brown		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
1.52	SANDSTONE, very hard, grey and white	90.94					
29.87	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
0	LIMESTONE, grey, broken rock						
1.48	SANDSTONE, very hard, grey and white	92.94	18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
29.87	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix D
QA/QC Assessment Memorandum and Laboratory Analytical Report

Memorandum

February 22, 2018

To:	Ben Kempel, Trevor Saunders, Airesse MacPhee	Ref. No.:	045804-58
From:	Pascal Renella/al/9		514-339-0758

Subject: Data Quality Assessment and Validation

Laboratory:	ALS Canada Ltd	Date(s) Sampled:	May 30 – November 30, 2017
Lab Job No.:	L1933863, L1935461, L1936074, L1984427, L2029238, L2029244, L2029749		
Sampled By:	Trevor Saunders		
Media Sampled:	Groundwater, Surface Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☒	☐	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☐	☒	☐	☐
Lab QA/QC	Within standard recoveries	☒	☐	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: PR			

The following results are qualified due to high temperature (13.4°C) upon arrival at the laboratory the day after sampling:

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-001	Alkalinity, total (as CaCO3)	543	J	mg/L
L1984427	GW-45804-083017-TS-002	Alkalinity, total (as CaCO3)	554	J	mg/L
L1984427	GW-45804-083017-TS-003	Alkalinity, total (as CaCO3)	536	J	mg/L
L1984427	GW-45804-083017-TS-004	Alkalinity, total (as CaCO3)	620	J	mg/L
L1984427	GW-45804-083017-TS-005	Alkalinity, total (as CaCO3)	10	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Alkalinity, total (as CaCO3)	791	J	mg/L
L1984427	GW-45804-083017-TS-007	Alkalinity, total (as CaCO3)	511	J	mg/L
L1984427	GW-45804-083017-TS-008	Alkalinity, total (as CaCO3)	1280	J	mg/L
L1984427	GW-45804-083017-TS-009	Alkalinity, total (as CaCO3)	1250	J	mg/L
L1984427	GW-45804-083017-TS-001	Ammonia-N	3.89	J	mg/L
L1984427	GW-45804-083017-TS-002	Ammonia-N	6.96	J	mg/L
L1984427	GW-45804-083017-TS-003	Ammonia-N	2.57	J	mg/L

ghd
4600, boul. de la Côte-Vertu, Montréal, Québec, H4S 1C7, Canada
T 514 333 5151 F 514 333 46744 W www.ghd.com
SMQ ISO 9001:2008

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-004	Ammonia-N	9.89	J	mg/L
L1984427	GW-45804-083017-TS-005	Ammonia-N	0.056	J	mg/L
L1984427	GW-45804-083017-TS-006	Ammonia-N	34.5	J	mg/L
L1984427	GW-45804-083017-TS-007	Ammonia-N	15.9	J	mg/L
L1984427	GW-45804-083017-TS-008	Ammonia-N	91.1	J	mg/L
L1984427	GW-45804-083017-TS-009	Ammonia-N	88.0	J	mg/L
L1984427	GW-45804-083017-TS-001	Dissolved organic carbon (DOC)	7.8	J	mg/L
L1984427	GW-45804-083017-TS-002	Dissolved organic carbon (DOC)	13.6	J	mg/L
L1984427	GW-45804-083017-TS-003	Dissolved organic carbon (DOC)	11.7	J	mg/L
L1984427	GW-45804-083017-TS-004	Dissolved organic carbon (DOC)	13.0	J	mg/L
L1984427	GW-45804-083017-TS-005	Dissolved organic carbon (DOC)	1.0	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Dissolved organic carbon (DOC)	16.0	J	mg/L
L1984427	GW-45804-083017-TS-007	Dissolved organic carbon (DOC)	11.2	J	mg/L
L1984427	GW-45804-083017-TS-008	Dissolved organic carbon (DOC)	33.4	J	mg/L
L1984427	GW-45804-083017-TS-009	Dissolved organic carbon (DOC)	33.8	J	mg/L
L1984427	GW-45804-083017-TS-001	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-002	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-003	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-004	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-005	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-006	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-007	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-008	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-009	Escherichia coli	1	J	cfu/100 mL
L1984427	GW-45804-083017-TS-001	Iron (dissolved)	2.24	J	mg/L
L1984427	GW-45804-083017-TS-002	Iron (dissolved)	3.65	J	mg/L
L1984427	GW-45804-083017-TS-003	Iron (dissolved)	4.24	J	mg/L
L1984427	GW-45804-083017-TS-004	Iron (dissolved)	3.38	J	mg/L
L1984427	GW-45804-083017-TS-005	Iron (dissolved)	0.010	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Iron (dissolved)	1.41	J	mg/L
L1984427	GW-45804-083017-TS-007	Iron (dissolved)	0.157	J	mg/L
L1984427	GW-45804-083017-TS-008	Iron (dissolved)	0.10	UJ	mg/L

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-009	Iron (dissolved)	0.10	UJ	mg/L
L1984427	GW-45804-083017-TS-001	Manganese (dissolved)	1.99	J	mg/L
L1984427	GW-45804-083017-TS-002	Manganese (dissolved)	2.33	J	mg/L
L1984427	GW-45804-083017-TS-003	Manganese (dissolved)	1.19	J	mg/L
L1984427	GW-45804-083017-TS-004	Manganese (dissolved)	1.89	J	mg/L
L1984427	GW-45804-083017-TS-005	Manganese (dissolved)	0.00050	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Manganese (dissolved)	0.145	J	mg/L
L1984427	GW-45804-083017-TS-007	Manganese (dissolved)	0.760	J	mg/L
L1984427	GW-45804-083017-TS-008	Manganese (dissolved)	0.189	J	mg/L
L1984427	GW-45804-083017-TS-009	Manganese (dissolved)	0.191	J	mg/L
L1984427	GW-45804-083017-TS-001	Nitrate (as N)	0.109	J	mg/L
L1984427	GW-45804-083017-TS-002	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-003	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-004	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-005	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-007	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-008	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-009	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-001	Phosphorus	0.0141	J	mg/L
L1984427	GW-45804-083017-TS-002	Phosphorus	0.104	J	mg/L
L1984427	GW-45804-083017-TS-003	Phosphorus	0.100	J	mg/L
L1984427	GW-45804-083017-TS-004	Phosphorus	0.209	J	mg/L
L1984427	GW-45804-083017-TS-005	Phosphorus	0.0030	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Phosphorus	0.0481	J	mg/L
L1984427	GW-45804-083017-TS-007	Phosphorus	0.0365	J	mg/L
L1984427	GW-45804-083017-TS-008	Phosphorus	0.567	J	mg/L
L1984427	GW-45804-083017-TS-009	Phosphorus	0.584	J	mg/L

The following results are qualified based on field blank detections:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1936074	GW-45804-060217-TS-010	Ammonia-N	0.038	U	mg/L
L1936074	GW-45804-060217-TS-015	Ammonia-N	0.111	U	mg/L
L2029749	GW-45804-113017-TS-010	Ammonia-N	0.161	U	mg/L
L2029749	GW-45804-113017-TS-011	Ammonia-N	0.550	U	mg/L
L2029749	GW-45804-113017-TS-012	Ammonia-N	0.264	U	mg/L
L2029749	GW-45804-113017-TS-010	Dissolved organic carbon (DOC)	6.4	U	mg/L

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L2029749	GW-45804-113017-TS-011	Dissolved organic carbon (DOC)	2.6	U	mg/L
L2029749	GW-45804-113017-TS-012	Dissolved organic carbon (DOC)	3.0	U	mg/L
L2029749	GW-45804-113017-TS-013	Dissolved organic carbon (DOC)	6.4	U	mg/L

The following results are qualified based on field duplicate variability:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1933863	SW-45804-053017-TS-001	Escherichia coli	12	J	cfu/100 mL
L1933863	SW-45804-053017-TS-002	Escherichia coli	8	J	cfu/100 mL
L1935461	GW-45804-060117-TS-001	Phosphorus	0.0542	J	mg/L
L1935461	GW-45804-060117-TS-002	Phosphorus	0.0211	J	mg/L
L2029238	GW-45804-112917-TS-002	Phosphorus	0.0121	J	mg/L
L2029238	GW-45804-112917-TS-003	Phosphorus	0.0079	J	mg/L
L2029244	SW-45804-112917-TS-001	Nitrate (as N)	0.362	J	mg/L
L2029244	SW-45804-112917-TS-002	Nitrate (as N)	0.648	J	mg/L

Notes:

J - Estimated concentration
U - Not Detected
UJ - Non-detect with an Estimated Report Limit
N - Nitrogen
CFU – Colony Forming Units

Appendix E
2010 – 2017 Analytical Data

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-4580-011410-MB-003	GW-4580-011410-MB-004	GW-4580-052710-MB-016	GW-4580-110210-TS-007	GW-4580-111011-TS-013	GW-4580-051412-MB-006	GW-4580-052312-MB-001	GW-4580-111212-MB-003
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012
			Original	Duplicate	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**								
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	-	0.0058	0.0061	0.0062	-	0.0054
Boron (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	-	ND(0.050)
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	0.00146	-	0.00228
Copper (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Iron (dissolved)	mg/L	45.3	16.6	17.2	3.56	1.50	0.697	1.02	-	6.78
Lead (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	82.9	79.6	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	11.0	10.9	1.14	0.640	0.539	0.956	-	2.17
Mercury (dissolved)	mg/L	-	-	-	-	-	-	ND(0.00010)	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0124	0.0116	0.0530	0.0344	0.0056	0.0037	-	0.0056
Nickel (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0020)	-	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	-	ND(0.0030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	490	490	207	187	177	254	-	396
Ammonia-N	mg/L	4.0	0.898	0.828	0.593	0.335	0.410	1.06	-	1.68
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	-	7.5
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	51	-	55
Chloride	mg/L	-	66.1	66.6	109	47.5	37.9	99.8	-	70.7
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	220	249	69.2	151	29.5	-	107	43.1 J
Conductivity	umhos/cm	-	1750	1760	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	9.9	6.4	7.0	6.5	9.5	-	9.2
Escherichia coli	cfu/100mL	25.6	0	0	3	9	ND(2)	-	13	6
Fecal coliform bacteria	cfu/100mL	-	0	0	11	14	2	-	6	10
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	-	7.85	7.59	-	-	-	7.78	-	7.75
Phenol	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	7.2	0.127	0.067	1.80	5.46	3.13	2.68	-	1.67
Sulfide	mg/L	-	-	-	-	-	-	-	-	397
Total coliform bacteria	cfu/100mL	-	0	0	700	50	70	-	470	100
Total dissolved solids (TDS)	mg/L	-	1310	1320	1010	896	482	700	-	1110
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	2.29	-	2.95
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	3970	-	4820
Turbidity	NTU	-	63.0	64.0	-	-	-	-	24.0	7.50 J
Unionized ammonia	mg/L	-	0.000415	0.000362	0.00645	0.000111	0.00367	-	-	0.194
Field Parameters										
Conductivity, field	mS/cm	-	1.09	1.09	0.5	1.82	0.701	1.16	1.24	1.32
Dissolved oxygen (DO), field	mg/L	-	2.29	2.29	-	6.87	-	-	-	3.01
Oxidation reduction potential (ORP), field	millivolts	-	-85	-85	-	-143	-	-	-	-113
pH, field	s.u.	-	6.53	6.53	7.47	6.13	7.62	6.65	6.24	8.68
Temperature, field	Deg C	-	3.7	3.7	16.5	11.1	9.5	12.98	12.73	12.3
Turbidity, field	NTU	-	207	207	-	-	-5	-	-	-5
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	690	440	930	700	-	460
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	690	440	930	700	-	460
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	2840	1520	3410	2650	-	1710
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	8000	4100	10800	9000	-	6300
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	-	-	-

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-WB-003	GW-45804-011410-WB-004	GW-45804-052710-WB-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-WB-006	GW-45804-052312-WB-001	GW-45804-111212-WB-003
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012
			Original	Duplicate	Original	Original	Original	Original	Original	Original
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.068
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	0.024
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	0.029
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0160	0.0397	0.0276	0.00886	-	0.034
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.041
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.056
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	0.113
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.034
Fluorene	µg/L	-	-	-	-	-	-	-	-	0.040
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	-	-	0.047
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	0.056
Pyrene	µg/L	-	-	-	-	-	-	-	-	0.056

002451

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoirdl Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-WB-C14	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111615-TS-016	GW-45804-051716-TS-006	GW-45804-111516-TS-005	
Sample Date:		5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/16/2015	5/17/2016	11/15/2016	
		Original	Original	Original	Original	Duplicate	Original	Original	Original	Original	
Parameters:	**Units**										
Metals											
Arsenic (dissolved)	mg/L	0.0048	0.0031	0.0041	0.0016	0.0015	0.0034	0.00149	0.00188	0.00161	
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.017	0.032	0.026	
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00061	0.00066	ND(0.00050)	
Cobalt (dissolved)	mg/L	0.00077	0.00070	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	0.00011	ND(0.00010)	
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)	ND(0.00020)	0.00058	
Iron (dissolved)	mg/L	5.03	1.86	2.76	2.54	2.54	3.42	3.00	6.28	8.11	
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.000050)	ND(0.000050)	
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	
Manganese (dissolved)	mg/L	1.43	1.09	1.23	0.916	0.901	1.07	0.988	1.26	2.09	
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	
Molybdenum (dissolved)	mg/L	0.0109	0.0042	0.0045	0.0026	0.0027	0.0017	0.00160	0.00113	0.00160	
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	0.00084	0.00065	
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	
Zinc (dissolved)	mg/L	ND(0.0030)	0.0036	0.0047	ND(0.0030)	0.0058	ND(0.0030)	0.0024	0.0010	ND(0.0010)	
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	206	185	234 J	234	238	269	222	322	273	
Ammonia-N	mg/L	1.12	0.449	2.08 J	1.22	1.32	0.844	0.492	0.803	0.917	
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	49	53	45 J	24	15	36	21	35	33	
Chloride	mg/L	90	50.2	85.2 J	59	59	75.5	52.2	97.1	101	
Color (apparent)	color unit	-	-	148 J	146	136	-	-	260	448	
Color (apparent)	TCU	27.8	34.9	-	-	-	46.5	103	-	-	
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.2	7.6	6.4 J	7.4	7.3	10.7	7.6	9.7	7.3	
Escherichia coli	cfu/100mL	20	11	0 J	0	2	1	0	0	0	
Fecal coliform bacteria	cfu/100mL	40	15	0 J	0 J	4 J	1	0	0	0	
Nitrate (as N)	mg/L	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.020)	ND(0.020)	ND(0.10)	
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.050)	
pH, lab	s.u.	7.74	7.31	7.77 J	7.90	7.86	7.74	7.72	7.65	8.06	
Phenol	mg/L	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)	0.0101	0.0022	0.0022	0.0024	
Phosphorus	mg/L	3.27	3.32	0.174 J	0.206	0.208	1.67	0.162	0.118	0.147	
Sulfate	mg/L	337	231	194 J	141	137	86.7	80.8	149	559	
Total coliform bacteria	cfu/100mL	20	990	5 J	280	800	329	150	1	100	
Total dissolved solids (TDS)	mg/L	812	537	644 J	513	511	488	441	727	1360	
Total kjeldahl nitrogen (TKN)	mg/L	2.53	1.37	2.88 J	1.44	1.54	1.95	0.99	1.62	0.79	
Total suspended solids (TSS)	mg/L	2690	3220	5.6 J	7.6	6.4	2800	23.1	11.3	12.1	
Turbidity	NTU	56.0	46.8	15.7 J	29.4	28.2	40.0	40.4	78.1	107	
Un-ionized ammonia	mg/L	0.000445	0.000151	0.0173 J	0.00696	0.00753	0.00483	0.0287	0.00845	0.00227	
Field Parameters											
Conductivity, field	mS/cm	1.3	0.857	1.17	0.307	0.307	0.697	0.594	0.795	1.59	
Dissolved oxygen (DO), field	mg/L	4.46	7.02	0	3.32	3.32	5.32	0	0	6.35	
Oxidation reduction potential (ORP), field	millivolts	-	-	-175	-53	-53	-92	-119	-102	-95	
pH, field	s.u.	6.05	6.18	7.38	7.47	7.47	7.24	6.39	7.87	7	
Temperature, field	Deg C	15.9	10.0	15.65	8.11	8.11	14.97	11.3	11.51	11.23	
Turbidity, field	NTU	>5	857	3.1	-	-	0	33.5	0.9	0	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	-	-	-	-	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	530	760	ND(250) J	ND(250)	ND(250)	530	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	530	760	ND(250) J	ND(250)	ND(250)	-	-	-	-	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1820	3160	ND(250) J	ND(250)	ND(250)	2470	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	13600	20000	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)	-	-	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-	-	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)	-	-	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)	-	-	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	3000	ND(380)	ND(380)	ND(380)	

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MB-C14	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111515-TS-016	GW-45804-051716-TS-006	GW-45804-111516-TS-015
Sample Date:		5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/15/2015	5/17/2016	11/15/2016
		Original	Original	Original	Original	Duplicate	Original	Original	Original	Original
Semi-Volatiles										
1-Methylnaphthalene	µg/L	0.040	-	-	-	-	–	–	–	–
1+2-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	–	–	–	–
2-Methylnaphthalene	µg/L	0.026	-	-	-	-	–	–	–	–
Acenaphthene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Acenaphthylene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Acridine	µg/L	ND(4.0)	-	-	-	-	–	–	–	–
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Benzo(a)pyrene	µg/L	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.033	-	-	-	-	–	–	–	–
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	-	-	–	–	–	–
Benzo(g,h,i)perylene	µg/L	0.027	-	-	-	-	–	–	–	–
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Carcinogenic potency equivalent	µg/L	ND(0.060)	-	-	-	-	–	–	–	–
Chrysene	µg/L	0.070	-	-	-	-	–	–	–	–
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Fluoranthene	µg/L	0.039	-	-	-	-	–	–	–	–
Fluorene	µg/L	ND(0.30)	-	-	-	-	–	–	–	–
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-	-	–	–	–	–
Naphthalene	µg/L	0.049	-	-	-	-	–	–	–	–
Phenanthrene	µg/L	0.061	-	-	-	-	–	–	–	–
Pyrene	µg/L	0.040	-	-	-	-	–	–	–	–

002453

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-C1131E-TS-004	GW-45804-0518104-MB-007	GW-45804-110210-TS-006	GW-45804-0518114-MD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-DUP-1	GW-45804-0515124-MB-007	GW-45804-111212-MB-009
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	TLP[1]								
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	0.00012	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	0.00122	0.00058
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	0.0026	0.0026
Iron (dissolved)	mg/L	46.3	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	26.5	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	0.0070	0.0081	0.0077	0.0110	-	0.177	0.0352	0.0074
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0064	0.0129	0.0077	0.0104	-	0.0122	0.0088	0.0085
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0052	0.0050
Zinc (dissolved)	mg/L	-	0.103	0.0253	0.0127	0.0414	-	0.0128	0.0080	0.0100
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	209	261	314	281	294	-	273	329
Ammonia-N	mg/L	4.0	ND(0.050)	0.071	0.080	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	ND(10)	19
Chloride	mg/L	-	ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	-	ND(2.0)	2.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	32.7	66.3	15.1	25.2	9.9	-	11.5	-
Conductivity	umhos/cm	-	465	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.5	1.5	3.2	4.6	10.0	-	3.9	5.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)	-	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	-	ND(2)	ND(2)
Nitrate (as N)	mg/L	1.3	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	0.31
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	8.00	-	-	-	-	-	8.00	7.83
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.110	0.039	0.033	0.033	0.038	-	ND(0.030)	0.054
Sulfate	mg/L	-	-	-	-	-	-	-	-	216
Total coliform bacteria	cfu/100mL	-	1	2	30	210	2	-	ND(2)	10
Total dissolved solids (TDS)	mg/L	-	258	456	576	518	554	-	516	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.43	0.43
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	24.4	-
Turbidity	NTU	-	5.10	-	-	-	-	-	4.60	-
Un-ionized ammonia	mg/L	-	ND(0.000057)	0.00045	0.0096	ND(0.000076)	ND(0.00056)	-	-	ND(0.000040)

Table 6.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-C1131E-TS-004	GW-45804-051810-MB-007	GW-45804-110210-TS-006	GW-45804-051814-MD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	TLP[1]								
Field Parameters										
Conductivity, field	mS/cm	-	0.601	0.578	0.971	0.95	0.77	-	-	1.21
Dissolved oxygen (DO), field	mg/L	-	-	5.89	4.3	9.19	-	-	-	6.86
Oxidation reduction potential (ORP), field	millivolts	-	-	14	-77	213	-	-	-	248
pH, field	s.u.	-	6.76	7.38	6.68	6.96	7.68	-	-	6.70
Temperature, field	Deg C	-	7.8	12.12	10.9	6.14	10.8	-	-	11.6
Turbidity, field	NTU	-	255	-	-	3.5	84.4	-	-	953
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	390	ND(250)	ND(250)	ND(250)	-	-	ND(250)	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene; 2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.027
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Chrysene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45BC4-111312-IB-009	GW-45BC4-052313-TS-001	GW-45BC4-111413-TS-006	GW-45BC4-052914-IB-011	GW-45BC4-053014-IB-011	GW-45BC4-112514-TS-010	GW-45BC4-111015-TS-010	GW-45BC4-051716-TS-003	GW-45BC4-111616-TS-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	*Units*									
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00025	0.00024	0.00050
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	0.018	0.011	ND(0.010)
Cadmium (dissolved)	mg/L	-	0.00022	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	0.000035	0.000035	0.000019
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00102	0.00063	ND(0.00050)
Cobalt (dissolved)	mg/L	-	0.00295	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	ND(0.00010)	ND(0.00010)	0.00023
Copper (dissolved)	mg/L	-	0.0031	0.0036	0.0039	-	0.0027	0.00276	0.00369	0.0705
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.000050)	0.000129	0.000149
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	-	0.0381	0.0035	0.0018	-	0.0047	0.00072	0.00171	0.00270
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0173	0.0067	0.0133	-	0.0081	0.00905	0.00905	0.0218
Nickel (dissolved)	mg/L	-	0.0064	0.0046	0.0046	-	0.0038	0.00453	0.00424	0.00526
Zinc (dissolved)	mg/L	-	0.0153	0.0071	0.0106	-	0.0047	0.0064	0.0139	0.0064
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	-	263	310	282	-	325	324	264	186
Ammonia-N	mg/L	-	ND(0.050)	0.105	ND(0.050)	-	ND(0.050)	ND(0.050)	0.054	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	34	10	-	13	ND(10)	18	38
Chloride	mg/L	-	2.7	ND(2.0)	ND(2.0)	-	ND(10)	ND(2.5)	0.88	2.81
Color (apparent)	color unit	-	-	-	9.9	-	7.0	-	85.5	143
Color (apparent)	TCU	17.1	24.3 J	14.5	-	-	-	58.5	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	ND(3.8)	5.9	2.2	-	5.8	5.2	5.1	10.0
Escherichia coli	cfu/100mL	-	ND(2)	0	0	-	0	0	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	ND(2)	0	0	-	0	0	0	ND(2)
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.10)	ND(0.020)	0.226
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	7.98	7.79	7.71	-	7.80	7.79	7.89	7.86
Phenol	mg/L	-	ND(0.0010)	0.0019	0.0016	-	ND(0.0010)	0.0027	0.0024	ND(0.0013)
Phosphorus	mg/L	-	0.073	ND(0.030)	0.052	-	0.031	0.041	0.0091	0.0517
Sulfate	mg/L	-	147	119	106	-	106	228	116	135
Total coliform bacteria	cfu/100mL	-	ND(100)	1	5	-	270	30	39	300
Total dissolved solids (TDS)	mg/L	566	448	446	402	-	437	569	502	413
Total Kjeldahl nitrogen (TKN)	mg/L	-	0.18	0.41	ND(0.40)	-	0.20	0.73	0.27	1.00
Total suspended solids (TSS)	mg/L	59.2	194	65.2	17.2	-	ND(2.0)	74.2	567	81.7
Turbidity	NTU	19.1	8.88	0.58	2.22	-	0.62	31.9	64.5	26.6
Un-ionized ammonia	mg/L	-	ND(0.0000026)	0.000034	ND(0.00048)	-	-	ND(0.0070)	0.0064	ND(0.000080)

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011	GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010	GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Field Parameters										
Conductivity, field	mS/cm	-	1.96	0.832	0.686	0.686	0.661	0.678	0.527	-
Dissolved oxygen (DO), field	mg/L	-	6.41	8.16	6.81	6.81	6.02	3.1	4.96	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	94	94	67	55	110	-
pH, field	s.u.	-	5.30	6.16	7.53	7.53	7.51	8.74	8.74	-
Temperature, field	Deg C	-	13.0	10.1	13.12	13.12	9.16	13.08	10.58	-
Turbidity, field	NTU	-	325	230	35.6	35.6	-	44.1	177	-
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	ND(100) J	ND(100)	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250) J	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051510-MB-010	GW-45804-051510-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MD-009	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/15/2010	5/15/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	Units								
Metals									
Arsenic (dissolved)	mg/L	0.0049	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00005)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	62.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0053	0.0071	0.0016	0.0036	0.0066
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0769	0.0135	0.0147	0.0132	0.0152	0.0328
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0021
Zinc (dissolved)	mg/L	0.0199	0.0462	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0147	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	309	278	276	316	322	278	276	250
Ammonia-N	mg/L	0.123	0.077	0.078	0.073	0.056	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	15
Chloride	mg/L	35.1	28.4	31.6	27.5	27.4	21.8	55.7	43.9
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	10.2	16.9	16.7	58.3	42.9	34.4	16.3	52.4
Conductivity	umhos/cm	1080	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.8	1.7	3.5	8.0	3.1	2.5	ND(5.0)
Escherichia coli	cfu/100mL	0	0	0	0	0	0	2	0
Fecal coliform bacteria	cfu/100mL	0	0	0	1	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	7.87	-	-	-	-	-	-	7.96
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.378	0.105	0.090	0.093	0.079	0.075	ND(0.030)	0.240
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	3	1	10	120	430	1	60	0
Total dissolved solids (TDS)	mg/L	736	618	680	786	776	482	1040	799
Total Kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.20
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	303
Turbidity	NTU	2.70	-	-	-	-	-	-	148
Un-ionized ammonia	mg/L	0.0000039	0.00118	0.00119	0.000095	0.000076	ND(0.00012)	ND(0.000049)	-
Field Parameters									
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	4.42	-	-	1.47	1.47	-	1.47	2.87
Oxidation reduction potential (ORP), field	millivolts	-	38	38	394	394	-	120	51
pH, field	s.u.	5.05	7.75	7.75	6.82	6.82	7.08	6.88	6.67
Temperature, field	Deg C	9.6	12.5	12.5	8.4	8.4	8.61	8.7	9.81
Turbidity, field	NTU	424	-	-	-	-	150	99	504

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051510-WB-010	GW-45804-051510-WB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-WB-009	GW-45804-110911-TS-001	GW-45804-051512-WB-011
Sample Date:		1/13/2010	5/15/2010	5/15/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	Units								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

002459

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-1113124-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-016	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-51816-TS-017	GW-45804-111616-TS-014
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	Units									
Metals										
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.001D)	ND(0.0010)	ND(0.0010)	0.0002E	ND(0.0010)	0.00028
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.024	ND(0.10)	0.022
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00001E	ND(0.00010)	0.000013
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0005E	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	0.0018	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00048	ND(0.0020)	ND(0.00065)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.10)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00009	ND(0.00050)	0.000067
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0273	0.0014	0.0042	0.0055	ND(0.0010)	0.0012	ND(0.00050)	0.0386	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0203	0.0148	0.0165	0.0458	0.0300	0.121	0.0182	0.181	0.0162
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)	0.0028	0.0043	0.00230	0.0083	0.00226
Zinc (dissolved)	mg/L	ND(0.0030)	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0013	ND(0.010)	0.0069
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	309	275	295	282	283	250	279	239	277
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.051	ND(0.113)	ND(0.050)	ND(0.036)	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	11	30	12	ND(10)	ND(10)	ND(10)	14	13
Chloride	mg/L	85.4	46	43.1	46.8	52.5	59.6	44.1	64.3	56.9
Color (apparent)	color unit	-	-	-	10.4	13.3	-	-	17.1	4.2
Color (apparent)	TCU	45.5	34.0	50.7	-	-	11.2	17.2	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	3.2	2.9	2.7	1.5	1.7	3.4	2.9	2.4
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	1	0	0	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0	1	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.032	ND(0.020)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.010)
pH, lab	s.u.	7.76	7.67	7.62	7.62	7.52	7.81	7.62	7.93	7.24
Phenol	mg/L	ND(0.0010)	0.0030	0.0012	0.0045	ND(0.0010)	0.0017	0.0019	ND(0.0010)	ND(0.0006)
Phosphorus	mg/L	0.301	0.038	0.166	0.074	ND(0.030)	0.042	0.035	0.0778	0.0188
Sulfate	mg/L	495	292	445	222	456	474	413	506	361
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5	50	30	170	ND(10)	39
Total dissolved solids (TDS)	mg/L	1130	714	1020	613	994	882	884	1060	867
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	1.34	ND(0.52)	0.18	ND(0.15)	0.23	0.26	0.24
Total suspended solids (TSS)	mg/L	642	99.0	209	108	72.8	116	42.0	101	11.7
Turbidity	NTU	11.8	13.5	6.82	4.84	44.8	6.42	36.7	70.5	15.0
Un-ionized ammonia	mg/L	ND(0.00042)	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00030	0.00103	ND(0.0017)	0.0021	ND(0.0000045)
Field Parameters										
Conductivity, field	mS/cm	1.21	1.16	1.46	0.946	434	0.934	1.03	0.983	0.953
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73	8.64	8.93	0	1.26	0
Oxidation reduction potential (ORP), field	millivolts	16	-	-	105	80	175	-40	78	65
pH, field	s.u.	7.58	5.09	6.16	7.24	7.48	7.52	6.31	8.32	6.96
Temperature, field	Deg C	9.8	11.3	10.4	8.09	8.44	12.8	13.08	13.77	11.08
Turbidity, field	NTU	473	393	25	194	-	211	0.3	21	14.8

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-016	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-51816-TS-017	GW-45804-111616-TS-014
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	Units									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(200)	ND(200)	ND(200)	ND(200)	ND(200)	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(200)	ND(200)	ND(200)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	0.064	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	0.212	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.0072	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.04)	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.050)	-	-	-	-	-	-	-
Chrysene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Fluorene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Naphthalene	µg/L	-	0.113	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-	-	-

002461

Table 8.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.,
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-4SB04-051910-MB-009	GW-4SB04-051711-MWD-006	GW-4SB04-110911-TS-003	GW-4SB04-051412-MB-001	GW-4SB04-052312-MB-006	GW-4SB04-111212-MB-010	GW-4SB04-052213-TS-007	GW-4SB04-111413-TS-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	0.052	-	0.072	0.056	0.058
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	-	ND(0.00010)	0.00020	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	0.00122	-	0.00373	0.00058	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0014	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	0.220	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	-	0.320	0.416	0.230
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0299	0.0180	0.0235	0.0192	-	0.0481	0.0204	0.0185
Nickel (dissolved)	mg/L	-	-	-	0.0110	-	0.0053	0.0053	0.0053
Zinc (dissolved)	mg/L	0.0691	0.0131	0.0080	ND(0.0050)	-	0.0053	0.0100	0.0041
General Chemistry									
Alkalinity, total (as $CaCO_3$)	mg/L	367	416	378	388	-	387	405	372
Ammonia-N	mg/L	0.069	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)	-	23	13	21
Chloride	mg/L	64.6	73.6	70.4	81.3	-	72.3	78	69.2
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	20.3	36.5	77.5	-	91.7	39.4 J	29.7	61.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0	-	1.7	1.6	2.0
Escherichia coli	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(10)	0
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	0.13
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	ND(0.10)
pH, lab	s.u.	-	-	-	7.54	-	7.67	7.60	7.56
Phenol	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.158	0.058	0.479	0.100	-	0.228	0.058	0.109
Sulfate	mg/L	-	-	-	-	-	697	731	691
Total coliform bacteria	cfu/100mL	0	40	2	-	16	2	ND(100)	ND(10)
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530	-	1540	1450	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21	-	ND(0.15)	ND(0.15)	0.18
Total suspended solids (TSS)	mg/L	-	-	-	24.0	-	1370	100	361
Turbidity	NTU	-	-	-	-	22.0	4.60 J	10.3	6.56
Unionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	-	-	ND(0.00049)	ND(0.0000023)	ND(0.000019)
Field Parameters									
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03	1.75	1.99	0.96
Dissolved oxygen (DO_2), field	mg/L	-	-	-	-	-	4.89	6.28	7.73
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	18	47	-
pH, field	s.u.	7.44	5.95	7.00	6.43	6.27	7.57	5.20	6.20
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.51	12.0	13.4	10.4
Turbidity, field	NTU	-	455	389	-	-	355	594	58

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoriol Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-009	GW-45804-051711-MWD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001	GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene^2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.026)	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0059)	ND(0.0050)	-	ND(0.010)	ND(0.0050)	0.0061
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-

002463

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Metals							
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.052	0.062	0.060	ND(0.10)	0.054	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000049	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	0.00068	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	0.00021	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00059	0.0017
Iron (dissolved)	mg/L	ND(0.060)	ND(0.060)	ND(0.059)	ND(0.10)	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.270	0.0861	0.187	0.154	0.207	0.160
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0201	0.0233	0.0199	0.0242	0.0188	0.0211
Nickel (dissolved)	mg/L	0.0061	0.0051	0.0055	0.0052	0.00675	0.0064
Zinc (dissolved)	mg/L	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)	0.0017	ND(0.010)
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	360	338	343	349	338	342
Ammonia-N	mg/L	ND(0.067)	ND(0.050)	ND(0.050)	ND(0.050)	0.030	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	10
Chloride	mg/L	68.1	68	77.6	82.6	70.8	65.9
Color (apparent)	color unit	1.7 J	10.9	-	-	ND(1.0)	ND(2.0)
Color (apparent)	TCU	-	-	2.4	1.6	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(1.0)	1.1	1.5	2.3	3.5	1.1
Escherichia coli	cfu/100mL	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.32	0.18	0.18	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.49	7.66	7.77	7.83	7.79	7.98
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0056	0.0029	ND(0.0010)	0.0020
Phosphorus	mg/L	ND(0.030)	0.032	ND(0.030)	ND(0.030)	ND(0.0030)	0.0038
Sulfate	mg/L	821	895	865	755	860	816
Total coliform bacteria	cfu/100mL	0	0	0	1	1	0
Total dissolved solids (TDS)	mg/L	1370	1390	1360	1360	1500	1620
Total Kjeldahl nitrogen (TKN)	mg/L	ND(0.21)	ND(0.15)	ND(0.15)	0.28	ND(0.15)	0.15
Total suspended solids (TSS)	mg/L	7.2	10.0	6.5	2.4	ND(2.0)	ND(2.0)
Turbidity	NTU	0.22	4.22	ND(0.44)	0.88	0.16	1.21
Un-ionized ammonia	mg/L	0.00024	ND(0.00012)	ND(0.00015)	ND(0.0016)	0.00029	0.000194
Field Parameters							
Conductivity, field	mS/cm	2.04	-	1.42	1.4	1.22	1.69
Dissolved oxygen (DO), field	mg/L	0.58	-	2.21	0	5.67	0
Oxidation reduction potential (ORP), field	millivolts	99	-	181	-7	108	77
pH, field	s.u.	7.11	7.07	6.83	6.15	7.58	7.24
Temperature, field	Deg C	12.62	8.5	15.83	10.14	11.88	10.38
Turbidity, field	NTU	57	-	0	0.6	1	2

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-018	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-			-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(360)	ND(360)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

Table 8.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051510-MB-009	GW-45804-110210-TS-011	GW-45804-051711-MD-007	GW-45804-110911-TS-002	GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-005
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	Units								
Metals									
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	0.059	-	0.059	0.065
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00015	-	0.00011	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	0.00231	-	0.00186	0.00287
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.409	0.487	0.301	0.781	0.099	-	ND(0.050)	0.247
Lead (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.292	0.372	-	0.422	0.317
Mercury (dissolved)	mg/L	-	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0408	0.0379	0.0360	0.0317	-	0.0226	0.0462
Nickel (dissolved)	mg/L	-	-	-	-	0.0054	-	0.0110	0.0058
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0030)	-	0.0073	0.0054
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	459	427	376	397	351	-	396	383
Ammonia-N	mg/L	0.117	0.084	0.061	0.052	ND(0.050)	-	ND(0.050)	0.066
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	ND(10)	-	13	21
Chloride	mg/L	81.4	203	87.3	93.4	78.0	-	80.4	66
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	25.4	93.5	139	86.4	-	271	11.2 J	33.5
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.9	2.7	3.1	1.7	-	1.8	1.6
Escherichia coli	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	0.13	-	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)
pH, lab	s.u.	-	-	-	-	7.67	-	7.74	7.73
Phenol	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0040
Phosphorus	mg/L	0.974	1.05	1.23	1.49	0.672	-	0.293	0.906
Sulfate	mg/L	-	-	-	-	-	-	718	786
Total coliform bacteria	cfu/100mL	0	4	3	2	-	0	10	ND(10)
Total dissolved solids (TDS)	mg/L	1950	1920	1700	1730	1740	-	1600	1540
Total Kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.19	-	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	-	-	-	-	5280	-	528	1710
Turbidity	NTU	-	-	-	-	-	67.0	2.69 J	84.0
Unionized ammonia	mg/L	0.00085	0.000021	0.00039	0.00014	-	-	ND(0.0065)	0.0000073

Table 8.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051510-MB-009	GW-45804-110210-TS-011	GW-45804-051711-MD-007	GW-45804-110911-TS-002	GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-005
Sample Date:		5/15/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	Units								
Field Parameters									
Conductivity, field	mS/cm	1.96	2.41	2.55	2.46	2.13	2.1	1.88	1.96
Dissolved oxygen (DO), field	mg/L	-	3.38	-	-	-	-	5.47	8.74
Oxidation reduction potential (ORP), field	millivolts	-	5	-	-	-	-	-75	-8
pH, field	s.u.	7.46	6.09	7.3	7.04	6.27	6.27	8.70	5.54
Temperature, field	Deg C	11.4	11.4	7.68	11.4	10.32	13.03	13.3	14.6
Turbidity, field	NTU	-	-	-	-5	-	-	640	-5
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1520	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	3800	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16, F2 less naphthalene	µg/L	ND(100)	ND(100)	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene-2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0309	0.0159	0.0059	0.0074	0.0121	-	ND(0.010)	0.0063
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.039)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)

002497

Table 8.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoid Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW-45804-111615-TS-015	GW-45804-051716-TS-008	GW-45804-111516-TS-007
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
		Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	0.00017
Boron (dissolved)	mg/L	0.070	0.059	0.071	0.054	0.10	0.056	0.074
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000012	0.000021
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	0.00144	0.00061	0.00145	0.00065	ND(0.0010)	0.00023	0.00036
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00035	0.00287
Iron (dissolved)	mg/L	1.86	0.231	0.383	0.380	0.13	0.045	0.410
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	0.218	0.182	0.234	0.169	0.137	0.160	0.126
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0361	0.0445	0.0397	0.0415	0.0532	0.0266	0.0459
Nickel (dissolved)	mg/L	0.0023	0.0022	ND(0.0020)	0.0022	ND(0.0050)	0.00136	0.00142
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0095	0.0091	ND(0.010)	0.0029	ND(0.0010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	350	309	328	310	346	314	313
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.131)	ND(0.050)	0.097	0.073
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	42	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	14
Chloride	mg/L	67.4	73.5	69	63.7	71.4	64.4	77.2
Color (apparent)	color unit	-	12.0	16.0	-	-	3.8	13.2
Color (apparent)	TCU	117	-	-	17.7	7.8	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	2.0	1.7	1.3	1.9	2.8	1.3
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	0.24	ND(0.50)	0.10	0.24	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.58	7.48	7.72	7.75	7.73	7.84	7.24
Phenol	mg/L	ND(0.0010)	0.0018	ND(0.0010)	0.0036	0.0030	ND(0.0010)	0.0034
Phosphorus	mg/L	1.75	0.070	0.097	0.045	ND(0.030)	0.0046	0.0053
Sulfate	mg/L	702	646	710	755	716	663	710
Total coliform bacteria	cfu/100mL	ND(10)	5	0	0	1	1	0
Total dissolved solids (TDS)	mg/L	1460	1380	1460	1280	1310	1420	1460
Total Kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	ND(0.15)	ND(0.15)	0.48	0.29	ND(0.15)	0.16
Total suspended solids (TSS)	mg/L	2950	110	61.2	23.3	10.4	2.8	9.5
Turbidity	NTU	19.4	22.0	9.33	13.9	6.22	1.41	3.99
Un-ionized ammonia	mg/L	ND(0.000016)	ND(0.00016)	ND(0.00016)	0.00041	ND(0.0019)	0.00056	0.000237

Table B.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organoclad Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-JB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111515-TS-015	GW-45804-051716-TS-008	GW-45804-111516-TS-007
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
		Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**							
Field Parameters								
Conductivity, field	mS/cm	2.01	2	0.059	1.89	1.89	1.04	1.58
Dissolved oxygen (DO), field	mg/L	6.45	6.85	8.44	1.63	1.63	0	0.15
Oxidation reduction potential (ORP), field	millivolts	-	10	19	191	191	45	-55
pH, field	s.u.	6.17	7.2	7.21	6.98	6.98	7.66	7.09
Temperature, field	Deg C	11.2	9.82	10.23	14.98	14.98	15.72	11.96
Turbidity, field	NTU	556	54.5	-	34.3	34.3	6.6	1.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	280	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	280	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	300	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	580	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
1-Methylnaphthalene+2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--
Anthracene	µg/L	ND(0.020)	0.038	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0064	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**TLP[1]**									
Metals											
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0010	ND(0.0010)	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L		-	-	-	-	-	-	0.054	0.056	-
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Calcium (dissolved)	mg/L		-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L		-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00080)	ND(0.00080)	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-
Iron (dissolved)	mg/L	48.2	1.99	4.88	4.18	5.18	3.92	3.83	6.27	6.24	-
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-
Magnesium (dissolved)	mg/L	-	116	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.65	3.25	2.99	3.59	3.42	3.47	4.73	4.79	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)	-
Molybdenum (dissolved)	mg/L	-	0.024	0.018	0.022	0.0095	0.0133	0.0129	0.0068	0.0068	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0020)	ND(0.0020)	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.139	ND(0.030)	ND(0.030)	0.0093	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0087	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	360	408	487	485	541	534	527	517	477
Ammonia-N	mg/L	4.0	0.698	0.663	0.320	3.90	4.77	4.76	7.39	6.85	9.99
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	45	35	-
Chloride	mg/L	-	94.4	147	66.5	103	106	108	-	-	104
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	23.1	25.9	128	102	29.2	23.6	10.9	13.0	25.6
Conductivity	umhos/cm	-	2150	-	-	-	-	-	-	-	2170
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.6	6.5	6.6	10.0	10.0	10.0	11.0	9.4	8.0
Escherichia coli	cfu/100mL	25.5	0	0	0	0	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	ND(2)	0	0	0 J
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)
Petroleum Products	mg/L	-	-	-	-	-	-	-	ND(1.0)	ND(1.0)	-
pH, lab	s.u.	-	7.68	-	-	-	-	-	7.56	7.53	7.08
Phenol	mg/L	-	-	-	-	-	-	-	0.0010	0.0010	-
Phosphorus	mg/L	7.2	5.11	1.20	0.758	0.167	0.482	0.519	0.636	0.631	0.706
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	3	0	6	10	4	ND(2)	0	0	1
Total dissolved solids (TDS)	mg/L	-	1750	1620	1350	1740	1610	1610	1800	1780	1790
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	10.5	9.87	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	2010 J	770 J	-
Turbidity	NTU	-	4.10	-	-	-	-	-	116	156	18.6
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-
Field Parameters		-									
		-									
Conductivity, field	mS/cm	-	2.56	0.957	2.15	2.87	2.48	-	2.51	2.51	2.56
Dissolved oxygen (DO), field	mg/L	-	-	-	4.92	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-57	-	-	-	-	-	-
pH, field	s.u.	-	5.54	6.83	5.72	6.52	7.15	7.15	6.57	6.57	5.23
Temperature, field	Deg C	-	9.6	11.6	14.9	6.8	13.7	13.7	7.52	7.52	8.4
Turbidity, field	NTU	-	0	-	-	286	852	-	-5	-5	-5

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051610-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**TLP[1]**									
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	12500	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	ND(2500)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	12400	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	36800	4400	2010	550	1770	1640	2470 J	610 J	4700
Petroleum hydrocarbons F4 gravimetric - silica gell (SHH)	µg/L	-	104000	13800	4500	-	4500	4100	6300	-	10300
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16, F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	-	-	-	ND(100)	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	49300	4400	2830	550	2370	2200	3190 J	610 J	4700
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-	-	-	-
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	0.27	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	0.24	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	0.25	0.141	0.023	0.100	0.151	0.074	0.068	-
Benzo(a)anthracene	µg/L	-	-	0.80	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.648	0.520	0.0435	0.244 J	0.470 J	0.234	0.218	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.54	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.88	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.64	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.51	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.79	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.41	-	-	-	-	-	-	-

002471

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-032112-MB-008	GW-45804-051412-MB-003	GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-060812-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004	GW-45804-052213-TS-013	GW-45804-080713-TS-004
Sample Date:		3/21/2012	5/14/2012	5/14/2012	5/23/2012	6/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013
		Original	Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**										
Metals											
Aluminum (dissolved)	mg/L	-	-	-	-	ND(0.10)	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	ND(0.050)	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	ND(0.010)	0.0019	0.0012	ND(0.0010)	0.0012	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	0.15	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	ND(0.010)	-	-	-	-	-
Boron (dissolved)	mg/L	-	0.067	0.064	-	ND(0.50)	0.073	0.057	0.055	0.064	0.074
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	-	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	292	-	-	-	-	-
Chromium (dissolved)	mg/L	-	ND(0.0010)	0.0015	-	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	-	ND(0.0050)	0.00033	0.00063	0.00056	0.00121	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	-	5.88	5.95	-	5.58	6.79	7.31	7.24	7.47	4.79
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	92.0	-	-	-	-	-
Manganese (dissolved)	mg/L	-	3.88	3.95	-	3.40	4.27	4.40	4.65	4.28	3.45
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0093	0.0094	-	0.014	0.0158	0.0110	0.0108	0.0163	0.0103
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	-	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	ND(0.50)	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	19	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	ND(0.0040)	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	10	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	101	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	3.31	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	ND(0.0030)	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	ND(0.010)	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	ND(0.020)	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	ND(0.10)	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	ND(0.050)	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.0030	ND(0.0030)	-	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	ND(0.040)	-	-	-	-	-
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	-	488	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	ND(10)	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	ND(10)	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	-	442	436	-	490	525	488	494	483	495
Ammonia-N	mg/L	10.3	10.1	10.0	-	6.90	3.35	12.1	12.6	10.3	16.3
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	30	25	-	36	44	59	57	38	30
Chloride	mg/L	-	116	116	-	178	142	149	149	320	144
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	-	-	106	57.4	52.1 J	55.0	46.4	28.0	66.5
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	9.4	9.4	-	8.1	8.3	12.1	11.1	8.3	9.5
Escherichia coli	cfu/100mL	0	-	-	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0 J	-	-	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	7.58	7.58	-	7.75	7.57	7.54	7.66	7.58	7.41
Phenol	mg/L	-	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	0.560	0.408	-	0.651	0.183	0.474	0.626	0.332	0.148
Sulfate	mg/L	-	-	-	-	-	424	872	872	581	773
Total coliform bacteria	cfu/100mL	0	-	-	ND(10)	0	2	ND(2)	2	100	10
Total dissolved solids (TDS)	mg/L	-	1720	1710	-	1740	1420	2030	2020	1910	1920
Total kjeldahl nitrogen (TKN)	mg/L	-	11.8	12.2	-	10.8	3.99	13.5	14.1	10.8	16.8
Total suspended solids (TSS)	mg/L	-	380	246	-	304	86.0	700 J	1400 J	650	16.4
Turbidity	NTU	-	-	-	26.0	29.0	6.90 J	39.0 J	20.7 J	19.2	28.0
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity, field	mS/cm	2.56	2.45	-	3.06	2.21	1.94	2.85	-	2.84	2.54
Dissolved oxygen (DO), field	mg/L	-	-	-	-	5.69	3.34	5.71	-	5.71	5.69
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-87	-	-	-87	-101
pH, field	s.u.	5.23	6.26	-	6.17	7.87	8.37	7.31	7.31	5.75	6.56
Temperature, field	Deg C	6.4	10.23	-	10.17	16.54	14.8	7.8	7.8	11.5	17.4
Turbidity, field	NTU	-5	-	-	-	463	199	939	-	818	2.2

GHD 045204 (72)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-032112-MB-008	GW-45804-051412-MB-003	GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-06-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004	GW-45804-052213-TS-013	GW-45804-080713-TS-004
Sample Date:		3/21/2012	5/14/2012	5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013
		Original	Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**										
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	280	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	280	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	690	840	-	1600	510	ND(420)	ND(250)	730	ND(250)
Petroleum hydrocarbons F4 gravimetric + silica gel (GHH)	µg/L	-	ND(2500)	2700	-	4400	ND(2500)	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	690	840	-	2140	510	ND(420)	ND(250)	980	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	-
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.027)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.28)	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.026)	-
Acenaphthene	µg/L	-	-	-	-	0.26	0.098	-	-	0.142	-
Acenaphthylene	µg/L	-	-	-	-	0.23	0.093	-	-	0.162	-
Acridine	µg/L	-	-	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	ND(0.020)	0.023	-	ND(0.20)	0.060	ND(0.20)	ND(0.20)	0.048	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	0.31	0.220	-	-	0.181	-
Benzo(a)pyrene	µg/L	-	0.0225 J	0.0282 J	-	0.28	0.197	0.11 J	0.31 J	0.159	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	0.33	0.184	-	-	0.199	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	0.23	0.117	-	-	0.113	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	0.20	0.152	-	-	0.167	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	0.257	-
Chrysene	µg/L	-	-	-	-	0.38	0.228	-	-	0.196	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.20)	0.038	-	-	0.029	-
Fluoranthene	µg/L	-	-	-	-	1.02	0.548	-	-	0.525	-
Fluorene	µg/L	-	-	-	-	ND(0.20)	0.034	-	-	ND(0.13)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.20)	0.120	-	-	0.117	-
Naphthalene	µg/L	-	-	-	-	ND(0.20)	ND(0.020)	-	-	0.024 J	-
Phenanthrene	µg/L	-	-	-	-	0.29	0.153	-	-	0.132	-
Pyrene	µg/L	-	-	-	-	0.85	0.480	-	-	0.458	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-111413-TS-011	GW-45804-042114-TS-005	GW-45804-052914-MB-012	GW-45804-053014-MB-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006
Sample Date:		11/14/2013	4/21/2014	5/29/2014	5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.060	ND(0.050)	0.063	-	0.066	0.066	ND(0.10)	ND(0.10)	0.10
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)
Iron (dissolved)	mg/L	5.00	6.73	6.53	-	4.68	7.82	14.5	7.55	10.9
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.36	3.08	3.28	-	2.50	2.45	5.33	3.60	3.86
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0102	0.0061	0.0068	-	0.0144	0.0339	0.0156	0.0071	0.0204
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	-	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.030)	ND(0.010)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	596	860	-	742 J	673 J	445	446	517	586
Ammonia-N	mg/L	18.4	26.4	30.4	-	26.0 J	6.91	9.71	33.2	37.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	55	ND(43)	41	-	34 J	33	65	34	45
Chloride	mg/L	149	269	-	231 J	207 J	244	1160	174	693
Color (apparent)	color unit	-	163 J	-	260 J	102 J	101			
Color (apparent)	TCU	130	-	-	-	-	-	74.4	34.2	161
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.8	7.5	7.1	-	8.4 J	9.2	5.4	7.7	8.5
Escherichia coli	cfu/100mL	0	0	0	-	0 J	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	-	1 J	0	ND(2)	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.51	7.31	-	7.52 J	7.43 J	7.48	7.37	7.75	7.81
Phenol	mg/L	0.0012	0.0076	0.0011	-	0.0011 J	0.0010	ND(0.0015)	0.0035	ND(0.0022)
Phosphorus	mg/L	0.404	0.183	0.188	-	0.161 J	0.105	0.912	0.365	0.131
Sulfate	mg/L	530	297	-	421 J	411 J	172	227	880	505
Total coliform bacteria	cfu/100mL	ND(10)	0	0	-	2 J	0	96	ND(100)	100
Total dissolved solids (TDS)	mg/L	1760	1480	-	1640 J	1420 J	1130	2470	1590	2300
Total kjeldahl nitrogen (TKN)	mg/L	20.3	26.9	26.0	-	25.8 J	9.31	9.19	37.9	26.3
Total suspended solids (TSS)	mg/L	391	21.5	-	17.6 J	9.6 J	20.8	1020	530	25.3
Turbidity	NTU	50.0	87.0	51.0	-	46.7 J	116	43.0	47.0	130
Un-ionized ammonia	mg/L	-	-	-	-	-	-	0.0307	0.203	0.292
Field Parameters										
Conductivity, field	mS/cm	2.55	2.57	2.86	2.86	2.57	1.107	2.679	2.49	2.64
Dissolved oxygen (DO), field	mg/L	7.15	4.86	0	0	1.06	3.93	-	-	6.44
Oxidation reduction potential (ORP), field	millivolts	-	-132	-168	-140	-139	-83	-	-	-125
pH, field	s.u.	6.24	7.15 D 7.15	7.31	7.4	8.53	6.62	7.36	7.39	7.35
Temperature, field	Deg C	13.2	9.9 D 9.85	9.44	9.5	18.99	10.38	3.89	11.54	22.72
Turbidity, field	NTU	243	22.9	5.7	32.2	44	-	-	294	173

GHD 045804 (12)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-111413-TS-011	GW-45804-042114-TS-005	GW-45804-052914-MB-012	GW-45804-053014-MB-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006
Sample Date:		11/14/2013	4/21/2014	5/29/2014	5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	120	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	270	ND(250)	ND(250)	-	ND(250) J	ND(250)	510	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	270	ND(250)	ND(250)	-	ND(250) J	ND(250)	500	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1010	ND(250)	ND(250)	-	ND(250) J	ND(250)	1500	530	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	1280	ND(380)	ND(380)	-	ND(380) J	ND(380)	2010	530	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--	--	--
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
1-Methylnaphthalene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Acenaphthene	µg/L	-	0.184	-	-	-	-	--	--	--
Acenaphthylene	µg/L	-	ND(0.187)	-	-	-	-	--	--	--
Acridine	µg/L	-	ND(4.0)	-	-	-	-	--	--	--
Anthracene	µg/L	0.029	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.20)	0.047	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	0.0634	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	ND(0.06)	-	-	-	-	--	--	--
Chrysene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Fluoranthene	µg/L	-	0.121	-	-	-	-	--	--	--
Fluorene	µg/L	-	0.049	-	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Naphthalene	µg/L	-	ND(0.050)	-	-	-	-	--	--	--
Phenanthrene	µg/L	-	ND(0.020)	-	-	-	-	--	--	--
Pyrene	µg/L	-	0.079	-	-	-	-	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-111015-TS-007	GW-45804-021016-TS-003	GW-45804-051616-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012
Sample Date:		11/10/2015	2/10/2016	5/16/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Aluminum (dissolved)	mg/L	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00018	0.0020	0.00089
Barium (dissolved)	mg/L	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--
Boron (dissolved)	mg/L	0.12	ND(0.10)	0.069	0.12	0.087
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	0.000015	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00063)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00014	ND(0.0010)	0.00024
Copper (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.00034	ND(0.0020)	ND(0.00070)
Iron (dissolved)	mg/L	4.86	5.58	6.86	10.3	4.89
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--
Manganese (dissolved)	mg/L	2.94	3.07	3.06	3.56	2.67
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00860	ND(0.00771)	0.00825	0.0174	0.00993
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00154	ND(0.0050)	0.00164
Phosphorus (dissolved)	mg/L	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0040)	ND(0.010)	ND(0.0010)
Zirconium (dissolved)	mg/L	--	--	--	--	--
General Chemistry						
Alkalinity, bicarbonate	mg/L	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	504	ND(459)	463	553	553
Ammonia-N	mg/L	24.5	12.7	18.9	17.4	14.7
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	32	ND(25)	27	74	34
Chloride	mg/L	165	ND(135)	126	656	140
Color (apparent)	color unit		240 J	115	243	184
Color (apparent)	TCU	151	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.8	ND(6.6)	6.7	11.4	8.7
Escherichia coli	cfu/100mL	0	0	0	1	0
Fecal coliform bacteria	cfu/100mL	0	0	0	23	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
Petroleum Products	mg/L	--	--	--	--	--
pH, lab	s.u.	7.82	7.76	7.88	7.54	7.18
Phenol	mg/L	0.0016	ND(0.0010)	ND(0.0019)	0.0056	ND(0.0026)
Phosphorus	mg/L	0.133	0.126	0.126	0.135	0.141
Sulfate	mg/L	675	ND(635)	749	405	504
Total coliform bacteria	cfu/100mL	0	0	0	600	0
Total dissolved solids (TDS)	mg/L	1710	ND(1490)	1700	2350	1510
Total Kjeldahl nitrogen (TKN)	mg/L	28.3	16.6	18.2	18.4	15.1
Total suspended solids (TSS)	mg/L	10.6	ND(7.4)	20.4	20.2	9.0
Turbidity	NTU	53.3	65.8 J	76.2	136	57.2
Un-ionized ammonia	mg/L	0.823	0.0588	0.159	0.0682	0.0450
Field Parameters						
Conductivity, field	mS/cm	2.54	2.11	2.01	3.01	2.01
Dissolved oxygen (DO), field	mg/L	0.1	0	0	0	0
Oxidation reduction potential (ORP), field	millivolts	-144	-115	-75	-62	-101
pH, field	s.u.	8.06	7.29	7.64	6.95	7.06
Temperature, field	Deg C	15.28	5.82	10.31	18.58	14.14
Turbidity, field	NTU	4.3	65.4	0.6	0	29.2

002476

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-111015-TS-007	GW-45804-021016-TS-003	GW-45804-051616-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012
Sample Date:		11/10/2015	2/10/2016	5/16/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)	--	--	--	--
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00ED)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--
Chysene	µg/L	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgroworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-006	GW-45804-081611-TS-004	GW-45804-111011-TS-009	GW-45804-021512-MB-002
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011	2/15/2012
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0032	0.0098	0.0101	0.0196	ND(0.010)	0.0026	0.0073
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.0026
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.00080
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	0.068	ND(0.050)	0.179	0.252	ND(0.050)	0.058	2.89	0.154	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	98.1	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.462	0.570	0.859	1.61	0.797	1.50	1.66	1.11	0.836
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0633	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)	0.0021
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.0041
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.190	0.0074	0.025	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	175	831	442	510	499	663	452	477	941
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1	15.8	23.0	96.9
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	8.5	40.6	2.5	12.6	149
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	524
Chloride	mg/L	29.7	36.8	93.4	166	63.7	82.1	87.6	74.1	-
Color (apparent)	TCU	5.1	161	53.2	187	239	102	114	17.0	310
Conductivity	umhos/cm	1920	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	266	9.0	80.0	16.7	25.0	9.3	7.7	104
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2	2970
Fecal coliform bacteria	cfu/100mL	0	50	90	6000	80	160	20	10	150000
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)	ND(1.0)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)	ND(1.0)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	ND(2.0)
Petroleum Products	SU	7.90	-	-	-	-	-	-	-	7.95
Phenol	mg/L	-	-	-	-	-	-	-	-	0.0890
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570	0.127	0.134	1.36
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	80	350	18000	13700	1510	290	210	93000
Total dissolved solids (TDS)	mg/L	1720	1960	1700	1640	1330	2290	1680	1610	1160
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	127
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	10.0
Turbidity	NTU	1.04	-	-	-	-	-	-	-	200
Un-ionized ammonia	mg/L	ND(0.000019)	0.512	0.0224	0.0474	0.0159	0.0645	0.0523	0.0858	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgroworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-006	GW-45804-081611-TS-004	GW-45804-111011-TS-009	GW-45804-021512-MB-002
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011	2/15/2012
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Field Parameters										
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43	2.62
Dissolved oxygen (DO), field	mg/L	1.73	25.6	0	0	-	-	0	2.48	-
Oxidation reduction potential (ORP), field	millivolts	23	-341	-268	-282	-333	-	-279	-236	-
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.28	6.88	6.87	6.9
Temperature, field	Deg C	4.8	14.07	22.3	17.3	11.0	15.99	21.7	17.5	11.87
Turbidity, field	NTU	185	-	-	-	-	-	166	15.3	50.3
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	40
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	110
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-	-	-	-	110
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgnworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Duplicate	Original	Original	Original
Parameters:	Units					
Metals						
Aluminum (dissolved)	mg/L	-	-	-	ND(0.10)	-
Antimony (dissolved)	mg/L	-	-	-	ND(0.050)	-
Arsenic (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	-	-	-	0.11	-
Beryllium (dissolved)	mg/L	-	-	-	ND(0.010)	-
Bismuth (dissolved)	mg/L	-	-	-	ND(0.010)	-
Boron (dissolved)	mg/L	-	-	0.064	ND(0.50)	0.069
Cadmium (dissolved)	mg/L	-	-	ND(0.00010)	ND(0.00080)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	282	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	-	-	1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	86.9	-
Manganese (dissolved)	mg/L	-	-	1.21	1.12	1.17
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	-	-	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	ND(0.50)	-
Potassium (dissolved)	mg/L	-	-	-	24	-
Selenium (dissolved)	mg/L	-	-	-	ND(0.0040)	-
Silicon (dissolved)	mg/L	-	-	-	ND(10)	-
Silver (dissolved)	mg/L	-	-	-	ND(0.0010)	-
Sodium (dissolved)	mg/L	-	-	-	54.2	-
Strontium (dissolved)	mg/L	-	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	-	ND(0.0030)	-
Tin (dissolved)	mg/L	-	-	-	ND(0.010)	-
Titanium (dissolved)	mg/L	-	-	-	ND(0.020)	-
Tungsten (dissolved)	mg/L	-	-	-	ND(0.10)	-
Uranium (dissolved)	mg/L	-	-	-	ND(0.050)	-
Vanadium (dissolved)	mg/L	-	-	-	ND(0.010)	-
Zinc (dissolved)	mg/L	-	-	0.0052	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	ND(0.040)	-
General Chemistry						
Alkalinity, bicarbonate	mg/L	-	-	-	442	-
Alkalinity, carbonate	mg/L	-	-	-	ND(10)	-
Alkalinity, hydroxide	mg/L	-	-	-	ND(10)	-
Alkalinity, total (as CaCO3)	mg/L	288	285	284	445	466
Ammonia-N	mg/L	10.8	10.8	7.89	106	96.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.5)	ND(2.5)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	-	-	11	42	114
Chloride	mg/L	92.9	95.9	106	87.3	157
Color (apparent)	TCU	511.2	48.9	60.4	34.4	169
Conductivity	umhos/cm	1610	1620	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.6	7.3	6.2	8.7	36.0
Escherichia coli	cfu/100mL	28	41	1	30	10
Fecal coliform bacteria	cfu/100mL	100 J	400 J	1	126	20
Nitrate (as N)	mg/L	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	ND(0.20)	-	-
Petroleum Products	s.u.	7.37	7.74	7.87	7.75	7.82
Phenol	mg/L	-	-	ND(0.0010)	0.0030	0.0280
Phosphorus	mg/L	0.150	0.143	0.079	0.310	0.138
Sulfate	mg/L	-	-	-	-	1060
Total coliform bacteria	cfu/100mL	93000	96000	21	190	110
Total dissolved solids (TDS)	mg/L	1560	1570	1530	1780	2240
Total kjeldahl nitrogen (TKN)	mg/L	-	-	9.54	110	46.6
Total suspended solids (TSS)	mg/L	-	-	6.8	7.2	17.0
Turbidity	NTU	7.00	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	0.000764	0.000753	-	-	0.668

002480

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgroworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Duplicate	Original	Original	Original
Parameters:	Units					
Field Parameters						
Conductivity, field	mS/cm	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	-	-	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	-	-	123	-271	-546
pH, field	s.u.	5.39	5.39	6.8	8.2	7.70
Temperature, field	Deg C	13.3	13.3	15.79	24.2	16.5
Turbidity, field	NTU	169	169	52.3	4.3	0
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	ND(0.020)	-
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	ND(0.020)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	ND(0.020)	-
Chrysene	µg/L	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	ND(0.053)	-
Phenanthrene	µg/L	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	ND(0.020)	-

002481

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-MB-010
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**						
Metals								
Arsenic (dissolved)	mg/L	-	0.0045	0.0025	0.0012	0.0063	ND(0.0010)	0.0019
Boron (dissolved)	mg/L	-	0.076	0.116	0.158	0.150	0.151	0.112
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00227	0.00085	ND(0.00050)	0.00251	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0028	ND(0.0010)	0.0022	ND(0.0010)
Iron (dissolved)	mg/L	46.3	34.5	4.06	ND(0.050)	12.6	ND(0.050)	0.209
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	2.24	1.21	0.179	0.711	0.0299	0.530
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0543	0.0196	0.0177	0.0270	0.0160	0.0230
Nickel (dissolved)	mg/L	-	0.0030	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030
Zinc (dissolved)	mg/L	-	0.0085	0.0146	0.0074	0.0063	ND(0.0030)	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	633	368	464	409	667	476	460
Ammonia-N	mg/L	4.0	6.98	11.8	9.32	13.7	22.1	34.9
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2
Chemical oxygen demand (COD)	mg/L	-	74	27	30	55	ND(41)	14
Chloride	mg/L	-	157	141	135	164	194	146
Color (apparent)	color unit	-	-	-	-	-	16.8 J	15.9
Color (apparent)	TCU	-	76.5	29.8 J	8.2	121	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	14.8	ND(7.8)	5.8	13.0	5.4	3.6
Escherichia coli	cfu/100mL	25.6	ND(2)	ND(2)	ND(2)	ND(2)	60	0
Fecal coliform bacteria	cfu/100mL	-	ND(2) J	ND(2)	2	ND(2)	80	0
Nitrate (as N)	mg/L	1.3	0.21	5.52	2.15	0.18	0.64	0.64
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.26	7.82	7.20	7.37	7.23	7.42
Phenol	mg/L	-	ND(0.0010)	ND(0.0030)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)
Phosphorus	mg/L	7.2	0.097	0.313	ND(0.030)	1.13	ND(0.030)	0.032
Sulfate	mg/L	-	1060	797	807	669	887	834
Total coliform bacteria	cfu/100mL	-	2	30	300	200	4200	50
Total dissolved solids (TDS)	mg/L	-	2160	1860	1860	1910	2040	1840
Total kjeldahl nitrogen (TKN)	mg/L	-	11.4	13.5	9.62	14.3	23.0	31.8
Total suspended solids (TSS)	mg/L	-	153	386	10.0	226	6.6	3.6
Turbidity	NTU	-	380	22.0	0.71	65.3	13.6	0.85
Un-ionized ammonia	mg/L	-	0.00228	0.00241	0.00211	0.00858	0.0436	0.162
Field Parameters								
Conductivity, field	mS/cm	-	2.89	2.62	2.37	2.67	3.09	2.82
Dissolved oxygen (DO), field	mg/L	-	3.22	2.93	3.73	8.15	3.7	0.61
Oxidation reduction potential (ORP), field	millivolts	-	-73	-	38	-	59	-52
pH, field	s.u.	-	6.32	5.74	5.60	6.26	7 D 7.00	7.06
Temperature, field	Deg C	-	5.4	16.5	22.32 D 22.3	15.5	8.31 D 8.3	17.67
Turbidity, field	NTU	-	329	97.5	24	73.9	38.6	37.6
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	360	ND(250)	2130	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	350	ND(250)	2110	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	920	ND(250)	7060	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	51400	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	1280	ND(250)	9210	ND(280)	ND(280)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-

002482

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-MB-010
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**						
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	0.048	0.59	ND(0.020)	0.67	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	0.097	1.26	0.0179	1.74	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

002483

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/13/2015	11/9/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.0136	0.0146	0.0067	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.161	0.157	0.079	ND(0.10)	0.13	0.17	0.12
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00166	0.00174	0.00056	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	4.76	4.95	10.7	11.6	ND(0.50)	1.23	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	1.18	1.23	1.62	2.02	0.088	1.41	0.0538
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	0.000014	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0263	0.0281	0.0161	0.0090	0.0071	0.0135	0.0148
Nickel (dissolved)	mg/L	0.0046	0.0050	ND(0.0020)	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0052	0.011	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	507 J	519 J	485	434	307	451	387
Ammonia-N	mg/L	25.9 J	25.7 J	19.6	19.2	ND(0.450)	11.3	1.38
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	23 J	32 J	26	41	18	25	16
Chloride	mg/L	114 J	115 J	111	133	197	185	136
Color (apparent)	color unit	39.4 J	35.6 J	101	–	–	–	–
Color (apparent)	TCU	-	-	-	127	9.4	76.7	8.8
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.8 J	5.8 J	6.7	5.1	4.3	6.3	5.0
Escherichia coli	cfu/100mL	0 J	0 J	0	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	0 J	0 J	0	ND(2)	0	0	0
Nitrate (as N)	mg/L	0.31 J	0.34 J	ND(0.50)	2.21	11.6	0.17	6.68
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.50)	0.111	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.15 J	7.15 J	7.66	7.64	7.47	7.77	7.26
Phenol	mg/L	ND(0.0010) J	ND(0.0010) J	ND(0.0010)	ND(0.0034)	0.0027	0.0017	ND(0.0010)
Phosphorus	mg/L	0.066 J	0.062 J	0.151	1.47	ND(0.030)	0.046	ND(0.030)
Sulfate	mg/L	592 J	595 J	695	1000	1010	769	705
Total coliform bacteria	cfu/100mL	0 J	0 J	1	4	20	20	15
Total dissolved solids (TDS)	mg/L	1430 J	1410 J	1560	1960	1920	1690	1520
Total kjeldahl nitrogen (TKN)	mg/L	28.1 J	26.0 J	21.7	17.2	0.39	9.49	1.88
Total suspended solids (TSS)	mg/L	15.2 J	10.4 J	230	2630	6.8	28.3	6.4
Turbidity	NTU	21.7 J	16.3 J	43.0	40.1	ND(1.34)	3.99	4.34
Un-ionized ammonia	mg/L	1.50 J	1.49 J	0.0664	0.0881	0.00109	0.184	0.0147
Field Parameters								
Conductivity, field	mS/cm	2.46	2.46	1.4	1.681	2.51	2.65	2.13
Dissolved oxygen (DO), field	mg/L	0.36	0.36	4.14	–	2.12	1.35	0
Oxidation reduction potential (ORP), field	millivolts	-96	-96	-75	–	247	-90	14
pH, field	s.u.	8.02	8.02	7.07	7.45	6.83	7.55	7.50
Temperature, field	Deg C	22.61	22.61	13.19	5.94	16.08	19.48	15.26
Turbidity, field	NTU	16.2	16.2	-	–	0	16.4	4.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	–	–	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250) J	ND(250)	1330	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250) J	ND(250)	1310	–	–	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250) J	290	4490	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	–	–	–	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380) J	ND(280)	5820	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	–	–	–	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	–	–	–	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	–	–	–	ND(250)

002484

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/13/2015	11/9/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**							
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	–	–	–	–
2-Methylnaphthalene	µg/L	-	-	-	–	–	–	–
Acenaphthene	µg/L	-	-	-	–	–	–	–
Acenaphthylene	µg/L	-	-	-	–	–	–	–
Acridine	µg/L	-	-	-	–	–	–	–
Anthracene	µg/L	ND(0.020) J	ND(0.020) J	0.026	0.83	ND(0.020)	0.020	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	–	–	–	–
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050) J	0.0863	2.26	0.0072	0.0284	0.0117
Benzo(b)fluoranthene	µg/L	-	-	-	–	–	–	–
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	–	–	–	–
Benzo(g,h,i)perylene	µg/L	-	-	-	–	–	–	–
Benzo(k)fluoranthene	µg/L	-	-	-	–	–	–	–
Carcinogenic potency equivalent	µg/L	-	-	-	–	–	–	–
Chrysene	µg/L	-	-	-	–	–	–	–
Dibenz(a,h)anthracene	µg/L	-	-	-	–	–	–	–
Fluoranthene	µg/L	-	-	-	–	–	–	–
Fluorene	µg/L	-	-	-	–	–	–	–
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	–	–	–	–
Naphthalene	µg/L	-	-	-	–	–	–	–
Phenanthrene	µg/L	-	-	-	–	–	–	–
Pyrene	µg/L	-	-	-	–	–	–	–

002485

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-021016-TS-006	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009
Sample Date:		2/10/2016	5/18/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0130	0.0087	0.00467
Boron (dissolved)	mg/L	ND(0.10)	0.073	0.12	0.111
Cadmium (dissolved)	mg/L	ND(0.000010)	0.000012	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.00058)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.0010)	0.00053	ND(0.0010)	0.00051
Copper (dissolved)	mg/L	ND(0.0020)	0.00068	ND(0.0020)	ND(0.00235)
Iron (dissolved)	mg/L	ND(0.10)	1.60	7.07	6.55
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000061
Manganese (dissolved)	mg/L	ND(0.0114)	1.09	1.09	0.957
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	ND(0.00987)	0.0201	0.0160	0.0196
Nickel (dissolved)	mg/L	ND(0.0050)	0.00282	ND(0.0050)	0.00225
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.0049)	ND(0.010)	0.0015
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	ND(323)	417	533	618
Ammonia-N	mg/L	0.237	12.2	28.5	17.1
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(14)	15	ND(35)	43
Chloride	mg/L	ND(126)	81.3	85.7	97.2
Color (apparent)	color unit	ND(6.3) J	18.0	237	216
Color (apparent)	TCU	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(4.5)	5.8	9.3	10.4
Escherichia coli	cfu/100mL	0 J	0	0	0
Fecal coliform bacteria	cfu/100mL	0 J	0	2	0
Nitrate (as N)	mg/L	1.35	ND(0.10)	ND(0.10)	2.81
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	0.162
pH, lab	s.u.	7.72	7.86	7.54	7.05
Phenol	mg/L	ND(0.0010)	ND(0.0024)	0.0044	ND(0.0024)
Phosphorus	mg/L	ND(0.030)	0.0116	0.0969	0.0440
Sulfate	mg/L	ND(752)	710	528	432
Total coliform bacteria	cfu/100mL	ND(10) J	ND(10)	200	20
Total dissolved solids (TDS)	mg/L	ND(1480)	1460	1370	1240
Total kjeldahl nitrogen (TKN)	mg/L	0.61	12.6	32.3	20.7
Total suspended solids (TSS)	mg/L	ND(6.8)	ND(9.2)	18.0	21.0
Turbidity	NTU	ND(2.39) J	11.8	94.5	58.3
Un-ionized ammonia	mg/L	0.000544	0.321	0.0906	0.0727
Field Parameters					
Conductivity, field	mS/cm	1.1	1.76	1.91	0.604
Dissolved oxygen (DO), field	mg/L	0	0	1.36	1.44
Oxidation reduction potential (ORP), field	millivolts	-18	-31	-89	-125
pH, field	s.u.	7.08	7.88	6.72	7.23
Temperature, field	Deg C	7.87	15.81	22.7	11.39
Turbidity, field	NTU	0	3.1	0	38
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--

002486

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-021016-TS-006	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009
Sample Date:		2/10/2016	5/18/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original
Parameters:	**Units**				
Semi-Volatiles					
1-Methylnaphthalene	µg/L	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--
Acenaphthene	µg/L	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--
Acridine	µg/L	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	0.032	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0144	0.0451	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--
Chrysene	µg/L	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--
Fluoranthene	µg/L	--	--	--	--
Fluorene	µg/L	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--
Naphthalene	µg/L	--	--	--	--
Phenanthrene	µg/L	--	--	--	--
Pyrene	µg/L	--	--	--	--

002487

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:			MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:			GW-45804-011310-TB-003	GW-45804-051810-MB-002	GW-45804-081810-MMD-004	GW-45804-110210-TB-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**								
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	46.3	10.0	6.20	17.3	15.9	24.0	24.7	10.5	10.4
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	77.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.41	1.85	2.06	2.14	3.36	3.30	4.01	4.02
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.037	0.059	0.058	0.055	0.026	0.024	0.0249	0.0252
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	530	220	444	428	698	710	277	281
Ammonia-N	mg/L	4.0	0.952	1.12	1.82	0.823	0.931	0.832	0.935	1.06
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.0	ND(2.0)	ND(2.0)	ND(2.0)	2.5	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	56.1	106	58.1	71.6	78.7	76.5	107	105
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	76.8	51.3	312	36.2	87.4	56.9	39.3	19.1
Conductivity	umhos/cm	-	1600	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.4	7.7	13.9	10.6	14.9	15.2	10.5	10.6
Escherichia coli	cfu/100mL	25.6	0	0	0	ND(2)	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	1	0	9	ND(2)	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	7.77	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	1.36	4.80	1.84	2.61	0.628	0.701	1.09	0.400
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	2	0	30	10	0	0	1	1
Total dissolved solids (TDS)	mg/L	-	1340	1280	1350	1260	1180	1200	1820	1880
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	4.90	-	-	-	-	-	-	-
Unionized Ammonia	mg/L	-	0.000325	0.00324	0.00102	0.000267	0.000218	0.000195	0.0000810	0.000103
Field Parameters										
Conductivity, field	mS/cm	-	2.3	1.87	1.54	2.07	2.35	2.35	2.79	2.79
Dissolved oxygen (DO), field	mg/L	-	-	-	-	3	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-125	-130	-130	-	-
pH, field	s.u.	-	6.22	7.11	6.09	5.99	6.20	6.20	5.73	5.73
Temperature, field	Deg C	-	8.8	8.9	18.3	15.0	4.7	4.7	7.21	7.21
Turbidity, field	NTU	-	-5	-	-	-	-	-	427	427
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	3300	2900	750	460	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	3300	2900	750	460	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	14300	13900	3120	1960	630	1800	4200	ND(2500)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:			MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:			GW-45804-011310-TB-003	GW-45804-051810-MB-002	GW-45804-051810-MMD-004	GW-45804-110210-TB-005	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:			1/13/2010	5/18/2010	5/18/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**								
Petroleum Products (cont'd)										
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	46900	52900	6800	5900	-	5800	12200	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	17600	18600	3670	2340	630	2270	4200	ND(2500)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
1-Methylnaphthalene;2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.20)	ND(0.20)	0.088	0.031	0.069	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	0.44	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.509	0.062	0.292	0.113	0.232	0.0141	0.0821
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene;Benzo(j)fluoranthene	µg/L	-	-	0.38	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.48	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.42	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.59	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.41	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.36	-	-	-	-	-	-
Naphthalene	µg/L	-	-	0.22	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.91	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.32	-	-	-	-	-	-

002489

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	Units								
Metals									
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	0.0067	0.0042	-	-	0.0047	-	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	ND(0.050)	-	-	0.056	-	-
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)	-	-
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Cobalt (dissolved)	mg/L	-	-	ND(0.00050)	-	-	ND(0.00050)	-	-
Copper (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Iron (dissolved)	mg/L	8.84	7.86	10.3	-	-	9.87	-	-
Lead (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.37	2.58	3.73	-	-	3.47	-	-
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	-	-	ND(0.00010)	-	-
Molybdenum (dissolved)	mg/L	0.051	0.0250	0.0119	-	-	0.0168	-	-
Nickel (dissolved)	mg/L	-	-	ND(0.0020)	-	-	ND(0.0020)	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.0030)	ND(0.0030)	-	-	ND(0.0030)	-	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	380	483	511	426	-	364	-	-
Ammonia-N	mg/L	3.17	3.16	4.06	2.58	2.74	3.74	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	5.5	5.2	ND(3.0)	-	3.2	-	-
Chemical oxygen demand (COD)	mg/L	-	-	49	-	-	36	-	-
Chloride	mg/L	141	112	-	173	-	162	-	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	44.4	30.2	13.2	23.3	-	-	158	112
Conductivity	umhos/cm	-	-	-	1959	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	18.5	13.1	11.3	-	11.0	-	-
Escherichia coli	cfu/100mL	0	ND(2)	0	0	0	-	0	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0 J	0 J	-	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Petroleum Products	mg/L	-	-	ND(1.0)	-	-	-	-	-
pH, lab	s.u.	-	-	7.51	7.09	-	7.59	-	-
Phenol	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Phosphorus	mg/L	0.511	0.716	0.475	0.592	-	0.321	-	-
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	1	2	0	0	0	-	2	4
Total dissolved solids (TDS)	mg/L	1680	1580	1580	1510	-	1620	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	5.55	-	-	5.33	-	-
Total suspended solids (TSS)	mg/L	-	-	465	-	-	967	-	-
Turbidity	NTU	-	-	162	27.0	-	-	58.0 J	23.0 J
Unionized Ammonia	mg/L	0.0329	0.0184	-	0.0000556	0.0000590	-	-	-
Field Parameters									
Conductivity, field	mS/cm	2.26	2.38	2.36	2.46	2.46	2.34	2.3	-
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-
pH, field	s.u.	7.34	7.29	5.9	5.09	5.09	6.46	6.29	-
Temperature, field	Deg C	19.9	13.7	4.85	6.8	6.8	10.77	11.06	-
Turbidity, field	NTU	-	881	-5	-5	-5	-	-	-
Petroleum Products									
Petroleum Hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(25)	ND(100)	-	ND(100)	-	-
Petroleum Hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	-	-
Petroleum Hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum Hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250)	-	ND(250)	-	-
Petroleum Hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	-	-	ND(250)	-	-
Petroleum Hydrocarbons F4 (C34-C50)	µg/L	520	1130	450	690	-	ND(250)	-	-

002490

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	Units								
Petroleum Products (cont'd)									
Petroleum hydrocarbons, F4 gravimetric - silica gel (GHH)	µg/L	-	3400	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	520	1420	450	680	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.033	0.021	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.135	0.0923	0.014	-	-	0.0299	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinaline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:		GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	**Units**								
Metals									
Aluminum (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Antimony (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0044	0.0044	0.0020	0.0035	0.0034	0.0071
Barium (dissolved)	mg/L	0.13	0.13	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Boron (dissolved)	mg/L	ND(0.50)	ND(0.50)	0.068	0.065	ND(0.050)	0.069	0.067	0.076
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	262	273	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.83	8.05	5.48	4.85	8.39	8.87	8.75	5.93
Lead (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	70.1	69.6	-	-	-	-	-	-
Manganese (dissolved)	mg/L	2.83	2.75	1.99	2.10	4.08	4.27	4.59	3.39
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.024	0.024	0.0115	0.0127	0.0068	0.0139	0.0130	0.0181
Nickel (dissolved)	mg/L	ND(0.020)	ND(0.020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	ND(0.50)	ND(0.50)	-	-	-	-	-	-
Potassium (dissolved)	mg/L	23	23	-	-	-	-	-	-
Selenium (dissolved)	mg/L	ND(0.0040)	ND(0.0040)	-	-	-	-	-	-
Silicon (dissolved)	mg/L	15	15	-	-	-	-	-	-
Silver (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	-	-	-	-	-
Sodium (dissolved)	mg/L	79.1	78.8	-	-	-	-	-	-
Strontium (dissolved)	mg/L	2.74	2.69	-	-	-	-	-	-
Thallium (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	-	-	-	-	-
Tin (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Titanium (dissolved)	mg/L	ND(0.020)	ND(0.020)	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Uranium (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0044	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	ND(0.040)	ND(0.040)	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	562	555	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	567	560	535	528	476	399	401	447
Ammonia-N	mg/L	4.82	5.22	4.95	4.77	3.68	4.48	4.35	7.02
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	3.9 J	6.8 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	53	51	42 J	55 J	53	49	44	36 J
Chloride	mg/L	119	119	120	116	184	190	186	148
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	184	88.6	65.6 J	79.5 J	23.6	34.0	33.7	126
Conductivity	umhos/cm	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	10.2	11.7	12.0	17.8	15.8	16.5	13.9
Escherichia coli	cfu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.96	8.00	7.83	7.83	7.61	7.79	7.67	7.48
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0039	0.0030	ND(0.0010)
Phosphorus	mg/L	0.756	0.727	0.564	0.718	0.662	0.728	0.793	0.993
Sulfate	mg/L	-	-	435	430	587	683	689	682
Total coliform bacteria	cfu/100mL	0	0	20 J	ND(2) J	ND(2)	ND(100)	ND(100)	10
Total dissolved solids (TDS)	mg/L	1430	1410	1370	1360	1660	1650	1640	1760
Total kjeldahl nitrogen (TKN)	mg/L	5.61	5.74	5.21	5.74	5.28	5.52	5.86	8.86
Total suspended solids (TSS)	mg/L	484	594	466	773	2680	646	748	254
Turbidity	NTU	54.0	30.0	9.30 J	5.70 J	32.0	20.5 J	40.0 J	34.0
Unionized Ammonia	mg/L	-	-	0.0917	0.0883	0.00158	0.00156	0.00151	0.0151
Field Parameters									
Conductivity, field	mS/cm	1.82	-	2.29	-	2.47	-	2.36	2.32
Dissolved oxygen (DO), field	mg/L	5.1	-	8.24	-	6.86	-	5.54	5.45
Oxidation reduction potential (ORP), field	millivolts	-	-	-132	-	-	-	-131	-119
pH, field	s.u.	7.7	-	7.75	7.75	7.78	6.11	6.11	6.83
Temperature, field	Deg C	18.24	-	15.1	15.1	6.9	12.3	12.3	20.7
Turbidity, field	NTU	6.92	-	840	-	-5	-	-5	0
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(25)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	460	520	630 J	ND(250) J	ND(630)	490	420	ND(250)

002492

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2012 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08
Sample ID:		GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	**Units**								
Petroleum Products (cont'd)									
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	2500	ND(2500)	3000	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	460	520	630 J	ND(250) J	ND(630)	490	420	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene:2-Methylnaphthalene	µg/L	ND(0.28)	ND(0.28)	ND(0.028)	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	ND(4.0)	-
Anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.20)	ND(0.20)	0.036	0.037	-	0.033	0.022	-
Benzo(a)pyrene	µg/L	ND(0.10)	ND(0.10)	0.040	0.042	ND(0.10)	0.0342	0.0252	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.040	0.040	-	0.047	0.035	-
Benzo(b)fluoranthene:Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	ND(0.20)	ND(0.20)	0.051	0.071	-	0.054	0.044	-
Benzo(k)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.033	0.034	-	0.036	0.024	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	ND(0.060)	-
Chrysene	µg/L	ND(0.20)	ND(0.20)	0.046	0.053	-	0.041	0.031	-
Dibenz(a,h)anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	ND(0.20)	0.34	0.129	0.145	-	0.104 J	0.089 J	-
Fluorene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	0.021	-	ND(0.13)	ND(0.097)	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.20)	ND(0.20)	0.026	0.032	-	0.029	0.024	-
Naphthalene	µg/L	ND(0.20)	ND(0.20)	0.054	0.054	-	0.058 J	0.053 J	-
Phenanthrene	µg/L	ND(0.20)	ND(0.20)	0.072 J	0.094 J	-	0.062	0.058	-
Pyrene	µg/L	ND(0.20)	0.36	0.154	0.178	-	0.131	0.101	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-016	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-092114-TS-007	GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-014
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	9/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	0.0068	0.0029	0.0012	0.0024	0.0040	0.0017	ND(0.0010)	0.0018	ND(0.00010)
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.075	0.067	ND(0.050)	0.075	0.092	0.066	ND(0.050)	0.079	ND(0.010)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	5.80	6.07	9.10	6.82	5.81	5.12	10.7	9.11	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.20	3.74	4.90	5.02	3.17	3.31	3.97	4.47	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0189	0.0107	0.0049	0.0094	0.0151	0.0063	0.0022	0.0056	ND(0.00050)
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)	0.0070	ND(0.0030)	ND(0.0030)	0.0019
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	446	511	474	475 J	534 J	545	572	489	ND(10)
Ammonia-N	mg/L	6.83	7.12	6.47	7.40 J	10.4 J	8.37	3.67	10.5	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	3.6	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	148 J	51	ND(50)	102 J	43 J	39	45	41	ND(10)
Chloride	mg/L	147	143	178	179 J	160 J	126	149	356	ND(0.50)
Color (apparent)	color unit	-	-	191 J	230 J	82.2 J	159			
Color (apparent)	TCU	80.0	176	-	-	-	-	54.2	78.0	ND(1.0)
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.7	11.6	8.6	8.2 J	7.7 J	10.9	7.8	10.7	ND(1.0)
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.010)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.50	7.61	7.30	7.58 J	7.51 J	7.94	7.71	7.69	7.18
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J	0.0016 J	ND(0.0010)	ND(0.0029)	0.0027	0.0021
Phosphorus	mg/L	0.118	0.638	0.046	0.127 J	0.079 J	0.088	0.938	0.073	ND(0.030)
Sulfate	mg/L	675	546	477	504 J	497 J	425	405	578	ND(0.30)
Total coliform bacteria	cfu/100mL	10	ND(2)	0	ND(2) J	0 J	0	12	10	1
Total dissolved solids (TDS)	mg/L	1770	1580	1450	1510 J	1450 J	1340	1410	1600	ND(10)
Total kjeldahl nitrogen (TKN)	mg/L	7.01	7.89	6.21	7.43 J	9.80 J	9.06	6.89	11.6	ND(0.15)
Total suspended solids (TSS)	mg/L	23.6	905	24.5	36.0 J	12.0 J	16.4	1480	21.4	ND(2.0)
Turbidity	NTU	32.0	538	117	96.0 J	62.2 J	52.6	27.4	96.0	ND(0.10)
Un-ionized Ammonia	mg/L	0.0149	0.00316	0.0215	0.0364 J	1.00 J	0.0287	0.0251	0.0477	-
Field Parameters										
Conductivity, field	mS/cm	-	2.24	2.36	2.39	2.24	0.579	1.245	2.47	0.661
Dissolved oxygen (DO), field	mg/L	-	8.06	5.69	0	2.02	3.03	-	1.04	0.81
Oxidation reduction potential (ORP), field	millivolts	-	-	-148	-176	-154	-103	-	-86	-252
pH, field	s.u.	6.83	6.21	7.34 D 7.34	7.32	6.64	7.14	7.44	7.19	7.59
Temperature, field	Deg C	20.7	12.5	7.2 D 7.17	10.58	20.31	11.26	4.4	13.32	19.3
Turbidity, field	NTU	-	641	33.8	30.1	45.1	-	-	0	252
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)	280	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	ND(250) J	ND(250) J	ND(250)	280	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1240	ND(250)	ND(250) J	ND(250) J	ND(250)	1290	ND(250)	ND(250)

DRO-V1604178

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-08	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-C16	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-C14
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**									
Petroleum Products (cont'd)										
Petroleum hydrocarbons F4 gravimetric + silica gell (GHH)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16), F2 less naphthalene	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1530	ND(380)	ND(360) J	ND(360) J	ND(360)	1540	ND(360)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--	--	--
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
1-Methylnaphthalene; 2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Acenaphthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Acenaphthylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Acridine	µg/L	-	-	ND(4.0)	-	-	-	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.056	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(b)fluoranthene; Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	ND(0.050)	-	-	-	--	--	--
Chrysene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Fluorene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Naphthalene	µg/L	-	-	ND(0.050)	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111015-TS-017	GW-45804-021016-TS-C08	GW-45804-051816-TS-C16	GW-45804-081616-TS-C06	GW-45804-111516-TS-C06
Sample Date:		11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Original
Parameters:	Units					
Metals						
Aluminum (dissolved)	mg/L	–	–	–	–	–
Antimony (dissolved)	mg/L	–	–	–	–	–
Arsenic (dissolved)	mg/L	0.0015	ND(0.0010)	0.00116	0.0016	0.00108
Barium (dissolved)	mg/L	–	–	–	–	–
Beryllium (dissolved)	mg/L	–	–	–	–	–
Bismuth (dissolved)	mg/L	–	–	–	–	–
Boron (dissolved)	mg/L	ND(0.10)	ND(0.10)	0.065	0.11	0.078
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	–	–	–	–	–
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00016	ND(0.0010)	0.00027
Copper (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.0020)	0.00058
Iron (dissolved)	mg/L	5.82	8.02	7.89	4.96	4.06
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)
Magnesium (dissolved)	mg/L	–	–	–	–	–
Manganese (dissolved)	mg/L	4.17	5.16	4.72	3.37	2.50
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00940	ND(0.00609)	0.00789	0.0107	0.00679
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00161	ND(0.0050)	0.00105
Phosphorus (dissolved)	mg/L	–	–	–	–	–
Potassium (dissolved)	mg/L	–	–	–	–	–
Selenium (dissolved)	mg/L	–	–	–	–	–
Silicon (dissolved)	mg/L	–	–	–	–	–
Silver (dissolved)	mg/L	–	–	–	–	–
Sodium (dissolved)	mg/L	–	–	–	–	–
Strontium (dissolved)	mg/L	–	–	–	–	–
Thallium (dissolved)	mg/L	–	–	–	–	–
Tin (dissolved)	mg/L	–	–	–	–	–
Titanium (dissolved)	mg/L	–	–	–	–	–
Tungsten (dissolved)	mg/L	–	–	–	–	–
Uranium (dissolved)	mg/L	–	–	–	–	–
Vanadium (dissolved)	mg/L	–	–	–	–	–
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0012)	ND(0.010)	ND(0.0010)
Zirconium (dissolved)	mg/L	–	–	–	–	–
General Chemistry						
Alkalinity, bicarbonate	mg/L	–	–	–	–	–
Alkalinity, carbonate	mg/L	–	–	–	–	–
Alkalinity, hydroxide	mg/L	–	–	–	–	–
Alkalinity, total (as CaCO3)	mg/L	469	ND(439)	398	518	558
Ammonia-N	mg/L	5.04	3.64	5.47	7.16	5.05
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	ND(33)	33	ND(44)	45
Chloride	mg/L	199	ND(157)	155	148	128
Color (apparent)	color unit		211	200	216	196
Color (apparent)	TCU	222	–	–	–	–
Conductivity	umhos/cm	–	–	–	–	–
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.5	ND(8.3)	8.8	11.0	10.9
Escherichia coli	cfu/100mL	0	0	0	1	0
Fecal coliform bacteria	cfu/100mL	0	0	0	60	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	–	–	–	–	–
pH, lab	s.u.	7.79	7.89	7.91	7.74	7.84
Phenol	mg/L	0.0029	ND(0.0010)	ND(0.0021)	0.0060	0.0022
Phosphorus	mg/L	0.191	0.056	0.0853	0.0820	0.0943
Sulfate	mg/L	660	ND(620)	726	580	511
Total coliform bacteria	cfu/100mL	0	0	10	3900	0
Total dissolved solids (TDS)	mg/L	1690	ND(1540)	1690	1550	1580
Total kjeldahl nitrogen (TKN)	mg/L	8.47	6.70	7.50	7.70	5.62
Total suspended solids (TSS)	mg/L	16.2	ND(16.0)	27.6	6.2	2.6
Turbidity	NTU	86.2	67.3 J	101	60.3	50.9
Un-ionized Ammonia	mg/L	0.355	0.0172	0.244	0.0285	0.0254
Field Parameters						
Conductivity, field	mS/cm	2.29	1.25	1.87	1.8	1.86
Dissolved oxygen (DO), field	mg/L	0.57	0	0	0	3.14
Oxidation reduction potential (ORP), field	millivolts	-167	-115	-94	-91	-129
pH, field	s.u.	D 6.11	7.22	6.16	6.87	7.1
Temperature, field	Deg C	13.86	4.95	11.99	18.33	13.5
Turbidity, field	NTU	2.3	0	1.8	0	0.2
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	–	–	–	–	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	–	–	–	–	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

002496

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd,
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111015-TS-017	GW-45804-021016-TS-C08	GW-45804-051816-TS-C16	GW-45804-081616-TS-C06	GW-45804-111516-TS-C06
Sample Date:		11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Original
Parameters:	Units					
Petroleum Products (cont'd)						
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	–	–	–	–	–
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)	–	–	–	–
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	–	–	–	–	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)	–	–	–	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)	–	–	–	–
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	–	–	–	–	–
1-Methylnaphthalene	µg/L	–	–	–	–	–
1+Methylnaphthalene/2+Methylnaphthalene	µg/L	–	–	–	–	–
2-Methylnaphthalene	µg/L	–	–	–	–	–
Acenaphthene	µg/L	–	–	–	–	–
Acenaphthylene	µg/L	–	–	–	–	–
Acridine	µg/L	–	–	–	–	–
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	–	–	–	–	–
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	–	–	–	–	–
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	–	–	–	–	–
Benzo(b)pyridine (Quinoline)	µg/L	–	–	–	–	–
Benzo(g,h,i)perylene	µg/L	–	–	–	–	–
Benzo(k)fluoranthene	µg/L	–	–	–	–	–
Carcinogenic potency equivalent	µg/L	–	–	–	–	–
Chrysene	µg/L	–	–	–	–	–
Dibenz(a,h)anthracene	µg/L	–	–	–	–	–
Fluoranthene	µg/L	–	–	–	–	–
Fluorene	µg/L	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	µg/L	–	–	–	–	–
Naphthalene	µg/L	–	–	–	–	–
Phenanthrene	µg/L	–	–	–	–	–
Pyrene	µg/L	–	–	–	–	–

0024497

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021511-MB-003	GW-45804-051611-MMD-003
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/15/2011	5/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**TLP[1]**							
Metals									
Arsenic (dissolved)	mg/L	-	0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	46.3	22.9	23.8	10.9	11.1	7.64	7.87	6.33
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	6.78	7.00	7.77	7.70	5.63	6.44	4.06
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0062
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030
		-							
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	633	284	280	186	192	152	182	202
Ammonia-N	mg/L	4.0	2.35	2.26	1.50	1.21	0.855	0.606	0.552
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-
Chloride	mg/L	-	107	108	78.7	76.4	40.1	44.3	58.9
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	83.6	87.8	520	486	367	196	71.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.8	9.0	8.9	6.7	10.2	8.6	10.0	9.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	0	0	1	0	10
Total dissolved solids (TDS)	mg/L	-	970	990	926	892	670	660	778
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	-	0.00798	0.00769	0.00108	0.000871	0.000386	0.000132	0.000252
Field Parameters									
Conductivity, field	mS/cm	-	1.423	1.423	0.99	0.89	1.35	1.56	1.37
Dissolved oxygen (DO), field	mg/L	-	1.89	1.68	0	0	0	0	-
Oxidation reduction potential (ORP), field	millivolts	-	-123	-129	-152	-152	-143	-129	-
pH, field	s.u.	-	7.05	7.05	6.20	6.20	6.17	6.17	6.43
Temperature, field	Deg C	-	13.82	13.82	19.2	19.2	14.3	4.7	6.88
Turbidity, field	NTU	-	-	-	-	-	-	-	14.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021511-MB-003	GW-45804-051611-MMD-003
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/15/2011	5/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**TLP[1]**							
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-001	GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-006	GW-45804-111212-MB-001	GW-45804-022713-TS-003
Sample Date:		8/16/2011	8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013
		Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.011	0.011	0.0092	-	0.0071	0.0067	0.0087	0.0074
Boron (dissolved)	mg/L	-	-	-	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00060)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	6.79	6.41	5.89	-	7.59	7.12	8.77	11.6
Lead (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.38	4.31	4.37	-	5.45	4.72	7.35	6.51
Mercury (dissolved)	mg/L	-	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	ND(0.010)	0.011	0.0079	-	0.0049	0.0041	0.0063	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.030)	0.218 J	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	190	192	181	189	183	212	272	309
Ammonia-N	mg/L	0.658	0.665	0.508	0.517	0.642	0.814	0.939	1.08
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	28	30	46	44
Chloride	mg/L	50.8	51.0	36.9	37.7	-	81.5	62.4	111
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	254	269	103	75.3	14.2	277	322 J	75.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.2	11.0	10.1	10.7	12.2	11.0	9.9	13.6
Escherichia coli	cfu/100mL	1	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	10	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-	ND(1.0)	-	-	-
pH, lab	s.u.	-	-	-	-	7.61	7.67	7.74	7.60
Phenol	mg/L	-	-	-	-	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	ND(0.030)	0.032	ND(0.030)	ND(0.030)	ND(0.030)	0.046	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	328	278
Total coliform bacteria	cfu/100mL	20	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2
Total dissolved solids (TDS)	mg/L	556	564	546	546	612	748	660	900
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	1.47	1.61	1.66	2.06
Total suspended solids (TSS)	mg/L	-	-	-	-	13.0	7.0	15.0	32.0
Turbidity	NTU	-	-	-	-	77.0	81.0	8.50 J	108
Unionized ammonia	mg/L	0.00404	0.00410	0.00168	0.00171	-	-	0.197	0.00558
Field Parameters									
Conductivity, field	mS/cm	0.86	-	0.75	-	1.05	1.21	1	1.62
Dissolved oxygen (DO), field	mg/L	0	-	1.55	-	-	1.66	9.47	1.62
Oxidation reduction potential (ORP), field	millivolts	-165	-	-153	-	-	-138	-119	-109
pH, field	s.u.	7.17	-	7.10	7.10	5.78	6.64	8.64	7.46
Temperature, field	Deg C	18.1	-	12.0	12.0	6	12.98	16.3	6.6
Turbidity, field	NTU	89.1	-	13.4	-	484	94.3	129	74.4
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-

GHD 045804 (12)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-001	GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-006	GW-45804-111212-MB-001	GW-45804-022713-TS-003
Sample Date:		8/16/2011	8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013
		Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**								
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.026)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	-
Pyrene	ug/L	-	-	-	-	-	-	ND(0.020)	-

002501

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052213-TS-006	GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	Units								
Metals									
Arsenic (dissolved)	mg/L	0.0061	0.0103	0.0100	0.0091	0.0063	0.0101	0.0081	0.0063
Boron (dissolved)	mg/L	ND(0.050)	0.056	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00096	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0029	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	7.17	5.03	5.22	2.69	5.16	3.91	4.60	7.30
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.03	2.73	2.79	1.76	2.89	1.96	2.41	4.02
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0060	0.0061	0.0052	0.0060	0.0042	0.0048	0.0047	0.0029
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.0060	0.0147	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	201	179	183	341	224 J	202 J	209	306
Ammonia-N	mg/L	1.11	1.26	0.674	0.667	1.30 J	1.49 J	1.03	0.969
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	3.6	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	27	62	ND(34)	54 J	30 J	30	29
Chloride	mg/L	92	65	51.9	71.1	87.2 J	62.7 J	52	84.7
Color (apparent)	color unit	-	-	-	59.4 J	283 J	136 J	203	
Color (apparent)	TCU	42.0	208	60.0	-	-	-	-	132
Dissolved organic carbon (DOC) (dissolved)	mg/L	17.9	10.6	9.3	7.7	6.9 J	11.3 J	9.9	7.0
Escherichia coli	cfu/100mL	ND(10)	ND(2)	ND(2)	0	0 J	0 J	0	ND(2)
Fecal coliform bacteria	cfu/100mL	ND(10)	ND(2)	ND(2)	0	0 J	1 J	0	ND(2)
Nitrate (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	--
pH, lab	s.u.	7.52	7.44	7.11	7.26	7.89 J	7.54 J	7.92	7.71
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)	ND(0.0027)
Phosphorus	mg/L	ND(0.030)	ND(0.030)	1.54	ND(0.030)	0.043 J	ND(0.030) J	0.039	0.363
Sulfate	mg/L	317	195	171	272	193 J	109 J	126	174
Total coliform bacteria	cfu/100mL	10	100	ND(10)	7	0 J	7 J	300	178
Total dissolved solids (TDS)	mg/L	734	630	524	628	650 J	456 J	479	655
Total kjeldahl nitrogen (TKN)	mg/L	1.65	2.31	0.81	ND(1.57)	2.15 J	2.10 J	1.32	1.48
Total suspended solids (TSS)	mg/L	14.0	3.2	2750	53.5	4.0 J	ND(2.0) J	3.6	448
Turbidity	NTU	59.0	18.7	106	47.0	34.0 J	7.09 J	19.6	52.0
Un-ionized ammonia	mg/L	0.000486	0.00423	0.000281	0.00164	0.00768 J	0.317 J	0.00646	0.0113
Field Parameters									
Conductivity, field	mS/cm	1.26	1.06	0.868	1.76	1.19	0.719	0.517	0.681
Dissolved oxygen (DO), field	mg/L	2.36	4.52	7.53	4.52	0	0.21	3.82	--
Oxidation reduction potential (ORP), field	millivolts	-	174	-	-101	-154	-147	-95	--
pH, field	s.u.	6.15	6.91	6.19	7.06 D 7.06	7.43	8.77	7.41	7.89
Temperature, field	Deg C	14.3	17.7	12.7	9.34 D 9.3	9.98	18.75	11.08	5.1
Turbidity, field	NTU	117	32.1	250	26.1	36.8	28.9	-	--
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)	960 J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)	1260 J
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	--

002502

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052213-TS-006	GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015	GW-45804-062114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	6/21/2014	11/25/2014	4/8/2015
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Semi-Volatiles									
1-Methylnaphthalene	µg/L	0.030	-	-	ND(0.020)	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	0.025	-	-	ND(0.020)	-	-	-	--
Acenaphthene	µg/L	0.070	-	-	0.037	-	-	-	--
Acenaphthylene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Acridine	µg/L	ND(4.0)	-	-	ND(4.0)	-	-	-	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.078
Benzo(b)fluoranthene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	ND(0.040)	-	-	-	--
Benzo(g,h,i)perylene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Carcinogenic potency equivalent	µg/L	ND(0.060)	-	-	ND(0.060)	-	-	-	--
Chrysene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Fluoranthene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Fluorene	µg/L	0.054	-	-	ND(0.020)	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--
Naphthalene	µg/L	ND(0.020)	-	-	ND(0.050)	-	-	-	--
Phenanthrene	µg/L	0.022	-	-	ND(0.020)	-	-	-	--
Pyrene	ug/L	ND(0.020)	-	-	ND(0.020)	-	-	-	--

002503

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-040815-TS-006	GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016
		Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**									
Metals										
Arsenic (dissolved)	mg/L	0.0064	0.0067	0.00696	0.00851	0.00519	0.00527	0.00631	0.00817	0.0101
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	0.045	0.042	ND(0.029)	ND(0.027)	0.030	0.046	0.044
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00050)	0.00086	ND(0.00085)	ND(0.00050)	0.00063	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00011	0.00013	0.00071	0.00067	0.00069	0.00194	0.00022
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00020)	ND(0.00020)	ND(0.00067) J	ND(0.00020) J	ND(0.00020)	ND(0.00020)	0.0403
Iron (dissolved)	mg/L	7.22	4.77	4.92	4.74	3.73	3.81	5.22	5.93	6.40
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000107
Manganese (dissolved)	mg/L	4.03	2.46	2.92	2.71	2.58	2.58	2.95	3.79	4.29
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	0.000013	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0029	0.0041	0.00467	0.00376	ND(0.00385)	ND(0.00379)	0.00372	0.00983	0.00371
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.00056	0.00052	ND(0.0017)	ND(0.00158)	0.00142	0.00436	0.00076
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0023	0.0016	0.0069 J	ND(0.0022) J	0.0015	0.0124	0.0024
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	308	228	262	254	ND(249)	ND(253)	282	322	328
Ammonia-N	mg/L	1.09	1.01	1.16	1.00	0.867	0.909	1.19	1.34	1.43
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	25	32	32	32	ND(29)	ND(28)	32	ND(39)	44
Chloride	mg/L	87.7	78.5	86.8	56.9	ND(43.4)	ND(44.2)	80.4	101	63.5
Color (apparent)	color unit					169 J	191 J	233	260	343
Color (apparent)	TCU	133	225	247	207	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.0	11.8	9.9	10.1	ND(6.5)	ND(6.5)	9.6	11.5	10.2
Escherichia coli	cfu/100mL	2	0	12	0	0	0	0	5	0
Fecal coliform bacteria	cfu/100mL	ND(2)	2	40	0	0	0	0	50	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	0.022	ND(0.020)	ND(0.025)	ND(0.024)	ND(0.020)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)	ND(0.010)
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.72	7.84	7.93	7.58	7.62	7.80	7.90	7.63	7.11
Phenol	mg/L	ND(0.0002)	0.0034	0.0021	0.0036	ND(0.0010)	ND(0.0010)	0.0021	0.0032	0.0011
Phosphorus	mg/L	0.257	ND(0.030)	ND(0.020)	0.048	ND(0.030)	ND(0.030)	0.0261	0.0156	0.0243
Sulfate	mg/L	185	80.1	102	88.2	ND(197)	ND(176)	144	223	283
Total coliform bacteria	cfu/100mL	128	50	50	2	ND(100)	ND(100)	10	3200	100
Total dissolved solids (TDS)	mg/L	676	431	565	374	ND(489)	ND(486)	711	810	897
Total kjeldahl nitrogen (TKN)	mg/L	1.59	1.72	1.87	1.50	1.35	1.36	1.83	2.07	2.62
Total suspended solids (TSS)	mg/L	390	8.3	ND(2.0)	ND(2.0)	ND(3.4)	ND(3.5)	20.1	9.0	10.2
Turbidity	NTU	53.0	24.6	16.2	16.3	ND(33.5) J	ND(31.4) J	61.1	68.0	111
Unionized ammonia	mg/L	0.0127	0.00653	0.0170	0.0265	0.00287	0.00301	0.0130	0.00369	0.00431
Field Parameters										
Conductivity, field	mS/cm	0.661	0.409	2.56	0.602	0.643	--	0.695	0.626	1.02
Dissolved oxygen (DO), field	mg/L	--	2.3	1.46	3.92	0	--	0.12	0	0
Oxidation reduction potential (ORP), field	millivolts	--	-43	-179	-136	-79	--	-57	-72	-107
pH, field	s.u.	7.89	7.34	7.62	7.96	7.3	--	7.7	6.81	7.06
Temperature, field	Deg C	5.1	13.59	17.28	13.49	6.17	--	9.63	18.38	11.98
Turbidity, field	NTU	--	0	0	1.9	17.6	--	6.7	0	4.9
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	370 J	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) Less naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(360) J	ND(360)	ND(360)	ND(360)	ND(380)	ND(360)	ND(380)	ND(380)	ND(360)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	ND(250)	--	--	--	--	--

002504

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-040815-TS-006	GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016
		Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**									
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	ug/L	--	--	--	--	--	--	--	--	--

002505

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**								
Metals										
Arsenic (dissolved)	mg/L	-	0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00090)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	0.00204	0.0086	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)
Copper (dissolved)	mg/L	-	0.0043	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)
Iron (dissolved)	mg/L	48.3	0.932	19.6	23.9	4.96	4.62	18.2	15.8	2.74
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Manganese (dissolved)	mg/L	17.1	1.82	19.4	17.5	7.70	5.35	13.3	14.6	11.5
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.186	0.0164	0.0172	0.0814	0.0232	0.0191	0.0139	0.0177
Nickel (dissolved)	mg/L	-	0.0073	ND(0.010)	0.0023	0.0102	0.0028	ND(0.010)	ND(0.010)	ND(0.010)
Zinc (dissolved)	mg/L	-	0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)	ND(0.030)	ND(0.030)
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	290	389	263	308	207	575	493 J	536
Ammonia-N	mg/L	4.0	7.46	4.69	8.87	14.3	4.80	13.2	11.2 J	7.20
Biochemical oxygen demand (carbonaceous)	mg/L	-	16.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	99	72	68	95	ND(54)	74	76 J	56
Chloride	mg/L	-	170	219	162	147	185	189	128 J	129
Color (apparent)	color unit	-	-	-	-	-	120 J	153 J	85.8 J	210
Color (apparent)	TCU	-	82.9	173 J	362	76.7	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	25.3	51.2	18.5	21.0	10.3	11.1	14.3 J	13.9
Escherichia coli	cfu/100mL	25.6	0	4	ND(2)	ND(2)	0	0	0 J	0
Fecal coliform bacteria	cfu/100mL	-	ND(0) J	6	10	ND(2)	0	0	0 J	0
Nitrate (as N)	mg/L	1.3	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)
pH, lab	s.u.	-	7.86	7.73	7.50	7.57	7.55	7.58	7.34 J	7.52
Phenol	mg/L	-	0.0016	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0117	ND(0.0010) J	ND(0.0010)
Phosphorus	mg/L	7.2	0.060	0.082	0.070	0.640	0.066	0.111	0.693 J	0.069
Sulfate	mg/L	-	685	531	800	713	452	507	539 J	512
Total coliform bacteria	cfu/100mL	-	100	1700	10400	10	1	0	ND(10) J	2
Total dissolved solids (TDS)	mg/L	-	1770	1800	2030	1600	1170	1580	1270 J	1470
Total kjeldahl nitrogen (TKN)	mg/L	-	9.95	6.85	8.80	14.8	5.67	13.6	15.0 J	9.81
Total suspended solids (TSS)	mg/L	-	72.0	78.0	106	564	32.0	202	647 J	61.0
Turbidity	NTU	-	61.0	162	43.0	75.0	54.0	132	57.8 J	124
Un-ionized ammonia	mg/L	-	0.0198	0.0292	0.0214	0.0536	0.0281	0.101	0.856 J	0.0259
Field Parameters										
Conductivity, field	mS/cm	-	2.15	2.17	2.53	2.5	2.41	2.55	2.53	0.628
Dissolved oxygen (DO), field	mg/L	-	3.61	3.67	7.86	7.24	6.62	2	6.28	6.19
Oxidation reduction potential (ORP), field	millivolts	-	-176	-	-122	-	-118	-145	-134	-90
pH, field	s.u.	-	7.14	7.20	6.65	7.12	7.03 D 7.40	7.3	8.13	7.15
Temperature, field	Deg C	-	8.0	17.3	21.59 D 21.6	13.1	9.32 D 10.5	17.06	22.61	11.56
Turbidity, field	NTU	-	76.4	150	150	104	148	444	684	-
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	610 J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	600 J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	12600 J	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3040 J	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**								
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	-	0.024	ND(0.0050)	0.0079	0.391	0.0212	0.0435	0.426 J	0.0183
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	0.029	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-	-	-
Chrysene	µg/L	-	-	-	-	-	0.023	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	0.041	-	-	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	-	-	-	0.035	-	-	-

002507

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-040915-TS-002	GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010
Sample Date:		4/9/2015	5/28/2015	8/13/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Metals									
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	0.0019	0.0014	0.0035	0.00226
Boron (dissolved)	mg/L	0.088	0.199	0.11	0.13	ND(0.10)	0.11	0.10	0.126
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	0.00129	ND(0.00050)	0.0040	0.0032	0.0022	0.0020	0.0020	0.00090
Copper (dissolved)	mg/L	0.0020	0.0024	0.0107	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00304
Iron (dissolved)	mg/L	0.765	0.071	9.28	7.79	7.75	6.27	14.5	6.05
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00056	ND(0.00050)	0.00088	ND(0.00050)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	3.46	0.548	12.5	9.30	7.40	6.02	8.13	4.01
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	0.000023	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0136	0.0174	0.0172	0.0152	ND(0.0101)	0.0146	0.0130	0.0132
Nickel (dissolved)	mg/L	0.0027	0.0045	0.0060	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00183
Zinc (dissolved)	mg/L	0.0040	ND(0.0030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.012	ND(0.0010)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	485	381	400	341	ND(373)	380	415	364
Ammonia-N	mg/L	7.35	1.93	12.3	6.45	1.72	3.97	5.81	1.20
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	56	23	47	41	ND(25)	27	ND(48)	25
Chloride	mg/L	193	197	114	66.1	ND(87.8)	134	61.3	54.3
Color (apparent)	color unit					163	102	141	103
Color (apparent)	TCU	198	66.9	130	142	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.8	6.5	9.4	9.5	ND(5.9)	6.7	9.2	7.3
Escherichia coli	cfu/100mL	ND(2)	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	0.37	2.18	1.66	0.93	2.55	ND(0.10)	15.6	2.58
Nitrite (as N)	mg/L	ND(0.10)	0.361	0.090	ND(0.050)	0.011	ND(0.050)	ND(0.050)	0.037
pH, lab	s.u.	7.49	7.71	7.90	7.78	7.75	7.86	7.68	7.18
Phenol	mg/L	0.0032	0.0020	0.0020	0.0032	0.0010	ND(0.0012)	0.0042	ND(0.0023)
Phosphorus	mg/L	0.598	0.042	0.041	0.086	ND(0.030)	0.0291	0.0449	0.0066
Sulfate	mg/L	646	693	621	385	ND(552)	968	519	454
Total coliform bacteria	cfu/100mL	30 J	0	40	5	ND(10)	ND(10)	100	0
Total dissolved solids (TDS)	mg/L	1620	1470	1180	1130	ND(1370)	1760	1300	1120
Total kjeldahl nitrogen (TKN)	mg/L	8.06	2.12	10.9	5.89	2.18	4.56	5.97	2.30
Total suspended solids (TSS)	mg/L	1240	92.4	35.1	52.8	28.5	40.3	104	23.5
Turbidity	NTU	20.9	38.0	8.07	68.1	80.9 J	77.5	91.5	57.3
Un-ionized ammonia	mg/L	0.000644	0.0170	0.256	0.190	0.00335	0.0906	0.0766	0.0196
Field Parameters									
Conductivity, field	mS/cm	--	2.12	1.46	1.82	0.888	1.94	1.87	1.21
Dissolved oxygen (DO), field	mg/L	--	10.14	0.17	3.54	2.75	0	0.79	1.21
Oxidation reduction potential (ORP), field	millivolts	--	-24	-120	-136	91	-73	-124	93
pH, field	s.u.	5.68	7.38	7.56	8.15	6.77	7.8	7.42	7.89
Temperature, field	Deg C	7.4	16.43	17.49	10.0	14.98	16.4	21.68	9.26
Turbidity, field	NTU	--	132	260	89	28.5	20.1	0	129
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	300	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1110	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	1410	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	ND(250)	--	--	--	--

002508

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-040915-TS-002	GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010
Sample Date:		4/9/2015	5/28/2015	8/13/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**								
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.20)	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.311	0.0510	0.0199	0.0166	0.0051	0.0127	0.0554	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

002509

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**							
Metals									
Arsenic (dissolved)	mg/L	-	0.0059	0.0142	0.0078	0.0029	0.0028	0.0092	0.0078
Boron (dissolved)	mg/L	-	0.073	0.052	0.063	0.076	0.074	0.062	0.061
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	48.3	2.09	5.31	4.58	2.07	2.11	0.216	0.212
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	0.487	0.650	0.630	0.512	0.518	0.443	0.413
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0090	0.0141	0.0106	0.0087	0.0086	ND(0.0010)	ND(0.0010)
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024
Zinc (dissolved)	mg/L	-	ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0059	ND(0.0030)	ND(0.0030)
		-							
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	633	482	365	382	429	427	911	980
Ammonia-N	mg/L	4.0	34.3	22.3	28.2	25.5	27.2	76.0	75.5
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1
Chemical oxygen demand (COD)	mg/L	-	46	15	13	32	30	ND(54)	65
Chloride	mg/L	-	173	128	199	164	164	246	245
Color (apparent)	color unit	-	-	-	-	-	-	46.9 J	53.9 J
Color (apparent)	TCU	-	27.1	58.9 J	52.9	83.5	73.7	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.5	ND(5.2)	5.1	4.5	4.1	9.3	9.4
Escherichia coli	cfu/100mL	25.6	/	ND(2)	ND(2)	0	0	390	380
Fecal coliform bacteria	cfu/100mL	-	50 J	ND(2)	ND(2)	0	0	450	430
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.82	7.76	7.41	7.54	7.51	7.25	7.26
Phenol	mg/L	-	ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0083	0.0103
Phosphorus	mg/L	7.2	0.048	0.045	0.035	0.051	ND(0.030)	0.067	0.067
Sulfate	mg/L	-	970	963	1050	674	678	429	427
Total coliform bacteria	cfu/100mL	-	180	110	2	2	ND(10)	4400	4800
Total dissolved solids (TDS)	mg/L	-	2100	1880	2140	1610	1600	1610	1600
Total kjeldahl nitrogen (TKN)	mg/L	-	38.2	24.5	30.0	25.8	27.2	74.3	75.0
Total suspended solids (TSS)	mg/L	-	16.0	31.0	44.4	8.4	6.4	20.0 J	4.4 J
Turbidity	NTU	-	19.0	33.0	36.0	19.2	22.7	51.0	59.0
Un-ionized ammonia	mg/L	-	0.141	0.0793	0.0695	0.0296	0.0316	0.174	0.173
Field Parameters									
Conductivity, field	mS/cm	-	3.01	2.59	2.75	2.43	-	2.12	-
Dissolved oxygen (DO), field	mg/L	-	2.68	1.21	4.33	6.79	-	4.53	-
Oxidation reduction potential (ORP), field	millivolts	-	-215	-	-101	-	-	-73	-
pH, field	s.u.	-	7.11	6.90	6.63	6.47	6.47	7.4 D 7.03	7.03
Temperature, field	Deg C	-	14.5	19.1	22.6 D 22.55	17.3	17.3	9.3 D 10.47	9.3
Turbidity, field	NTU	-	170	119	34.2	11.2	-	31.8	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**							
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	ND(4.0)
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005	GW-45804-112514-TS-003	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001
Sample Date:		5/29/2014	5/29/2014	8/21/2014	11/25/2014	4/8/2015	5/27/2015	8/13/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.0040	0.0049	ND(0.0010)	0.0011	ND(0.0010)	ND(0.010)	0.0011
Boron (dissolved)	mg/L	0.065	0.067	0.068	0.073	0.060	ND(0.10)	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00078	ND(0.0050)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0020)
Iron (dissolved)	mg/L	0.080	0.095	0.296	2.75	1.39	7.40	4.59
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.443	0.532	0.568	0.580	0.889	1.06	0.699
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0070	0.0181	0.0150	0.0146
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0035	ND(0.010)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0211	ND(0.0030)	ND(0.030)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	600	608	438 J	406	270	288	323
Ammonia-N	mg/L	57.8	57.8	18.2 J	18.6	15.9	13.7	15.3
Biochemical oxygen demand (carbonaceous)	mg/L	8.1	6.6	3.0 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	34	30	19 J	11	27	16	14
Chloride	mg/L	218	217	114 J	111	135	175	225
Color (apparent)	color unit	55.5 J	70.7 J	12.4 J	67.7			
Color (apparent)	TCU	-	-	-	-	21.4	40.9	133
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.2	5.2	4.4 J	4.2	2.6	3.6	4.4
Escherichia coli	cfu/100mL	0	0	0 J	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0 J	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.55	7.59	7.41 J	7.76	7.76	7.53	7.85
Phenol	mg/L	0.0074	0.0090	0.0023 J	ND(0.0010)	ND(0.0053)	0.0057	ND(0.0010)
Phosphorus	mg/L	0.134	0.107	0.072 J	0.089	0.253	0.156	0.068
Sulfate	mg/L	649	649	509 J	738	1350	1360	1240
Total coliform bacteria	cfu/100mL	2	1	ND(10) J	10	1730	2	100
Total dissolved solids (TDS)	mg/L	1740	1730	1290 J	1480	2460	2200	2250
Total kjeldahl nitrogen (TKN)	mg/L	48.4	51.2	19.3 J	20.7	15.5	14.9	13.8
Total suspended solids (TSS)	mg/L	11.6 J	4.0 J	16.8 J	21.3	402	293	16.0
Turbidity	NTU	18.2	28.0	3.47 J	20.9	9.71	21.0	17.0
Un-ionized ammonia	mg/L	0.396	0.396	17.0 J	0.0553	0.131	0.135	0.376
Field Parameters								
Conductivity, field	mS/cm	3.02	3.02	2.02	0.695	2.212	3.15	3.26
Dissolved oxygen (DO), field	mg/L	5.33	5.33	0.26	2.72	--	4.34	0.44
Oxidation reduction potential (ORP), field	millivolts	-318	-318	-276	-71	--	-6	-142
pH, field	s.u.	7.19	7.19	9.87	6.93	7.47	7.29	7.60
Temperature, field	Deg C	18.92	18.92	21.66	16.4	12.8	20.8	22.91
Turbidity, field	NTU	24.6	24.6	108	-	--	412	41.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250) J	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250) J	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	330 J	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380) J	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005	GW-45804-112514-TS-003	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001
Sample Date:		5/29/2014	5/29/2014	8/21/2014	11/25/2014	4/8/2015	5/27/2015	8/13/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**							
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	-	--	--	--
Acenaphthene	µg/L	-	-	-	-	--	--	--
Acenaphthylene	µg/L	-	-	-	-	--	--	--
Acridine	µg/L	-	-	-	-	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	--	--	--
Chrysene	µg/L	-	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	-	-	--	--	--
Fluorene	µg/L	-	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	--	--	--
Naphthalene	µg/L	-	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	-	-	--	--	--
Pyrene	µg/L	-	-	-	-	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-110915-TS-006	GW-45804-021016-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001
Sample Date:		11/9/2015	2/10/2016	5/18/2016	8/16/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**						
Metals							
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0014)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.11	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0020)	0.0045	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0303
Iron (dissolved)	mg/L	7.61	5.77	4.45	4.08	4.13	2.20
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.669	0.567	0.637	0.536	0.534	0.852
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0181	ND(0.0187)	0.0101	0.00807	0.00831	0.00710
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.010)	0.011	ND(0.010)	ND(0.010)	0.412	ND(0.010)
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	379	ND(371)	376	449	451	406
Ammonia-N	mg/L	5.71	3.95	4.68	15.1	15.8	11.5
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	14	ND(16)	16	ND(18)	ND(18)	20
Chloride	mg/L	155	ND(128)	141	81.3	87.7	94.1
Color (apparent)	color unit		100	79.3	107	88.0	56.9
Color (apparent)	TCU	84.0	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.6	ND(5.6)	4.2	5.4	5.1	3.8
Escherichia coli	cfu/100mL	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	4	3	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.46	7.72	7.88	7.60	7.60	6.94
Phenol	mg/L	0.0026	0.0011	ND(0.0015)	ND(0.0016) J	0.0034 J	0.0016
Phosphorus	mg/L	0.073	ND(0.030)	0.0234	0.0381	0.0393	0.0306
Sulfate	mg/L	799	ND(822)	965	671	722	947
Total coliform bacteria	cfu/100mL	1	ND(10)	ND(10)	100	100	200
Total dissolved solids (TDS)	mg/L	1530	ND(1720)	1840	1530	1520	1790
Total kjeldahl nitrogen (TKN)	mg/L	5.61	5.70	5.35	16.4	16.4	12.8
Total suspended solids (TSS)	mg/L	15.0	ND(10.5)	22.7	15.5	6.1	8.3
Turbidity	NTU	110	68.1 J	50.0	52.6	49.6	28.8
Un-ionized ammonia	mg/L	0.135	0.0226	0.321	0.0476	0.0475	0.0258
Field Parameters							
Conductivity, field	mS/cm	2.39	2.13	2.25	1.93	--	2.1
Dissolved oxygen (DO), field	mg/L	0.91	0	3.07	0	--	0
Oxidation reduction potential (ORP), field	millivolts	-150	-103	-115	-90	--	-107
pH, field	s.u.	7.73	7.07	8.22	6.72	--	6.7
Temperature, field	Deg C	19.0	14.71	18.12	21.89	--	18.57
Turbidity, field	NTU	11.9	30.5	0.4	0	--	41.3
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)	--	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-110915-TS-006	GW-45804-021016-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001
Sample Date:		11/9/2015	2/10/2016	5/18/2016	8/16/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**						
Semi-Volatiles							
1-Methylnaphthalene	µg/L	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014	GW-45804-021016-TS-009	GW-45804-051816-TS-011	GW-45804-081616-TS-008	GW-45804-111616-TS-013
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016
Sample Type:			Original	Original	Original	Duplicate	Original	Original	Original	Original
Parameters	**Units**	**ILP[1]**								
Metals										
Arsenic (dissolved)	mg/L	-	0.0011	0.00190	0.0012	0.0011	ND(0.0010)	0.00107	0.00074	0.00082
Boron (dissolved)	mg/L	-	0.095	0.165	0.18	0.18	ND(0.13)	0.129	0.180	0.198
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	0.000018
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00068)	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025	0.00039	0.00099
Copper (dissolved)	mg/L	-	ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.00056)	ND(0.00069)
Iron (dissolved)	mg/L	48.3	2.54	1.50	3.09	3.20	3.60	4.66	0.838	2.19
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	2.44	1.35	1.59	1.62	1.94	1.96	1.06	2.62
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0102	0.0164	0.0125	0.0127	ND(0.0121)	0.0108	0.0170	0.0180
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.00205	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00124	0.00222	0.00174
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0013)	0.0037	0.0023
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	423	449	461	469	ND(474)	443	467	497
Ammonia-N	mg/L	4.0	18.6	2.93	2.90	3.86	4.79	4.18	3.26	1.91
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	27	34	38	41	ND(36)	36	ND(39)	48
Chloride	mg/L	-	153	112	114	119	ND(109)	101	107	112
Color (apparent)	TCU	-	95.7	71.6	189	143	150 J	132	63.1	114
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.0	9.9	12.7	10.7	ND(10.1)	9.9	12.7	13.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	15	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.24	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	-	7.92	7.94	7.66	7.68	7.88	7.89	7.69	7.26
Phenol	mg/L	-	0.0060	ND(0.0017)	0.0024	0.0033	ND(0.0010)	ND(0.0010)	0.0039	ND(0.0053)
Phosphorus	mg/L	7.2	0.068	0.057	0.060	0.074	0.055	0.101	0.0684	0.0341
Sulfate	mg/L	-	709	423	444	479	ND(495)	542	503	387
Total coliform bacteria	cfu/100mL	-	0	ND(1)	0	0	0	0	200	0
Total dissolved solids (TDS)	mg/L	-	1370	1100	1170	1180	ND(1350)	1390	1370	1230
Total kjeldahl nitrogen (TKN)	mg/L	-	11.9	3.30	3.38	3.91	4.48	4.12	3.43	2.27
Total suspended solids (TSS)	mg/L	-	6.8	11.5	7.3	7.9	21.0	30.0	22.3	4.6
Turbidity	NTU	-	25.0	14.1	60.2	47.7	89.0 J	84.5	30.5	34.5
Un-ionized ammonia	mg/L	-	0.171	0.0516	0.0823	0.109	0.0176	0.159	0.0190	0.00827
Field Parameters										
Conductivity, field	mS/cm	-	2.07	3.92	1.32	1.32	1.04	1.52	1.57	1.63
Dissolved oxygen (DO), field	mg/L	-	1.98	0.51	3.12	3.12	0	1.42	0	0.33
Oxidation reduction potential (ORP), field	millivolts	-	43	-122	-134	-134	-114	-97	-69	-13
pH, field	s.u.	-	7.76	7.35	8.01	8.01	7.25	8.22	7.26	7.14
Temperature, field	Deg C	-	13.75	17.5	12.9	12.9	8.88	10.63	14.6	14.3
Turbidity, field	NTU	-	0	149	13.8	13.8	212	41.2	0	8.7
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	540	420	400	290	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	540	420	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	540	420	400	ND(380)	ND(380)	ND(380)
Semi-Volatiles										
Anthracene	µg/L	-	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

002516

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original		
Parameters	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	0.0140	0.0138	ND(0.0010)	0.00018	ND(0.0010)
Boron (dissolved)	mg/L	-	0.23	0.24	0.11	0.070	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.0321	0.0330	ND(0.0050)	ND(0.00069)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00020	ND(0.0020)
Iron (dissolved)	mg/L	48.3	0.45	0.40	0.19	0.022	2.56
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	4.52	4.57	1.04	--	--
Mercury (dissolved)	mg/L	-	0.000038 J	0.000018 J	ND(0.000010)	0.0650	1.01
Molybdenum (dissolved)	mg/L	-	0.00268	0.00206	0.00068	ND(0.000010)	ND(0.000010)
Nickel (dissolved)	mg/L	-	0.0075	0.0075	ND(0.0050)	0.0150	0.00507
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	0.00084	ND(0.0050)
						ND(0.0013)	0.166
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	1810	1830	436	153	354
Ammonia-N	mg/L	4.0	61.3	58.7	8.03	0.123	14.3
Biochemical oxygen demand (carbonaceous)	mg/L	-	1340	1380	4.3	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	2480	2840	38	16	23
Chloride	mg/L	-	453	480	162	45.3	111
Color (apparent)	TCU	-	1100	1110	119	27.3	102
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	988	1030	10.7	3.2	6.3
Escherichia coli	cfu/100mL	25.6	1000 J	4000 J	0	4	0
Fecal coliform bacteria	cfu/100mL	-	4000	4000	0	5	0
Nitrate (as N)	mg/L	1.3	ND(0.20)	ND(0.20)	ND(0.10)	0.112	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.050)	0.015	ND(0.050)
pH, lab	s.u.	-	7.11	7.15	7.52	8.34	8.92
Phenol	mg/L	-	1.07	1.07	0.0029	ND(0.0020)	ND(0.0033)
Phosphorus	mg/L	7.2	1.68	1.59	0.281	0.0099	0.116
Sulfate	mg/L	-	399	391	848	304	945
Total coliform bacteria	cfu/100mL	-	100000	130000	40	50	1
Total dissolved solids (TDS)	mg/L	-	3800	3620	1630	673	1880
Total kjeldahl nitrogen (TKN)	mg/L	-	85.7	86.1	7.98	0.26	14.0
Total suspended solids (TSS)	mg/L	-	12.3	15.6	64.1	27.0	5.1
Turbidity	NTU	-	463	418	81.3	47.9	36.1
Un-ionized ammonia	mg/L	-	0.108	--	0.292	0.0223	0.0412

002517

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original		
Parameters	**Units**	**TLP[1]**					
Field Parameters							
Conductivity, field	mS/cm	-	5.44	5.44	2.48	0.769	2.14
Dissolved oxygen (DO), field	mg/L	-	1.37	1.37	3.33	1.56	4.41
Oxidation reduction potential (ORP), field	millivolts	-	-362	-362	-215	-113	-63
pH, field	s.u.	-	6.59	6.59	7.99	8.65	6.84
Temperature, field	Deg C	-	21.6	21.6	16.66	19.81	18.26
Turbidity, field	NTU	-	182	182	243	7.2	30.1
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	--	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	-	--	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	µg/L	-	ND(0.035)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

002518

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

002519

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0010	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.00015	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	-	1.76	3.30	0.455
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	-	0.496	1.43	1.11
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.0438	0.0049	0.0058
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	-	0.0115	0.308	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	-	422	559	558
Ammonia-N	mg/L	-	-	0.2	-	0.245	0.252	0.218
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	-	73.6	333	104
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	-	27.2	132	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	-	4.5	8.0	7.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	-	ND(0.10)	ND(0.10)	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	-	ND(0.10)	ND(0.10)	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	-	0.033	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	-	808	1580	1360
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	0.0057	0.00152	0.00303
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.972	1.228	1.58	2.05
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	10.92	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	-	6.68	8.02	7.41	7.76
Temperature, field	Deg C	15	AO	-	9.33	9.96	10.6	10.98
Turbidity, field	NTU	5	AO	-	125	-	-	16.5

002520

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

002521

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	0.111	0.078
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	0.0016	0.0036
Iron (dissolved)	mg/L	0.3	AO	10.6	2.30	-	2.36	1.16
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.31	-	1.23	1.94
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0066	-	0.0030	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	-	0.0038	0.0023
Zinc (dissolved)	mg/L	5	AO	-	0.0080	-	0.0285	0.0085
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	559	-	558	541
Ammonia-N	mg/L	-	-	0.2	0.478	-	1.60	0.478
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	13	30
Chloride	mg/L	250	AO	-	109	-	-	140
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	7.5	-	64.6	33.2 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	6.9	-	5.0	5.3
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	-	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(10)	-	0	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	-	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	7.74	7.66
Phenol	mg/L	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	-	0.037	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	446
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	-	0	ND(2)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1380	-	1300	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	3.85	0.69
Total suspended solids (TSS)	mg/L	-	-	-	-	-	5.6	2.0
Turbidity	NTU	5	AO	-	-	-	16.9	5.90 J
Un-ionized ammonia	mg/L	-	-	-	0.00171	-	-	0.0217
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.26	0.831	2.02	1.8
Dissolved oxygen (DO), field	mg/L	-	-	-	9.81	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-55
pH, field	s.u.	6.5-8.5	OG	-	7.21	6.55	6.57	8.28
Temperature, field	Deg C	15	AO	-	9.7	13.8	11.48	11.2
Turbidity, field	NTU	5	AO	-	40.7	-	-	113

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	-	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

002523

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.108	0.111	0.079	0.080
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	0.0030	0.0310	0.0134	0.0691
Iron (dissolved)	mg/L	0.3	AO	10.6	1.06	0.733	1.72	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.17	1.11	1.30	1.30
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0042	0.0045	0.0041	0.0048
Nickel (dissolved)	mg/L	-	-	-	0.0086	0.0031	0.0022	0.0026
Zinc (dissolved)	mg/L	5	AO	-	0.0064	0.0146	0.0044	0.0065
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	550	584	570	563
Ammonia-N	mg/L	-	-	0.2	0.809	1.91	3.72	1.13
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	34	34	23	19
Chloride	mg/L	250	AO	-	143	164	170	196
Color (apparent)	color unit	5	AO	-	-	-	45.7	7.5
Color (apparent)	TCU	5	AO	-	30.1 J	85.4	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	ND(5.2)	6.1	4.4	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.20	0.16	ND(0.10)	0.68
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.82	7.43	7.48	7.37
Phenol	mg/L	-	-	-	ND(0.0030)	ND(0.0010)	0.0023	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	325	358	355	345
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1270	1380	1400	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	2.04	3.52	1.16
Total suspended solids (TSS)	mg/L	-	-	-	4.8	7.2	6.4	4.8
Turbidity	NTU	5	AO	-	8.75	13.8	14.5	ND(0.59)
Un-ionized ammonia	mg/L	-	-	-	0.000166	0.000746	0.0128	0.00423
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.97	2.1	2.27	0.626
Dissolved oxygen (DO), field	mg/L	-	-	-	8.32	10.4	6.56	6.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-41	124
pH, field	s.u.	6.5-8.5	OG	-	5.84	6.16	7.13	7.08
Temperature, field	Deg C	15	AO	-	13.5	12.3	11.63	14.3
Turbidity, field	NTU	5	AO	-	196	1	4.3	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

002525

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016
Sample Date:					5/28/2015	5/28/2015	11/10/2015	5/17/2016	11/16/2016
					Original	Duplicate	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Metals									
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00013
Boron (dissolved)	mg/L	5	IMAC	-	0.106	0.103	0.14	0.12	0.132
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.0010)	ND(0.0010)	0.00019
Copper (dissolved)	mg/L	-	-	-	0.0154	0.0173	0.0112	0.0147	0.00871
Iron (dissolved)	mg/L	0.3	AO	10.6	0.411[b]	0.635[b]	0.29	0.67b	0.025
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.00050)	0.000089
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.35[b]	1.26[b]	1.54[b]	1.55b	1.686
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0048	0.0051	0.00551	0.00438	0.00404
Nickel (dissolved)	mg/L	-	-	-	0.0033	0.0031	ND(0.0050)	0.0075	0.00661
Zinc (dissolved)	mg/L	5	AO	-	0.0113 J	0.0064 J	ND(0.010)	0.013	0.0043
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	565[b]	574[b]	595[b]	580b	547b
Ammonia-N	mg/L	-	-	0.2	0.636[a]	0.650[a]	0.679[a]	0.756a	0.670a
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	25	25	25	26	26
Chloride	mg/L	250	AO	-	264[b]	247	83.7	268b	212b
Color (apparent)	color unit	5	AO	-				34.2	25.1
Color (apparent)	TCU	5	AO	-	36.6	37.9	43.1	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.8[b]	5.4[b]	5.8[b]	7.6	4.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.34	0.31	0.051	ND(0.10)	0.14
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	7.67	7.62	7.50	7.71	6.99
Phenol	mg/L	-	-	-	0.0018 J	0.0037 J	0.0027	0.0025	ND(0.0034)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.0037	0.0041
Sulfate	mg/L	500	AO	-	313	294	62.0	312	308
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	16	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1250[b]	1300[b]	1060[b]	1260b	1220b
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	0.95	0.97	1.08	1.05
Total suspended solids (TSS)	mg/L	-	-	-	3.0	ND(2.0)	4.0	5.5	4.1
Turbidity	NTU	5	AO	-	9.06[b]	5.71[b]	14.1[b]	9.29b	10.2b
Un-ionized ammonia	mg/L	-	-	-	0.00321	0.00328	0.0247	0.0107	0.00145
Field Parameters									
Conductivity, field	mS/cm	-	-	-	1.78	--	2.7	2.43	2.61
Dissolved oxygen (DO), field	mg/L	-	-	-	4.47	--	2.49	6.23	4.21
Oxidation reduction potential (ORP), field	millivolts	-	-	-	166	--	-2	51	149
pH, field	s.u.	6.5-8.5	OG	-	7.23	7.23	7.99	7.7	6.88
Temperature, field	Deg C	15	AO	-	13.58	13.6	13.44	12.35	13.02
Turbidity, field	NTU	5	AO	-	0	--	0.9	1.4	5.75

002526

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016
Sample Date:					5/28/2015	5/28/2015	11/10/2015	5/17/2016	11/16/2016
					Original	Duplicate	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	ND(250)	--	--
Semi-Volatiles									
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--	--

002527

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0032	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	6.60	9.16	-	6.52
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.12	1.57	-	1.41
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0059	0.0042	-	0.0049
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	0.110	ND(0.0030)	-	0.0078
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	611	309	-	571
Ammonia-N	mg/L	-	-	0.2	0.157	0.104	-	0.117
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	2500	AO	-	64.0	63.0	-	58.1
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	137	-	109	232
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	9.4	9.9	-	11.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.462	-	0.031
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	4	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1060	892	-	1020
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.00083	0.00022	-	0.000126
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.6	1.22	1.36	1.98
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.94	0.5	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-98	-88	-
pH, field	s.u.	6.5-8.5	OG	-	7.2	6.90	6.29	6.69
Temperature, field	Deg C	15	AO	-	15.1	12.2	12	9.74
Turbidity, field	NTU	5	AO	-	-	-	-	29.7

002528

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

002529

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	7.17	6.97	7.19	7.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.42	1.37	1.71	1.52
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	0.0033	ND(0.0030)	0.0057
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	597	648	666	643
Ammonia-N	mg/L	-	-	0.2	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	27	34	30
Chloride	mg/L	2500	AO	-	56.7	76.7	82.1	94
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	50.1	256	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	11.1	12.9	9.5	15.1
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.91	7.87	7.46
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	0.0020
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	198	213
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	42	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1000	1030	1090	1090
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.53	0.60	0.50
Total suspended solids (TSS)	mg/L	-	-	-	-	15.0	16.0	42.0
Turbidity	NTU	5	AO	-	-	80.0	8.80 J	90.0
Un-ionized ammonia	mg/L	-	-	-	0.00028	-	0.00078	0.000032
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.82	1.83	2	1.87
Dissolved oxygen (DO), field	mg/L	-	-	-	2.95	1.27	0.87	1.71
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-98	-77	-158	-
pH, field	s.u.	6.5-8.5	OG	-	6.97	6.4	7.32	5.84
Temperature, field	Deg C	15	AO	-	12.8	11.55	12.8	14.9
Turbidity, field	NTU	5	AO	-	73.1	94.5	15.7	53

002530

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)

002531

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.062	11.1	1.12	8.35[b]
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0638	1.02	0.0994	0.401[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0042	0.0027	0.0010	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	--
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	ND(0.0030)	0.0034	0.0035
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	74	309	84	166
Ammonia-N	mg/L	-	-	0.2	0.091	0.055	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	76	34	ND(10)	12
Chloride	mg/L	2500	AO	-	86.8	76.9	80	395[b]
Color (apparent)	color unit	5	AO	-	-	25.3	31.7	
Color (apparent)	TCU	5	AO	18.4	23.7	-	-	29.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.9	3.0	3.5	2.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	ND(2)	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	8.54	7.67	8.30	8.08
Phenol	mg/L	-	-	-	0.0133	0.0032	0.0015	0.0030
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	61.4	191	62	393
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	10	0	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	284	722	269	346
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.40	0.60	ND(0.15)	0.21
Total suspended solids (TSS)	mg/L	-	-	-	177	292	9.6	ND(2.0)
Turbidity	NTU	5	AO	-	8.60	145	6.03	8.83[b]
Un-ionized ammonia	mg/L	-	-	-	0.000038	0.00016	ND(0.0012)	0.0016
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.98	1.91	0.329	0.474
Dissolved oxygen (DO), field	mg/L	-	-	-	11.04	0.15	4.3	0.56
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-122	-154	-186
pH, field	s.u.	6.5-8.5	OG	-	6.22	6.98	7.98	7.94
Temperature, field	Deg C	15	AO	-	11.3	13.8	11.6	14.57
Turbidity, field	NTU	5	AO	-	187	44.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(360)	ND(360)	ND(360)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	ND(0.020)	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

002533

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:					11/9/2015	5/17/2016	11/15/2016
					Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Metals							
Arsenic (dissolved)	mg/L	0.025	MAC	-	0.00015	ND(0.00010)	0.00017
Boron (dissolved)	mg/L	5	MAC	-	0.023	0.022	0.023
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	0.05	MAC	-	0.00053	0.00056	ND(0.00050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Copper (dissolved)	mg/L	-	-	-	ND(0.00020)	0.00047	0.0539
Iron (dissolved)	mg/L	0.3	AO	10.6	0.133	1.02[b]	0.199
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.000050)	ND(0.000050)	0.000078
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0470	0.218[b]	0.0486
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.00124	0.000422	0.00131
Nickel (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Silver (dissolved)	mg/L	-	-	-	--	--	--
Zinc (dissolved)	mg/L	5	AO	-	0.0013	0.0031	0.0021
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	105	173	102
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	0.083	0.033
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	5.2
Chemical oxygen demand (COD)	mg/L	-	-	-	12	13	21
Chloride	mg/L	2500	AO	-	87.0	75.0	86.5
Color (apparent)	color unit	5	AO	-		48.2	31.6
Color (apparent)	TCU	5	AO	18.4	48.2	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.2	3.8	4.5
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	1	AO	-	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	8.56[b]	8.33	8.52[b]
Phenol	mg/L	-	-	-	0.0027	0.0035	0.0025
Phosphorus	mg/L	-	-	0.5	8.83[a]	0.0096	0.0060
Sulfate	mg/L	500	AO	-	17.4	42.1	0.34
Total coliform bacteria	cfu/100mL	ND	MAC	-	1[b]	2[b]	198[b]
Total dissolved solids (TDS)	mg/L	500	OAO	-	245	346	241
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.26	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L	-	-	-	2.7	45.2	5.1
Turbidity	NTU	5	AO	-	16.5[b]	161[b]	13.3[b]
Un-ionized ammonia	mg/L	-	-	-	ND(0.045)	0.0316	0.0029
Field Parameters							
Conductivity, field	mS/cm	-	-	-	0.404	0.422	0.379
Dissolved oxygen (DO), field	mg/L	-	-	-	0	1.85	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-157	-260	-148
pH, field	s.u.	6.5-8.5	OG	-	10.95[b]	9.35[b]	8.57[b]
Temperature, field	Deg C	15	AO	-	14.06	10.47	11.36
Turbidity, field	NTU	5	AO	-	2	37[b]	12.8[b]

002534

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:					11/9/2015	5/17/2016	11/15/2016
					Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)	--	--
Semi-Volatiles							
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--
Acridine	µg/L	-	-	-	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--
Chrysene	µg/L	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--
Fluorene	µg/L	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--
Pyrene	µg/L	-	-	-	--	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0023	-	0.0018
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00022	0.00020	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	3.59	2.85	-	5.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.52	1.53	-	2.71
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0695	0.0527	-	0.0168
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0742	ND(0.0030)	-	0.0123
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	427	490	-	519
Ammonia-N	mg/L	-	-	0.2	0.373	0.311	-	0.476
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	83.5	70.6	-	106
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	143	-	90.6	203
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	8.5	9.7	-	10.3
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	-	0.072
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	10	2
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	1080	-	1460
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.000407	0.00152	-	0.0145
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.52	1.53	1.65	2.31
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.91	2.12	0.02
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-124	-31	-60
pH, field	s.u.	6.5-8.5	OG	-	6.62	7.24	6.14	8.12
Temperature, field	Deg C	15	AO	-	11.9	12.9	7.72	10.59
Turbidity, field	NTU	5	AO	-	-	-	-	4.2

002536

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

002537

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	0.068	0.078	0.074
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	0.00078	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.050)	5.77	6.02	5.55
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.321	2.95	2.91	2.64
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	291	519	548	507
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	1.85	2.33	2.45
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	23	51	36
Chloride	mg/L	250	AO	-	42.8	116	140	94.2
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	5.0	112	73.0	35.0 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.1	10.6	7.6	ND(5.2)
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	0.44	ND(0.10)	ND(0.10)	0.25
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.96	7.60	7.82
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	545	373
Total coliform bacteria	cfu/100mL	ND	MAC	-	340	2	10	140
Total dissolved solids (TDS)	mg/L	500	OAO	-	834	1550	1600	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	2.16	2.43	2.95
Total suspended solids (TSS)	mg/L	-	-	-	-	12.5	14.0	38.7
Turbidity	NTU	5	AO	-	-	79.0	7.60	53.0
Un-ionized ammonia	mg/L	-	-	-	ND(0.00031)	-	0.605	0.00202
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.981	2.37	1.95	2.17
Dissolved oxygen (DO), field	mg/L	-	-	-	-	1.7	0	5.62
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-73	-104	-
pH, field	s.u.	6.5-8.5	OG	-	7.48	6.36	9.17	6.41
Temperature, field	Deg C	15	AO	-	9.0	9.92	9.6	14.6
Turbidity, field	NTU	5	AO	-	62.3	165	26.7	46

002538

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

002539

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.081	0.099	0.204	0.186
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	6.25	3.06	ND(0.050)	0.178
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	2.38	1.34	0.648	0.0878[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0211	0.0133	0.0301	0.0351
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0034	0.0075	0.0075	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	548	466	489	305
Ammonia-N	mg/L	-	-	0.2	4.60	2.69	0.273	0.099
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	46	19	ND(10)	ND(10)
Chloride	mg/L	250	AO	-	157	103	127	48.9
Color (apparent)	color unit	5	AO	-	-	34.6 J	61.9	
Color (apparent)	TCU	5	AO	-	35.7	-	-	15.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	13.5	4.2	2.5	2.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	0.15	0.40	0.836[a]
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.53	7.76	7.54	8.02
Phenol	mg/L	-	-	-	ND(0.0010)	0.0030	0.0015	0.0014
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.030
Sulfate	mg/L	500	AO	-	639	279	333	172
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	10	0	1[c]
Total dissolved solids (TDS)	mg/L	500	OAO	-	1750	1030	1140	523[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	5.09	2.85	0.42	0.43
Total suspended solids (TSS)	mg/L	-	-	-	26.4	10.0	24.4	28.1
Turbidity	NTU	5	AO	-	63.6	23.5	11.4	3.44
Un-ionized ammonia	mg/L	-	-	-	0.00197	0.0104	0.00386	0.0020
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.32	1.69	0.557	0.661
Dissolved oxygen (DO), field	mg/L	-	-	-	7.89	8.74	10.48	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-64	24	144
pH, field	s.u.	6.5-8.5	OG	-	6.24	7.22	7.90	7.73
Temperature, field	Deg C	15	AO	-	11.1	10.44	7.2	17.05
Turbidity, field	NTU	5	AO	-	0	5.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	–
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	–
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	–
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	–
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	–
Acridine	µg/L	-	-	-	-	ND(4.0)	-	–
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	–
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	–
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	–
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	–
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	–
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	–
Naphthalene	µg/L	-	-	-	-	ND(0.050)	-	–
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	–
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	–

002541

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:					11/9/2015	5/17/2016	5/17/2016	11/15/2016
					Original	Original	Duplicate	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.29	0.13	0.14	0.27
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0607
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.10)	1.49[b]	1.55[b]	ND(0.10)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0439	0.425[b]	0.434[b]	0.0256
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0816	0.242	0.247	0.0847
Nickel (dissolved)	mg/L	-	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Silver (dissolved)	mg/L	-	-	-	--	--	--	--
Zinc (dissolved)	mg/L	5	-	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	261	259	257	301
Ammonia-N	mg/L	-	-	0.2	0.355[a]	0.591[a]	0.581[a]	0.057
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	14	69 J	19 J	13
Chloride	mg/L	250	AO	-	52.5	92.7	91.6	61.2
Color (apparent)	color unit	5	AO	-		47.7	66.3	38.4
Color (apparent)	TCU	5	AO	-	59.8	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	4.3	4.4	3.9	1.9
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.81[a]	ND(0.020)	ND(0.020)	0.487
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.72	7.89	7.90	7.39
Phenol	mg/L	-	-	-	0.0019	0.0023 J	0.0034 J	0.0048
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.0408	0.0390	0.0160
Sulfate	mg/L	500	AO	-	256	213	211	271
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	40[b]	40[b]	168[b]
Total dissolved solids (TDS)	mg/L	500	OAO	-	554[b]	728[b]	712[b]	727[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.04	0.70	0.68	0.30
Total suspended solids (TSS)	mg/L	-	-	-	6.0	23.3 J	86.0 J	8.7
Turbidity	NTU	5	AO	-	4.96	29.4[b]	28.6[b]	45.8[b]
Un-ionized ammonia	mg/L	-	-	-	0.177	0.0571	0.0543	0.00036
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.331	0.802	--	0.926
Dissolved oxygen (DO), field	mg/L	-	-	-	2.36	1.56	--	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	136	-49	--	-29
pH, field	s.u.	6.5-8.5	OG	-	8.63[b]	8.54[b]	--	7.43
Temperature, field	Deg C	15	AO	-	11.35	13.6	--	10.39
Turbidity, field	NTU	5	AO	-	2.6	3.7	--	10.7[b]

002542

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:					11/9/2015	5/17/2016	5/17/2016	11/15/2016
					Original	Original	Duplicate	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)	--	--	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--

002543

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards, Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the Tier I Trigger Level
[ ] - Exceedence of the ODWQS

002544

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0031	ND(0.0010)	-	0.0018	0.0013
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.000188	0.000110	0.000046	-	0.00001	0.000035
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.089	ND(0.050)	1.00	-	0.811	ND(0.050)
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	73.7	-	-	-	-	-
Manganese	mg/L	-	0.0433	0.0357	0.305	-	0.348	0.0346
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.264	0.348	0.134	-	0.345	0.187
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	0.0200	0.0067	0.0304	-	0.185	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	220	201	216	-	188	286
Ammonia-N	mg/L	-	ND(0.050)	0.103	0.096	-	0.110	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	83.1	83.6	79.2	-	122	122
Color (apparent)	TCU	-	6.7	9.9	-	9.1	21.3	12.0
Conductivity	umhos/cm	-	1480	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	3.1	6.7	-	5.2	4.9
Escherichia coli	cfu/100mL	100	0	1	-	1	35	1
Fecal coliform bacteria	cfu/100mL	4800	1	10	-	1	37	2
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(1.0)	0.57	0.94	-	1.32	0.55
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.08	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0044	0.0079	0.0395	-	0.0197	0.0061
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	8	350	-	2100	600	140
Total dissolved solids (TDS)	mg/L	-	1100	1010	1010	-	1170	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	0.92	-	-	-	-	-
Unionized ammonia	mg/L	0.02	ND(0.000014)	0.0025	0.00035	-	0.00034	ND(0.000094)

002545

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1850	1263	1480	1750	1840	1740
Dissolved oxygen (DO), field	mg/L	-	-	-	10.51	10.4	11.2	12.6
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	171	-
pH, field	s.u.	6.5-8.5	9.31	7.85	7.27	9.2	7.08	6.96
Temperature, field	Deg C	-	4.0	22	8.1	6.7	12.28	8.8
Turbidity, field	NTU	-	73	-	-	-	6.7	10.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L			-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0093	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002546

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	-	ND(0.0010)	0.0027	0.0025	ND(0.010)
Boron	mg/L	0.2	0.140	-	0.089	0.087	0.105	ND(0.10)
Cadmium	mg/L	0.0002	0.000092	-	0.00013	0.00016	0.00021	ND(0.00090)
Chromium	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt	mg/L	0.0009	0.00111	-	0.00233	0.00196	0.00277	ND(0.0050)
Copper	mg/L	0.005	0.0016	-	0.0011	ND(0.0010)	ND(0.0010)	ND(0.010)
Iron	mg/L	0.3	0.231	-	0.118	0.089	0.078	ND(0.50)
Lead	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0050)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0536	-	0.185	0.0636	0.0593	0.028
Mercury	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.275	-	0.558	0.465	0.408	0.583
Nickel	mg/L	0.025	0.0113	-	0.0157	0.0138	0.0238	0.016
Zinc	mg/L	0.03	0.0174	-	ND(0.0030)	ND(0.0030)	0.0053	ND(0.030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	268	-	232	145	178	136
Ammonia-N	mg/L	-	0.073	-	0.100	0.634	0.463	0.105
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	15	-	76	ND(10)	38	10
Chloride	mg/L	-	164	-	94.2	96.6	101	100
Color (apparent)	TCU	-	-	7.2	15.0	9.4 J	8.8	16.3
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.2	-	3.2	2.4	4.5	2.2
Escherichia coli	cfu/100mL	100	-	45	130	ND(10)	10	10
Fecal coliform bacteria	cfu/100mL	4800	-	11	150	ND(10)	3	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	1.10	-	0.34	1.26	1.30	0.33
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.87	-	8.08	8.11	8.14	8.12
Phenol	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	0.0050	ND(0.0010)	0.0036
Phosphorus	mg/L	0.01	0.0122	-	0.0093	0.0133	0.0092	0.0193
Sulfate	mg/L	-	-	-	684	570	696	489
Total coliform bacteria	cfu/100mL	-	-	260	1000	ND(1000)	600	2200
Total dissolved solids (TDS)	mg/L	-	1370	-	1420	1130	1370	1040
Total kjeldahl nitrogen (TKN)	mg/L	-	0.49	-	0.51	0.80	0.66	0.49
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	11.6	-	5.6	12.8	15.2	7.2
Turbidity	NTU	-	-	1.11	2.20	3.45	12.6	4.83
Unionized ammonia	mg/L	0.02	-	-	0.000189	0.000171	0.000153	0.0068

002547

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	2340	1920	1510	1590	1770	1560
Dissolved oxygen (DO), field	mg/L	-	-	-	12.19	8.13	10.16	8.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	66	-	-	9
pH, field	s.u.	6.5-8.5	6.97	7.06	7.02	8.74	8.45	8.14
Temperature, field	Deg C	-	18.66	17.64	7.2	20.3	2.4	20.43
Turbidity, field	NTU	-	-	-	67.1	58.8	11.5	12.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002548

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW2-09
Sample ID:			SW-45804-112814-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051616-TS-002	SW-45804-111416-TS-003	SW-45804-051810-MB-003
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/18/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.010)	ND(0.0010)	ND(0.0010)	0.00031	0.0011
Boron	mg/L	0.2	0.090	0.11	ND(0.10)	ND(0.10)	0.095	-
Cadmium	mg/L	0.0002	0.00011	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00020)	0.00052
Chromium	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	-
Cobalt	mg/L	0.0009	0.00141	ND(0.0050)	0.0028	ND(0.0010)	0.00079	-
Copper	mg/L	0.005	0.0013	ND(0.010)	ND(0.010)	ND(0.010)	0.0011	-
Iron	mg/L	0.3	0.061	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.050)	0.221
Lead	mg/L	0.005	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	0.000 IE	-
Magnesium	mg/L	-	-	-	-	--	-	-
Manganese	mg/L	-	0.0334	0.139	0.0843	0.0273	0.0314	0.0750
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Mercury (dissolved)	mg/L	-	-	-	-	--	-	-
Molybdenum	mg/L	0.04	0.301	0.229	0.292	0.230	0.270	0.208
Nickel	mg/L	0.025	0.0165	0.035	0.0196	0.0071	0.00955	-
Zinc	mg/L	0.03	0.0068	ND(0.030)	ND(0.030)	ND(0.030)	0.0068	0.0136
General Chemistry								
Alkalinity, total (as $CaCO_3$)	mg/L	-	235	187	203	213	238	161
Ammonia-N	mg/L	-	0.081	1.10	ND(0.050)	0.028	ND(0.020)	0.079
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	--	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	4.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	24	12	16	19	130	-
Chloride	mg/L	-	224	87.1	221	177	163	89.0
Color (apparent)	TCU	-	9.0	12.4	8.7	5.9	5.6	17.4
Conductivity	umhos/cm	-	-	-	-	--	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.0	2.7	3.9	4.9	3.0	3.6
Escherichia coli	cfu/100mL	100	4	50	1	4	2	170
Fecal coliform bacteria	cfu/100mL	4800	8	110	10	30	10	190
Mineral oil and grease	mg/L	-	-	-	-	--	-	-
Nitrate (as N)	mg/L	1.82	0.56	2.80	0.68	1.65	1.03	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	0.047	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	--	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	--	-	-
pH, lab	s.u.	6.5-8.5	7.88	8.14	7.85	8.06	7.63	-
Phenol	mg/L	0.005	ND(0.0010)	0.0053	0.0012	0.0017	0.0017	-
Phosphorus	mg/L	0.01	0.0088	0.0326	0.0082	0.0070	0.0044	0.0362
Sulfate	mg/L	-	597	583	950	884	883	-
Total coliform bacteria	cfu/100mL	-	1900	2000	500	800	1000	270
Total dissolved solids (TDS)	mg/L	-	1440	1110	1630	1430	1280	1170
Total kjeldahl nitrogen (TKN)	mg/L	-	0.31	1.34	0.32	0.51	0.39	-
Total phosphorus	mg/L	-	-	-	-	--	-	-
Total suspended solids (TSS)	mg/L	-	ND(2.0)	52.3	2.8	2.4	3.0	-
Turbidity	NTU	-	4.39	36.0	3.10	0.93	1.04	-
Un-ionized ammonia	mg/L	0.02	0.00069	0.0840	ND(0.0032)	0.0029	ND(0.000051)	0.0025

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW2-09
Sample ID:			SW-45804-112814-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051616-TS-002	SW-45804-111416-TS-003	SW-45804-051810-MB-003
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/18/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	980	1.53	2.36	1.26	1.76	1445
Dissolved oxygen (DO), field	mg/L	-	21.17	10.05	6.58	3.45	8.1	-
Oxidation reduction potential (ORP), field	millivolts	-	117	-	46	124	183	-
pH, field	s.u.	6.5-8.5	7.84	8.23	8.51	8.52	7.11	7.79
Temperature, field	Deg C	-	2.57	19.92	9.12	12.51	6.23	21.3
Turbidity, field	NTU	-	-	106	1.3	0.4	0.8	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	170	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	--	--	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	450	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	--	--	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	620	ND(380)	ND(380)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	170	--	--	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	450	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	ND(250)	--	--	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
2-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
Acenaphthene	µg/L	-	-	-	-	--	--	-
Acenaphthylene	µg/L	-	-	-	-	--	--	-
Acridine	µg/L	-	-	-	-	--	--	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	--	--	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	--	--	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	--	--	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	--	--	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	--	--	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	--	--	-
Chrysene	µg/L	0.0001	-	-	-	--	--	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	--	--	-
Fluoranthene	µg/L	0.0008	-	-	-	--	--	-
Fluorene	µg/L	0.2	-	-	-	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	--	--	-
Naphthalene	µg/L	7	-	-	-	--	--	-
Phenanthrene	µg/L	0.03	-	-	-	--	--	-
Pyrene	µg/L	-	-	-	-	--	--	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

002550

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-110510-TS-015	SW-45804-111110-TS-002	SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004
Sample Date:			11/5/2010	11/11/2010	5/17/2011	5/17/2011	11/17/2011	5/14/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0055	-	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)
Boron	mg/L	0.2	-	-	-	-	-	ND(0.050)
Cadmium	mg/L	0.0002	0.000058	-	0.000077	0.000083	0.00007	ND(0.00010)
Chromium	mg/L	-	-	-	-	-	-	0.0013
Cobalt	mg/L	0.0009	-	-	-	-	-	ND(0.00050)
Copper	mg/L	0.005	-	-	-	-	-	0.0022
Iron	mg/L	0.3	5.36	-	0.180	0.184	ND(0.050)	0.717
Lead	mg/L	0.005	-	-	-	-	-	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.859	-	0.0845	0.0961	0.201	0.186
Mercury	mg/L	0.0002	-	-	-	-	-	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.141	-	0.248	0.252	0.175	0.0050
Nickel	mg/L	0.025	-	-	-	-	-	0.0021
Zinc	mg/L	0.03	0.0338	-	0.0178	0.0161	0.0057	0.0273
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	217	-	190	186	303	215
Ammonia-N	mg/L	-	0.162	-	0.080	0.073	ND(0.050)	0.068
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	40
Chloride	mg/L	-	66.8	-	70.0	69.6	162	66.2
Color (apparent)	TCU	-	-	23.7	23.5	19.0	13.7	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.2	-	4.4	4.1	5.1	17.6
Escherichia coli	cfu/100mL	100	-	3	22	19	0	-
Fecal coliform bacteria	cfu/100mL	4800	-	3	20	30	2	-
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.74	-	1.16	1.16	1.13	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	-	-	7.97
Phenol	mg/L	0.005	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.278	-	0.0090	0.0074	0.0043	0.0768
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	2400	1400	1600	130	-
Total dissolved solids (TDS)	mg/L	-	780	-	976	940	1390	514
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	0.84
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	26.4
Turbidity	NTU	-	-	-	-	-	-	-
Unionized ammonia	mg/L	0.02	0.00053	-	0.000125	0.000113	ND(0.000086)	-

002551

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-110510-TS-015	SW-45804-111110-TS-002	SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004
Sample Date:			11/5/2010	11/11/2010	5/17/2011	5/17/2011	11/17/2011	5/14/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1200	1610	1600	1600	1839	812
Dissolved oxygen (DO), field	mg/L	-	12.6	12.04	-	-	17.19	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	7.26	6.58	6.8	6.8	7.03	7.04
Temperature, field	Deg C	-	7.2	6	11.13	11.13	5.7	19.03
Turbidity, field	NTU	-	-	-	14.2	14.2	24.7	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	0.022	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.0556	-	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002552

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052312-mb-004	SW-45804-111312-MB-004	SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052814-MB-005
Sample Date:			5/23/2012	11/13/2012	5/23/2013	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	-	ND(0.0010)	0.0022 J	ND(0.0010) J	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009	-	ND(0.00050)	0.00066	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	-	ND(0.0010)	0.0027 J	0.0016 J	ND(0.0010)	0.0011
Iron	mg/L	0.3	-	0.157	1.41 J	0.518 J	0.164	0.385
Lead	mg/L	0.005	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.133	0.120	0.0864	0.0716	0.133
Mercury	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0058	0.0057	0.0058	0.0033	0.0060
Nickel	mg/L	0.025	-	ND(0.0020)	0.0027	ND(0.0020)	ND(0.0020)	0.0024
Zinc	mg/L	0.03	-	ND(0.0030)	0.0094	0.0072	0.0059	0.0046
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	240	168	163	240	234
Ammonia-N	mg/L	-	-	ND(0.050)	0.056	0.051	ND(0.050)	0.077
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	42	32	40	34	25
Chloride	mg/L	-	-	121	81.6	82.6	112	119
Color (apparent)	TCU	-	67.9	29.8	56.5 J	59.4 J	30.3	37.4
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	-	8.0	12.7	12.6	9.2	6.8
Escherichia coli	cfu/100mL	100	395	11	40 J	20 J	10	70
Fecal coliform bacteria	cfu/100mL	4800	264	13	80 J	150 J	30	100
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	-	0.11	0.14	0.14	0.18	0.18
Nitrite (as N)	mg/L	0.3	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	8.19	8.07	8.07	8.08	8.25
Phenol	mg/L	0.005	-	ND(0.0010)	0.0056 J	0.0050 J	0.0044	0.0020
Phosphorus	mg/L	0.01	-	0.0286	0.1870	0.0933	0.0312	0.0259
Sulfate	mg/L	-	-	205	119	119	134	188
Total coliform bacteria	cfu/100mL	-	1200	1200	24000	17000	3000	2900
Total dissolved solids (TDS)	mg/L	-	-	762	474	462	606	730
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.52	0.61	0.54	1.03	0.65
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	4.0	69.0	83.0	5.2	5.2
Turbidity	NTU	-	4.20	0.85	3.34	4.31	2.49	3.52
Unionized ammonia	mg/L	0.02	-	ND(0.00014)	0.000014	ND(0.000013)	ND(0.000016)	0.0049

002553

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052312-mb-004	SW-45804-111312-MB-004	SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052814-MB-005
Sample Date:			5/23/2012	11/13/2012	5/23/2013	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	873	900	750	-	1040	1220
Dissolved oxygen (DO), field	mg/L	-	-	13.84	7.64	-	10.24	10.3
Oxidation reduction potential (ORP), field	millivolts	-	-	57	-	-	-	54
pH, field	s.u.	6.5-8.5	7.42	7.22	6.75	6.75	6.42	6.21
Temperature, field	Deg C	-	21.26	6.3	19.1	19.1	2.1	17.97
Turbidity, field	NTU	-	-	35.7	43.9	-	0	9.2
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002554

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW3-09
Sample ID:			SW-45804-112814-TS-001	SW-45804-052715-TS-004	SW-45804-110915-TS-004	SW-45804-051616-TS-003	SW-45804-111416-TS-004	SW-45804-051810-MB-004
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/18/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.00030	0.00042	0.00030	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	0.037	0.026	0.044	-
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	0.000011	ND(0.000010)	ND(0.000010)	0.00031
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	0.00100	0.00097	ND(0.00050)	-
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	0.00026	0.00035	0.00025	-
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Iron	mg/L	0.3	0.455	0.291	0.404	0.444	0.186	0.178
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.00019	0.00018	0.00010	-
Magnesium	mg/L	-	-	-	-	--	--	-
Manganese	mg/L	-	0.0650	0.209	0.149	0.161	0.0637	0.110
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Mercury (dissolved)	mg/L	-	-	-	-	--	--	-
Molybdenum	mg/L	0.04	0.0082	0.0044	0.0102	0.00719	0.00887	0.155
Nickel	mg/L	0.025	ND(0.0020)	ND(0.0020)	0.0022	0.0022	0.00203	-
Zinc	mg/L	0.03	0.0039	0.0046	0.0033	ND(0.0030)	ND(0.0030)	0.0127
General Chemistry								
Alkalinity, total (as $CaCO_3$)	mg/L	-	203	238	234	217	236	214
Ammonia-N	mg/L	-	0.102	0.150	ND(0.050)	0.059	0.064	0.105
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	--	--	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	22	29	ND(10)	30	22	-
Chloride	mg/L	-	109	160	123	145	141	100
Color (apparent)	TCU	-	35.2	51.5	31.7	33.0	26.2	33.1
Conductivity	umhos/cm	-	-	-	-	--	--	-
Dissolved organic carbon (DOC)	mg/L	-	6.4	10.8	6.4	6.8	7.3	5.9
Escherichia coli	cfu/100mL	100	50	210	20	28	23	28
Fecal coliform bacteria	cfu/100mL	4800	70	340	40	80	50	120
Mineral oil and grease	mg/L	-	-	-	-	--	--	-
Nitrate (as N)	mg/L	1.82	0.43	ND(0.020)	0.48	ND(0.10)	0.280	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.010)	ND(0.050)	ND(0.050)	0.017	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	--	--	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	--	--	-
pH, lab	s.u.	6.5-8.5	8.01	8.13	8.02	8.32	7.96	-
Phenol	mg/L	0.005	ND(0.0010)	0.0031	0.0017	0.0016	0.00149	-
Phosphorus	mg/L	0.01	0.0268	0.0435	0.0213	0.201	0.0161	0.0280
Sulfate	mg/L	-	179	113	243	180	276	-
Total coliform bacteria	cfu/100mL	-	1500	4000	600	1200	2000	240
Total dissolved solids (TDS)	mg/L	-	637	596	688	663	796	960
Total kjeldahl nitrogen (TKN)	mg/L	-	0.49	1.30	0.61	0.52	0.42	-
Total phosphorus	mg/L	-	-	-	-	--	--	-
Total suspended solids (TSS)	mg/L	-	6.0	7.6	6.0	19.0	8.1	-
Turbidity	NTU	-	7.32	7.11	3.61	5.50	4.41	-
Un-ionized ammonia	mg/L	0.02	0.00174	0.0044	ND(0.0065)	0.0170	0.00032	0.0070

002555

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW3-09
Sample ID:			SW-45804-112814-TS-001	SW-45804-052715-TS-004	SW-45804-110915-TS-004	SW-45804-051616-TS-003	SW-45804-111416-TS-004	SW-45804-051810-MB-004
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/18/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	473	0.722	0.947	0.803	1.02	1219
Dissolved oxygen (DO), field	mg/L	-	21.98	5.47	5.99	4.51	12.75	-
Oxidation reduction potential (ORP), field	millivolts	-	123.1	-	65	191	203	-
pH, field	s.u.	6.5-8.5	8.17	7.75	8.38	8.38	7.47	8.02
Temperature, field	Deg C	-	1.83	21.32	6.3	10.91	6.47	24.6
Turbidity, field	NTU	-	-	0	1	1	5.2	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	--	--	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	--	--	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	ND(100)	--	--	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	ND(250)	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	ND(250)	--	--	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
2-Methylnaphthalene	µg/L	2	-	-	-	--	--	-
Acenaphthene	µg/L	-	-	-	-	--	--	-
Acenaphthylene	µg/L	-	-	-	-	--	--	-
Acridine	µg/L	-	-	-	-	--	--	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	--	--	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	--	--	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	--	--	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	--	--	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	--	--	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	--	--	-
Chrysene	µg/L	0.0001	-	-	-	--	--	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	--	--	-
Fluoranthene	µg/L	0.0008	-	-	-	--	--	-
Fluorene	µg/L	0.2	-	-	-	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	--	--	-
Naphthalene	µg/L	7	-	-	-	--	--	-
Phenanthrene	µg/L	0.03	-	-	-	--	--	-
Pyrene	µg/L	-	-	-	-	--	--	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

002556

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003	SW-45804-111711-TS-005	SW-45804-051412-MB-003
Sample Date:			5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011	5/14/2012
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0014	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	-	-	-	-	ND(0.050)
Cadmium	mg/L	0.0002	0.000031	0.00013	-	0.00020	ND(0.00010)	0.00039
Chromium	mg/L	-	-	-	-	-	-	ND(0.0010)
Cobalt	mg/L	0.0009	-	-	-	-	-	0.00085
Copper	mg/L	0.005	-	-	-	-	-	0.0019
Iron	mg/L	0.3	0.166	1.68	-	0.153	0.523	0.471
Lead	mg/L	0.005	-	-	-	-	-	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.105	0.199	-	0.101	0.116	0.167
Mercury	mg/L	0.0002	-	-	-	-	-	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.158	0.0330	-	0.0509	0.0064	0.117
Nickel	mg/L	0.025	-	-	-	-	-	0.0049
Zinc	mg/L	0.03	0.0040	0.0104	-	0.0062	0.0043	0.0094
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	208	229	-	239	242	209
Ammonia-N	mg/L	-	0.153	0.058	-	ND(0.050)	ND(0.050)	0.122
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	21
Chloride	mg/L	-	107	74.3	-	68.1	61.2	94.0
Color (apparent)	TCU	-	26.8	-	35.1	39.6	30.3	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.5	8.2	-	11.2	7.0	13.0
Escherichia coli	cfu/100mL	100	309	-	12	31	24	-
Fecal coliform bacteria	cfu/100mL	4800	170	-	23	39	10	-
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.51	0.14	-	ND(0.30)	ND(0.10)	0.49
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	-	-	8.06
Phenol	mg/L	0.005	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.0390	0.0618	-	0.0109	0.0254	0.0855
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	260	-	300	1500	290	-
Total dissolved solids (TDS)	mg/L	-	942	572	-	634	518	738
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	0.61
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	20.8
Turbidity	NTU	-	-	-	-	-	-	-
Unionized ammonia	mg/L	0.02	0.0102	0.00034	-	ND(0.00022)	ND(0.000071)	-

002557

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003	SW-45804-111711-TS-005	SW-45804-051412-MB-003
Sample Date:			5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011	5/14/2012
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1219	970	1060	739	799	1200
Dissolved oxygen (DO), field	mg/L	-	-	12.49	11.84	9.64	15.93	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	231	-	-
pH, field	s.u.	6.5-8.5	8.02	7.55	8.97	7.25	6.91	7
Temperature, field	Deg C	-	24.6	6.0	5.54	11.18	6.7	18.31
Turbidity, field	NTU	-	-	-	-	3.6	28.2	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	0.0147	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002558

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002	SW-45804-052814-MB-004	SW-45804-112814-TS-002
Sample Date:			5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014	11/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	-	ND(0.00010)	0.00012	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	-	0.0011	0.0011	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009	-	ND(0.00050)	ND(0.00050)	0.00068	0.00051	ND(0.00050)
Copper	mg/L	0.005	-	0.0014	0.0018	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	-	0.521	0.634	0.369	0.229	0.339
Lead	mg/L	0.005	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.149	0.0824	0.106	0.110	0.0871
Mercury	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0265	0.0308	0.0722	0.157	0.0221
Nickel	mg/L	0.025	-	0.0032	0.0028	0.0053	0.0055	0.0031
Zinc	mg/L	0.03	-	0.0045	0.0052	0.0116	ND(0.0030)	0.0067
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	246	175	239	216	214
Ammonia-N	mg/L	-	-	ND(0.050)	0.076	0.126	0.071	0.097
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	51	38	38	21	24
Chloride	mg/L	-	-	120	84.0	110	120	109
Color (apparent)	TCU	-	55.2	34.0	53.6 J	27.6	30.9	31.2
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	-	7.8	12.4	9.8	5.3	9.3
Escherichia coli	cfu/100mL	100	77	11	320	10	40	70
Fecal coliform bacteria	cfu/100mL	4800	360	12	140	20	50	80
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	-	0.14	0.19	0.37	0.25	0.61
Nitrite (as N)	mg/L	0.3	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	8.24	8.09	8.11	8.23	8.02
Phenol	mg/L	0.005	-	ND(0.0010)	0.0050	0.0016	0.0044	ND(0.0010)
Phosphorus	mg/L	0.01	-	0.0308	0.101	0.0215	0.0316	0.0256
Sulfate	mg/L	-	-	226	145	235	305	302
Total coliform bacteria	cfu/100mL	-	1000	1500	17000	1000	2700	1800
Total dissolved solids (TDS)	mg/L	-	-	792	518	758	875	837
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.57	0.54	0.46	0.51	0.45
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	19.2	67.0	4.8	6.8	8.4
Turbidity	NTU	-	4.50	1.36	5.35	8.96	3.24	7.27
Unionized ammonia	mg/L	0.02	-	ND(0.000058)	0.0000144	0.000034	0.0045	0.00158

002559

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002	SW-45804-052814-MB-004	SW-45804-112814-TS-002
Sample Date:			5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014	11/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	752)	989	800	1230	1440	582
Dissolved oxygen (DO), field	mg/L	-	-	13.97	7.75	8.35	10.58	21.46
Oxidation reduction potential (ORP), field	millivolts	-	-	98	-	-	45	98.1
pH, field	s.u.	6.5-8.5	7.84	6.87	5.62	6.27	6.22	6.13
Temperature, field	Deg C	-	22.76	5.4	19.2	1.8	17.62	2.36
Turbidity, field	NTU	-	-	46.7	94.7	4.1	8.2	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002560

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051616-TS-004	SW-45804-051616-TS-005	SW-45804-111416-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/27/2015	11/9/2015	5/16/2016	5/16/2016	11/14/2016	5/18/2010	11/5/2010
			Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Metals (Total)									
Arsenic	mg/L	0.005	ND(0.0010)	0.00029	0.00043	0.00038	0.00031	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.057	0.061	0.032	0.031	0.049	-	-
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.000030)	0.000013	0.000012	ND(0.000030)	0.00011	ND(0.00010)
Chromium	mg/L	-	ND(0.0010)	0.00071	0.00069	0.00071	ND(0.00050)	-	-
Cobalt	mg/L	0.0009	0.00071	0.00031	0.00035	0.00035	0.00031	-	-
Copper	mg/L	0.005	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	-
Iron	mg/L	0.3	0.485	0.190	0.280	0.272	0.177	0.271	0.475
Lead	mg/L	0.005	ND(0.0010)	0.00010	0.00017	0.00016	0.00012	-	-
Magnesium	mg/L	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.227	0.122	0.157	0.154	0.0648	0.0542	0.0262
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0813	0.0997	0.0247	0.0234	0.0515	0.0536	0.0230
Nickel	mg/L	0.025	0.0053	0.0055	0.0031	0.0030	0.00370	-	-
Zinc	mg/L	0.03	0.0060	0.0054	ND(0.0030)	0.0033	ND(0.0030)	0.0056	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-	235	205	225	230	244	135	116
Ammonia-N	mg/L	-	0.072	0.067	ND(0.020)	ND(0.020)	0.041	0.142	0.354
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.3	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	25	18	23	23	18	-	-
Chloride	mg/L	-	181	131	160	153	141	108	36.9
Color (apparent)	TCU	-	41.0	22.9	31.2	30.9	22.2	21.2	-
Conductivity	umhos/cm	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	9.5	6.3	8.7	8.9	6.2	6.8	9.6
Escherichia coli	cfu/100mL	100	180	30	26	21	29	5	-
Fecal coliform bacteria	cfu/100mL	4800	260	40	70	80	40	2	-
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.52	0.562	0.68	0.29	0.27	0.358	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	0.3	0.011	ND(0.050)	ND(0.050)	ND(0.050)	0.015	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.18	8.06	8.34	8.34	7.99	-	-
Phenol	mg/L	0.005	0.0018	0.0024	0.0023	0.0026	0.0035	-	-
Phosphorus	mg/L	0.01	0.0415	0.0151	0.0218	0.0214	0.0126	0.0255	0.0345
Sulfate	mg/L	-	245	625	247	237	332	-	-
Total coliform bacteria	cfu/100mL	-	3000	500	1200	1400	2000	50	-
Total dissolved solids (TDS)	mg/L	-	761	1250	791	805	862	936	548
Total kjeldahl nitrogen (TKN)	mg/L	-	0.91	0.51	0.54	0.54	0.36	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	14.0	ND(2.0)	6.4	7.4	3.6	-	-
Turbidity	NTU	-	10.6	2.93	4.81	4.23	2.31	-	-
Un-ionized ammonia	mg/L	0.02	0.0029	0.0112	ND(0.012)	ND(0.012)	0.00029	0.0029	0.00078

002561

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051616-TS-004	SW-45804-051616-TS-005	SW-45804-111416-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/27/2015	11/9/2015	5/16/2016	5/16/2016	11/14/2016	5/18/2010	11/5/2010
			Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Field Parameters									
Conductivity, field	uS/cm	-	1.15	1.53	0.871	–	1.07	1207	810
Dissolved oxygen (DO), field	mg/L	-	8.64	8.62	8.86	–	10.41	-	12.47
Oxidation reduction potential (ORP), field	millivolts	-	-	74	169	–	214	-	-
pH, field	s.u.	6.5-8.5	7.87	8.01	8.05	–	7.66	7.6	7.13
Temperature, field	Deg C	-	21.97	7.7	11.34	–	5.59	21	5.9
Turbidity, field	NTU	-	6.1	0.1	2.5	–	0.9	-	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	–	–	–	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	–	–	–	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	ND(250)	–	–	–	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	ND(250)	–	–	–	-	-
Semi-Volatiles									
1-Methylnaphthalene	µg/L	2	-	-	–	–	–	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	–	–	–	-	-
2-Methylnaphthalene	µg/L	2	-	-	–	–	–	-	-
Acenaphthene	µg/L	-	-	-	–	–	–	-	-
Acenaphthylene	µg/L	-	-	-	–	–	–	-	-
Acridine	µg/L	-	-	-	–	–	–	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	–	–	–	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	–	–	–	-	-
Benzo(c)pyridine (Quinoline)	µg/L	10	-	-	–	–	–	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	–	–	–	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	–	–	–	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	–	–	–	-	-
Chrysene	µg/L	0.0001	-	-	–	–	–	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	–	–	–	-	-
Fluoranthene	µg/L	0.0008	-	-	–	–	–	-	-
Fluorene	µg/L	0.2	-	-	–	–	–	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	–	–	–	-	-
Naphthalene	µg/L	7	-	-	–	–	–	-	-
Phenanthrene	µg/L	0.03	-	-	–	–	–	-	-
Pyrene	µg/L	-	-	-	–	–	–	-	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
{_____} - Exceedence of the PWQO

002562

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	0.0011	0.0012	0.0012	ND(0.0005)	0.0009
Boron	mg/L	0.2	-	-	-	-	0.011	0.039
Cadmium	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	-	-	-	-	ND(0.002)	0.003
Cobalt	mg/L	0.0009	-	-	-	-	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	-	-	-	-	0.002	0.004
Iron	mg/L	0.3	-	0.129	0.630	0.585	-	-
Lead	mg/L	0.005	-	-	-	-	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.0757	0.132	0.117	-	-
Mercury	mg/L	0.0002	-	-	-	-	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0163	0.0124	0.0119	-	-
Nickel	mg/L	0.025	-	-	-	-	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	-	0.0124	0.0033	ND(0.0030)	ND(0.005)	0.011
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	135	143	136	-	-
Ammonia-N	mg/L	-	-	0.146	0.056	0.053	0.15	0.78
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	7	28
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	19.5	18.7	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	33	88
Chloride	mg/L	-	-	60.6	35.3	36.1	-	-
Color (apparent)	TCU	-	43.4	26.7	25.8	24.9	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	-	11.9	11.2	10.7	5.6	12.4
Escherichia coli	cfu/100mL	100	6	80	44	58	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	4800	15	140	70	80	-	-
Mineral oil and grease	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	0.2
Nitrite (as N)	mg/L	0.3	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	ND(1.0)	1.9
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
pH, lab	s.u.	6.5-8.5	-	-	-	-	7.95	8.14
Phenol	mg/L	0.005	-	-	-	-	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	-	0.0197	0.1552	0.112	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	90	2900	600 J	300 J	-	-
Total dissolved solids (TDS)	mg/L	-	-	792	474	468	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	1.55	3.48
Total phosphorus	mg/L	-	-	-	-	-	0.12	0.21
Total suspended solids (TSS)	mg/L	-	-	-	-	-	9	40
Turbidity	NTU	-	-	-	-	-	-	-
Unionized ammonia	mg/L	0.02	-	0.00101	0.0040	0.0038	-	-

002563

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	880	873	877	-	469	1020
Dissolved oxygen (DO), field	mg/L	-	12.91	10.95	16.38	-	16	10.1
Oxidation reduction potential (ORP), field	millivolts	-	-	218	-		-	-
pH, field	s.u.	6.5-8.5	6.6	7.37	8.62	8.62	-	-
Temperature, field	Deg C	-	6.68	13.5	7.2	7.2	-	-
Turbidity, field	NTU	-	-	0	57	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0060	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	-	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	-	-
Fluorene	µg/L	0.2	-	-	-	0.023	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	-
Naphthalene	µg/L	7	-	-	-	ND(0.020)	-	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	-	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002564

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	6/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0027	0.0014	0.0014	-	-	0.0024
Boron	mg/L	0.2	0.044	ND(0.050)	ND(0.050)	-	-	0.041
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.00010)	ND(0.00010)	-	-	ND(0.005)
Chromium	mg/L	-	ND(0.002)	ND(0.0010)	ND(0.0010)	-	-	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	0.00071	0.00069	-	-	ND(0.005)
Copper	mg/L	0.005	0.002	0.0015	0.0014	-	-	ND(0.002)
Iron	mg/L	0.3	-	0.830	0.817	-	-	-
Lead	mg/L	0.005	ND(0.02)	ND(0.0010)	ND(0.0010)	-	-	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.443	0.399	-	-	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0087	0.0086	-	-	-
Nickel	mg/L	0.025	ND(0.01)	0.0025	0.0024	-	-	ND(0.01)
Zinc	mg/L	0.03	0.006	0.0041	ND(0.0030)	-	-	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	87	85	-	-	-
Ammonia-N	mg/L	-	0.09	ND(0.050)	ND(0.050)	-	-	ND(0.01)
Biochemical oxygen demand (BOD)	mg/L	-	8	-	-	-	-	3
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	9.1	8.3	-	-	-
Chemical oxygen demand (COD)	mg/L	-	61	78	72	-	-	40
Chloride	mg/L	-	-	80.3	81.0	-	-	-
Color (apparent)	TCU	-	-	-	-	126	116	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.7	21.2	21.8	-	-	10.3
Escherichia coli	cfu/100mL	100	4	-	-	158	142	28
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	1680 J	860 J	-
Mineral oil and grease	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Nitrate (as N)	mg/L	1.82	0.1	ND(0.10)	ND(0.10)	-	-	0.1
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.10)	ND(0.10)	-	-	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
pH, lab	s.u.	6.5-8.5	8.33	8.49	8.47	-	-	8.21
Phenol	mg/L	0.005	ND(0.001)	ND(0.0010)	ND(0.0010)	-	-	ND(0.001)
Phosphorus	mg/L	0.01	-	0.151	0.153	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	420 J	1100 J	-
Total dissolved solids (TDS)	mg/L	-	-	578	596	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.38	2.18	1.86	-	-	1.73
Total phosphorus	mg/L	-	0.21	-	-	-	-	0.11
Total suspended solids (TSS)	mg/L	-	23	17.2	18.0	-	-	11
Turbidity	NTU	-	-	-	-	14.5	16.3	-
Unionized ammonia	mg/L	0.02	-	-	-	-	-	-

002565

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	6/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1010	1000	-	1020	-	980
Dissolved oxygen (DO), field	mg/L	-	9.4	-	-	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	-	7.6	-	7.14	-	-
Temperature, field	Deg C	-	-	22.73	-	21.02	-	-
Turbidity, field	NTU	-	-	-	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002566

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45804-111212-MB-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0006	0.0019	0.001	0.0012	0.0008	ND(0.0010)
Boron	mg/L	0.2	0.047	0.047	0.038	0.049	0.057	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	0.003	0.008	0.076	0.02	0.0013
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	0.00074
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	0.003	0.005	0.004	0.0028
Iron	mg/L	0.3	-	-	-	-	-	0.745
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	0.346
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	-	-	0.0120
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	0.02	0.07	0.02	0.0035
Zinc	mg/L	0.03	0.006	0.008	ND(0.005)	0.016	0.009	0.0059
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	-	155
Ammonia-N	mg/L	-	ND(0.01)	0.24	ND(0.01)	0.31	0.05	0.161
Biochemical oxygen demand (BOD)	mg/L	-	6	ND(3)	3	8	13	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	-	-	14.0
Chemical oxygen demand (COD)	mg/L	-	58	52	30	70	52	62
Chloride	mg/L	-	-	-	-	-	-	47.5
Color (apparent)	TCU	-	-	-	-	-	-	76.6 J
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.8	10.3	6.3	9.2	11.5	12.0
Escherichia coli	cfu/100mL	100	240	420	8.20	10.2	100	60
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	-	-	140
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
Nitrate (as N)	mg/L	1.82	ND(0.1)	0.1	ND(0.1)	0.1	ND(0.1)	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(1.0)	ND(0.1)	ND(0.1)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(0.1)	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
pH, lab	s.u.	6.5-8.5	7.76	7.86	7.99	8	8	8.18
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)
Phosphorus	mg/L	0.01	-	-	-	-	-	0.319
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	-	-	1000
Total dissolved solids (TDS)	mg/L	-	-	-	-	-	-	566
Total kjeldahl nitrogen (TKN)	mg/L	-	2.94	1.76	1.26	2.62	3.14	2.00
Total phosphorus	mg/L	-	0.29	0.19	0.12	0.32	0.21	-
Total suspended solids (TSS)	mg/L	-	20	11	9	69	34	50.0
Turbidity	NTU	-	-	-	-	-	-	39.0 J
Unionized ammonia	mg/L	0.02	-	-	-	-	-	0.013

002567

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45804-111212-MB-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1030	947	718	862	810	865
Dissolved oxygen (DO), field	mg/L	-	1.6	2	8.1	11.1	11.9	18.17
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-126
pH, field	s.u.	6.5-8.5	-	-	-	-	-	8.28
Temperature, field	Deg C	-	-	-	-	-	-	6.1
Turbidity, field	NTU	-	-	-	-	-	-	255
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.028)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	0.03	-	-	-	-	-	0.021
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002568

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0009	0.0011	0.0010	0.0012	0.0015
Boron	mg/L	0.2	ND(0.050)	0.03	0.038	ND(0.050)	0.023	0.026
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	0.0017	ND(0.002)	ND(0.002)	ND(0.0010)	ND(0.002)	0.002
Cobalt	mg/L	0.0009	0.00076	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.0027	0.002	0.002	0.0014	0.002	0.002
Iron	mg/L	0.3	0.820	-	-	0.152	-	-
Lead	mg/L	0.005	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.343	-	-	0.203	-	-
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0123	-	-	0.0174	-	-
Nickel	mg/L	0.025	0.0035	ND(0.01)	ND(0.01)	0.0025	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	0.0061	0.053	0.013	ND(0.0030)	ND(0.005)	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	163	-	-	166	-	-
Ammonia-N	mg/L	-	0.171	0.88	0.47	0.797	ND(0.01)	0.02
Biochemical oxygen demand (BOD)	mg/L	-	-	ND(3)	ND(3)	-	ND(3)	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	13.5	-	-	2.8	-	-
Chemical oxygen demand (COD)	mg/L	-	56	34	26	27	27	29
Chloride	mg/L	-	46.5	-	-	90.5	-	-
Color (apparent)	TCU	-	53.3 J	-	-	26.2 J	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.3	6.2	7.2	9.9	8.5	9.2
Escherichia coli	cfu/100mL	100	60	22	76	ND(10)	3	50
Fecal coliform bacteria	cfu/100mL	4800	210	-	-	40	-	-
Mineral oil and grease	mg/L	-	-	ND(1.0)	ND(1.0)	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	ND(0.10)	0.2	0.2	0.11	0.4	0.1
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.1)	ND(0.1)	ND(0.10)	0.4	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
Oil and grease, animal and vegetable	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
pH, lab	s.u.	6.5-8.5	8.15	7.72	8.35	8.18	8.09	8.15
Phenol	mg/L	0.005	ND(0.0010)	ND(0.001)	ND(0.001)	0.00136	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.215	-	-	0.0628	-	-
Sulfate	mg/L	-	-	-	-	340	-	-
Total coliform bacteria	cfu/100mL	-	1100	-	-	1000	-	-
Total dissolved solids (TDS)	mg/L	-	566	-	-	718	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.01	1.84	2.06	1.85	1.14	1.92
Total phosphorus	mg/L	-	-	0.13	0.08	-	0.05	0.19
Total suspended solids (TSS)	mg/L	-	44.0	7	14	4.4	5	48
Turbidity	NTU	-	31.0 J	-	-	2.71	-	-
Unionized ammonia	mg/L	0.02	0.004	-	-	0.000323	-	-

002569

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	837	1080	1160	960	851
Dissolved oxygen (DO), field	mg/L	-	-	5.4	13.1	8.09	8.9	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	9.59	-	-	9.80	-	-
Temperature, field	Deg C	-	8.1	-	-	20.6	-	-
Turbidity, field	NTU	-	-	-	-	114	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	ND(0.028)	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	-	-	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0008	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.020)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002570

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			8/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0002	0.0003	ND(0.0001)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.025	0.007	0.027	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.0010)	0.0012	ND(0.0010)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	ND(0.002)	0.0016 J	0.0028 J	0.0011
Iron	mg/L	0.3	-	-	-	0.360	0.557	0.226
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	0.150	0.165	0.0571
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	0.0078	0.0075	0.0124
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	ND(0.01)	0.0022 J	0.0043 J	ND(0.0020)
Zinc	mg/L	0.03	ND(0.005)	0.005	0.009	0.0072 J	0.0133 J	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	160	170	145
Ammonia-N	mg/L	-	ND(0.01)	ND(0.01)	0.99	0.659	0.696	0.190
Biochemical oxygen demand (BOD)	mg/L	-	5	ND(3)	8	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	3.3	3.9	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	33	25	11	70	72	39
Chloride	mg/L	-	-	-	-	51.4	50.5	54.2
Color (apparent)	TCU	-	-	-	-	43.5	46.6	32.0
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.1	8.9	11.3	10.6	10.5	9.1
Escherichia coli	cfu/100mL	100	2	16	96	30	20	1 J
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	50	50	3 J
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.1)	0.1	0.2	ND(0.10)	0.14	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
pH, lab	s.u.	6.5-8.5	8.2	8.53	8.03	8.16	8.23	8.20
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	0.0019	0.0014 J
Phosphorus	mg/L	0.01	-	-	-	0.0536	0.0795	0.0556 J
Sulfate	mg/L	-	-	-	-	183	181	240
Total coliform bacteria	cfu/100mL	-	-	-	-	4000	5000	300 J
Total dissolved solids (TDS)	mg/L	-	-	-	-	488	486	636
Total kjeldahl nitrogen (TKN)	mg/L	-	1.26	0.87	2.69	2.26	1.71	1.25
Total phosphorus	mg/L	-	0.1	0.04	0.1	-	-	-
Total suspended solids (TSS)	mg/L	-	8	ND(3)	10	8.8 J	14.0 J	4.4
Turbidity	NTU	-	-	-	-	5.76	10.0	3.15
Unionized ammonia	mg/L	0.02	-	-	-	0.000227	0.000240	0.0194

002571

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			8/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	775	689	765	624	-	1120
Dissolved oxygen (DO), field	mg/L	-	11.1	13.3	12.5	14.72	-	1.53
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	5
pH, field	s.u.	6.5-8.5	-	-	-	6.36	6.35	6.34
Temperature, field	Deg C	-	-	-	-	4.9	4.9	20.8
Turbidity, field	NTU	-	-	-	-	7.6	-	7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.030)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	0.0069 J	0.0118 J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.050)
Phenanthrene	µg/L	0.03	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002572

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.023
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	0.00169 J
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00040
Copper	mg/L	0.005	0.0012	ND(0.0010)	ND(0.0010)	0.0013	0.0012	0.0013
Iron	mg/L	0.3	0.239	0.180	0.173	0.284	0.248	0.549
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00037
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0546	0.170	0.166	0.0448	0.0503	0.146
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0120	0.0055	0.0053	0.0128	0.0130	0.00576
Nickel	mg/L	0.025	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0021	ND(0.0020)	0.0016
Zinc	mg/L	0.03	ND(0.0030)	0.0046	0.0043	0.0066 J	0.0030 J	0.0075
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	143	176	162	115	113	163
Ammonia-N	mg/L	-	0.193	1.68	1.93	0.084	0.128	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	4.7	4.1	2.4	2.0	16.2
Chemical oxygen demand (COD)	mg/L	-	30	43	41	36	29	130
Chloride	mg/L	-	84.5	47.2	46.9	67.5	67.5	50.7
Color (apparent)	TCU	-	32.4	35.0	36.5	35.5	35.0	80.9
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.8	10.9	11.2	12.7	12.0	15.9
Escherichia coli	cfu/100mL	100	4 J	100	90	190	220	60
Fecal coliform bacteria	cfu/100mL	4800	7 J	110	100	190	240	100
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	0.10	ND(0.10)	ND(0.020)	ND(0.020)	0.028
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)	ND(0.010)	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.19	7.84	7.95	8.62	8.60	8.43
Phenol	mg/L	0.005	0.0034 J	ND(0.0010)	ND(0.0010)	0.0045 J	0.0035 J	0.00139 J
Phosphorus	mg/L	0.01	0.133 J	0.150	0.170	0.0693	0.0777	0.547
Sulfate	mg/L	-	241	115	114	96.4	96.1	82.9
Total coliform bacteria	cfu/100mL	-	500 J	800	900	1000	2000	26000
Total dissolved solids (TDS)	mg/L	-	632	406	404	384	405	390
Total kjeldahl nitrogen (TKN)	mg/L	-	1.01	2.84	2.28	1.35	1.30	1.05 J
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	4.0	9.2	8.8	7.5	5.8	35.0
Turbidity	NTU	-	2.76	9.18	8.17	3.34	4.16	17.8
Unionized ammonia	mg/L	0.02	0.0198	0.0458	0.0537	0.0129	0.0095	ND(0.038)

002573

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	319	-	0.453	0.453	0.462
Dissolved oxygen (DO), field	mg/L	-	-	16.58	-	8.12	8.12	8.76
Oxidation reduction potential (ORP), field	millivolts	-	-	16.5	-	-	-	49
pH, field	s.u.	6.5-8.5	-	8.34	8.34	8.00	8.58	9.87
Temperature, field	Deg C	-	-	3.16	3.2	23.84	23.84	9.6
Turbidity, field	NTU	-	-	-	-	0	0	2.2
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	110
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	520
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	250
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	880
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	110
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	520
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	250
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	ND(0.050)	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0008	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.050)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

002574

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-110915-TS-003	SW-45804-051616-TS-001	SW-45804-111416-TS-001	SW-45804-111416-TS-002
Sample Date:			11/9/2015	5/16/2016	11/14/2016	11/14/2016
			Duplicate	Original	Original	Duplicate
Parameters:	**Units**	**PWQO**				
Metals (Total)						
Arsenic	mg/L	0.005	0.00064	0.00057	0.00070	0.00075
Boron	mg/L	0.2	0.022	0.031	0.030	0.031
Cadmium	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium	mg/L	-	0.00130 J	0.00067	0.00150	0.00160
Cobalt	mg/L	0.0009	0.00031	0.00015	0.00053	0.00056
Copper	mg/L	0.005	0.0012	ND(0.0010)	0.0015	0.0015
Iron	mg/L	0.3	0.384	0.059	0.648	0.710
Lead	mg/L	0.005	0.00029	ND(0.00010)	0.00036	0.00036
Magnesium	mg/L	-	-	--	--	--
Manganese	mg/L	-	0.139	0.0663	0.291	0.322
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	--	--	--
Molybdenum	mg/L	0.04	0.00582	0.00765	0.00366	0.00409
Nickel	mg/L	0.025	0.0016	0.0017	0.00212	0.00216
Zinc	mg/L	0.03	0.0086	ND(0.0030)	0.0036	0.0038
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	-	162	194	176	174
Ammonia-N	mg/L	-	0.051	0.026	1.26	1.25
Biochemical oxygen demand (BOD)	mg/L	-	-	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	-	18.9	2.9	10.6	10.1
Chemical oxygen demand (COD)	mg/L	-	114	61	67	71
Chloride	mg/L	-	51.0	98.6	57.3	57.6
Color (apparent)	TCU	-	103	39.0	98.4	91.9
Conductivity	umhos/cm	-	-	--	--	--
Dissolved organic carbon (DOC)	mg/L	-	18.4	12.6	12.6	14.1
Escherichia coli	cfu/100mL	100	80	9	20	30
Fecal coliform bacteria	cfu/100mL	4800	100	40	60	90
Mineral oil and grease	mg/L	-	-	--	--	--
Nitrate (as N)	mg/L	1.82	0.022	ND(0.10)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	0.3	ND(0.010)	ND(0.050)	0.023	0.023
Oil and grease (HEM), total	mg/L	-	-	--	--	--
Oil and grease, animal and vegetable	mg/L	-	-	--	--	--
pH, lab	s.u.	6.5-8.5	8.37	8.24	8.12	8.06
Phenol	mg/L	0.005	0.0013 J	0.0022	0.00151	0.00057
Phosphorus	mg/L	0.01	0.422	0.0827	0.215	0.224
Sulfate	mg/L	-	83.5	280	149	149
Total coliform bacteria	cfu/100mL	-	31000	700	2000	1000
Total dissolved solids (TDS)	mg/L	-	386	760	507	424
Total kjeldahl nitrogen (TKN)	mg/L	-	4.27 J	1.40	4.52	3.76
Total phosphorus	mg/L	-	-	--	--	--
Total suspended solids (TSS)	mg/L	-	41.0	6.5	24.6	33.3
Turbidity	NTU	-	17.1	4.55	18.4	20.9
Un-ionized ammonia	mg/L	0.02	0.039	0.0075	0.00659	0.00650

002575

Table E.4.4

Surface Water Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-110915-TS-003	SW-45804-051616-TS-001	SW-45804-111416-TS-001	SW-45804-111416-TS-002
Sample Date:			11/9/2015	5/16/2016	11/14/2016	11/14/2016
			Duplicate	Original	Original	Duplicate
Parameters:	**Units**	**PWQO**				
Field Parameters						
Conductivity, field	uS/cm	-	0.462	0.772	0.643	--
Dissolved oxygen (DO), field	mg/L	-	8.76	3.67	8.24	--
Oxidation reduction potential (ORP), field	millivolts	-	49	159	224	--
pH, field	s.u.	6.5-8.5	9.87	9.11	7.43	--
Temperature, field	Deg C	-	9.6	13.38	6.1	--
Turbidity, field	NTU	-	2.2	2.9	33.1	--
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	130	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	370	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	500	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		130	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		370	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		ND(250)	--	--	--
Semi-Volatiles						
1-Methylnaphthalene	µg/L	2	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	--	--	--
2-Methylnaphthalene	µg/L	2	-	--	--	--
Acenaphthene	µg/L	-	-	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--
Acridine	µg/L	-	-	--	--	--
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	--	--	--
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	10	-	--	--	--
Benzo(g,h,i)perylene	µg/L	0.00002	-	--	--	--
Benzo(k)fluoranthene	µg/L	0.0002	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--
Chrysene	µg/L	0.0001	-	--	--	--
Dibenz(a,h)anthracene	µg/L	0.002	-	--	--	--
Fluoranthene	µg/L	0.0008	-	--	--	--
Fluorene	µg/L	0.2	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--
Naphthalene	µg/L	7	-	--	--	--
Phenanthrene	µg/L	0.03	-	--	--	--
Pyrene	µg/L	-	-	--	--	--

Notes:

1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[dashed box] - Exceedence of the PWQO

002576

www.ghd.com



May 29, 2018

Kyle Straberger
Senior Environmental Officer
Ministry of the Environment and Climate Change
2430 Don Reid Drive
Ottawa, Ontario
K1H 1E1

Dear Mr. Straberger,

Orgaworld operates a Stormwater Management Pond (SWM Pond) at our facility in Ottawa. The SWM Pond is approved under ECA Number 2844-9YNGZC (the ECA). The ECA defines various operational procedures related to the SMP. Condition 5(11) specifies that the Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for Stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of [i.e. discharged] in a timely manner to minimize the occurrence of emergency overflow during major storm events. Condition 5(5) describes the sampling that is to be completed within the SWM Pond prior to the discharge of any stormwater from the pond. This Condition defines parameters and trigger levels against which sample results are to be compared prior to any discharge.

Orgaworld personnel sampled the SWM Pond on April 9, 2018 and the analytical results for the collected sample demonstrated water quality that was below all trigger levels defined in Table 2 (Trigger Parameters) of Condition 5(5) the ECA. Orgaworld opened the manually-operated sluice gate wide enough (i.e. 1-2 inches) to allow for a steady stream of effluent, and discharged the SWM Pond for a period of 12 days.

Based on the sampling conducted and the analytical results for the SWM Pond sample, it is Orgaworld's position that the Conditions of the ECA were met prior to discharge.

Eleven days after the discharge period concluded, Orgaworld's landlord, Tomlinson, notified Orgaworld that they had a sample collected from the pond's outlet pipe during the discharge interval, and that the analytical result for unionized ammonia and E.coli in the sample exceeded their respective PWQOs and ECA Trigger Levels. Orgaworld understands from Tomlinson that the sample was collected by staff from Golder & Associates. A copy of the chain of custody, site plan, field notes, sampling methodology, and an analytical certificate reportedly for the SWM Pond outlet sample were later provided to Orgaworld upon request. No report summarizing the sampling exercise from Golder & Associates was provided to Orgaworld, nor do we know if such a document exists. Based on the information provided to Orgaworld, the SWM Pond sample collected by Golder staff contained an unionized ammonia concentration of 0.066 mg/L and an E.coli reading of 122 CFU/100 ml. These concentrations exceeds the trigger levels for unionized ammonia defined in the ECA (0.05 mg/L) and E.coli (100 CFU/100 ml). Tomlinson's sampling activity came as a surprise to Orgaworld.

Orgaworld's environmental consultant, GHD Ltd., reviewed the information provided by Tomlinson and Golder, and verified that the sampling carried out by Golder was not consistent with the sampling requirements prescribed in the ECA. There is no requirement for grab sampling of pond effluent during the actual discharge period, or for samples to be taken from the pond's concrete headwall outlet pipe.

Tomlinson's motivation for conducting the sampling exercise is unknown as the discharged storm water is not thought to impact any of their property holdings in the area.

The difference between the unionized ammonia concentration reported in the pre-discharge sample collected by Orgaworld on April 9th, and the concentration reported in the Golder sample taken on April 19th, may be attributable to the expected natural variability within surface water quality of a large Stormwater retention pond and/or the higher field temperature (Δ 5.6°C) reported by Golder at the time of sampling. The calculation to derive the unionized fraction of ammonia is extremely sensitive to the temperature of the water sample – a higher field temperature will result in a higher unionized fraction. The difference in E.coli could be attributed to variability in the retention pond resulting from the presence of numerous water fowl during the late winter/early spring.

As GHD was not involved in either sampling activity, they cannot comment on the details of the respective sampling methodologies or the validity of the data obtained by the two parties. GHD did comment to Orgaworld that the ECA is clear on the pre-discharge sampling requirement, and the obligation to compare Stormwater samples to the Trigger Parameters in Table 2 prior to discharge. Based on the evidence presented, it appears to GHD that Orgaworld satisfied the intent of these requirements.

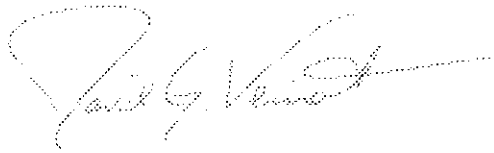
Orgaworld is unsure of the relevance of the sampling results reported by Tomlinson. It is Orgaworld's understanding that the Conditions of the ECA have been met. No additional sampling or reporting of data is required, based on the Conditions of the ECA. Therefore, Orgaworld has decided not to report a violation of the Site's ECA to the MOECC based on the sampling performed by Golder on behalf of Tomlinson.

Orgaworld is committed to complying with the Conditions of the ECA in a responsible manner and will continue to properly characterize SWM Pond water quality prior to discharge. Accordingly, Orgaworld will not discharge from the pond until sample results confirm that water quality within the SWM Pond meets the trigger levels defined in Condition 5(5) of the ECA.

In the event that future sampling results indicate an exceedance of a trigger level in a SWM Pond sample collected during discharge, Orgaworld will implement the "Spill Contingency and Pollution Prevention Plan", as required by Condition 5(6) of the ECA.

We trust that this review has satisfied the request you made in your email of May 8, 2018. If you have any further comments or questions, please feel free to contact me at your convenience.

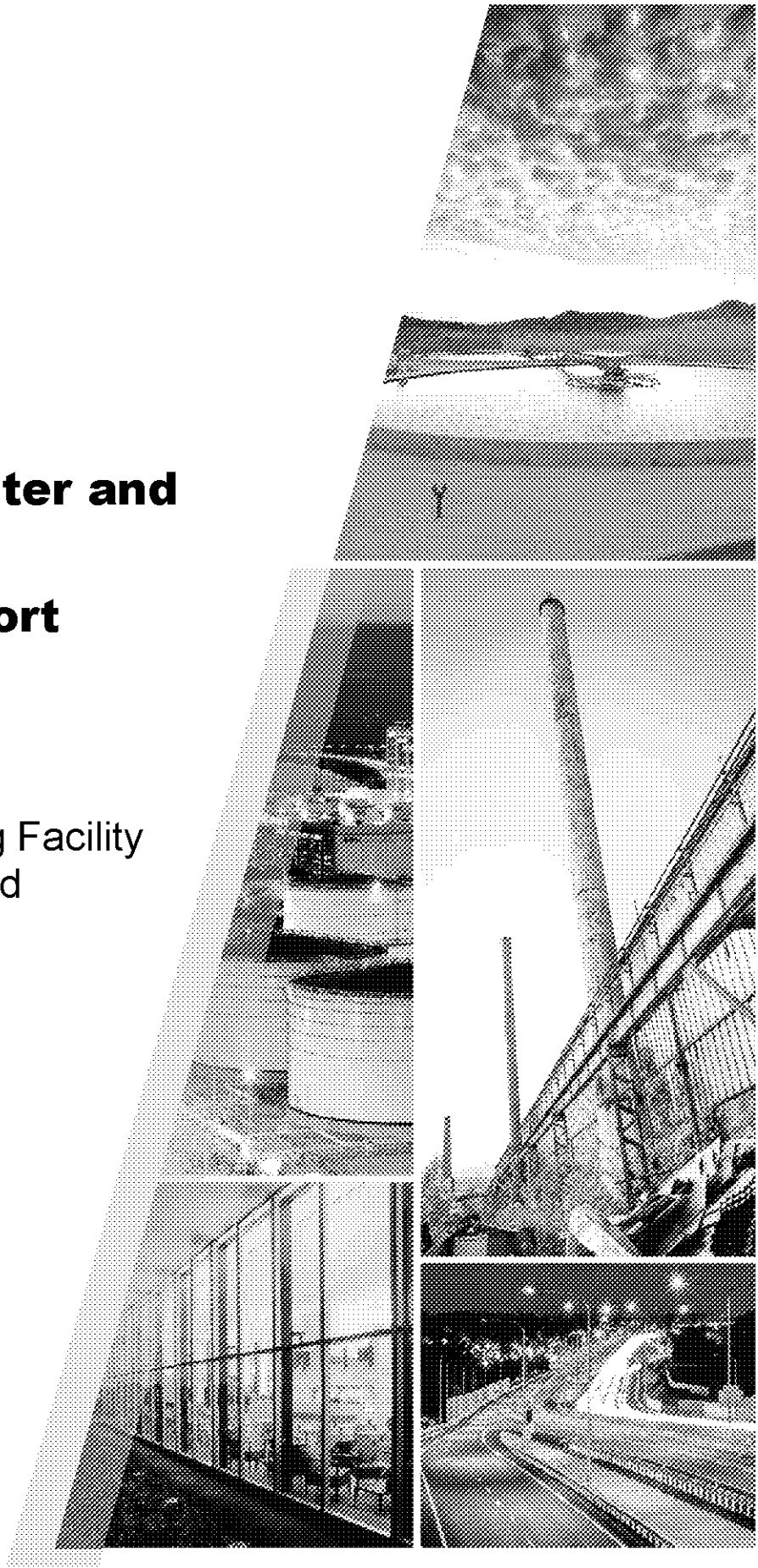
Best regards,



David Veinot
Compliance Officer

2018 Groundwater and Surface Water Monitoring Report

Renewi Canada Ltd.
Organics Composting Facility
5123 Hawthorne Road
Ottawa, Ontario



002580

Executive Summary

GHD was retained by Renewi Canada Ltd. (formerly Orgaworld Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Renewi Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

The 2018 Monitoring Program was completed in general accordance with the requirements of the Facility's Industrial Sewage Works Environmental Compliance Approval (No. 2844-9YNGZC) as amended on February 1, 2017.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

GHD completed three monitoring events at the Site in May, August, and November 2018 that included groundwater elevation measurements, groundwater quality sampling, and surface water sampling. Based on the groundwater elevations gathered in May and November 2018, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.

Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source.

Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing ammonia concentrations during previous monitoring periods had been observed downgradient of the Facility at TW-8, however recent results show decreases in ammonia concentrations.

The 2018 groundwater quality results were assessed using the Site's Trigger Level Program. Within the shallow unconfined aquifer, ammonia was found at concentrations greater than those specified by the Site's trigger concentrations at several of the near Facility monitoring wells as well as some downgradient monitoring locations.

Multiple Tier I trigger level exceedances in a single sample were found at four shallow unconfined aquifer locations in 2018. Trigger level exceedances at MW102-09 (in August) and MW105-13 (in May) did not persist during subsequent sampling events, as such, both wells will be sampled as part of the Tier I program in 2019. The trigger level exceedances at MW101-13 and MW104-13 occurred in the November 2018 samples. These locations will be sampled under Tier II conditions during the Spring 2019 monitoring event.

The only trigger level exceedances from a deep bedrock aquifer location in 2018 occurred in the November 2018 sample from TW-4 with elevated ammonia and E.coli concentrations. This location will be sampled under Tier II conditions during the Spring 2019 monitoring event. This location was sampled under Tier II in May 2018 due to trigger level exceedances in November 2017. Trigger level exceedances were not observed in the May 2018 sample and as such the well was returned to Tier I monitoring for November.

Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2018 monitoring period.

Surface water was discharged twice from the on-Site Stormwater Management Pond during the 2018 monitoring period (April and June). All parameters were below their respective trigger levels listed in the Site ECA in samples collected from the Stormwater Management Pond prior to discharging.

Table of Contents

1. Introduction 1
1.1 Site Background 1
1.2 Site Setting 2
1.3 Site Processes 3
1.4 MECP Correspondence to Date 3

2. Physical Setting 4
2.1 Site Geology 4
2.2 Site Hydrogeology 6
2.3 Surface Water and Drainage Features 7
2.4 Groundwater Use 7

3. Monitoring Program 7
3.1 Monitoring Network 8
3.2 Monitoring Protocol 8
3.2.1 Groundwater Monitoring 8
3.2.2 Surface Water Monitoring 9
3.3 Quality Assurance/Quality Control Program 9

4. Monitoring Results 10
4.1 Groundwater Hydraulic Monitoring 10
4.2 Water Quality Monitoring 11
4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality 11
4.2.2 Deep Bedrock Aquifer Groundwater Quality 16
4.2.3 Surface Water Quality 18

5. Shallow Groundwater Extraction System 20

6. Compliance and Trigger Level Program 21
6.1 Trigger Parameters 21
6.2 Trigger Concentrations 21
6.3 Trigger Level Assessment 22

7. MECP Correspondence 24
7.1 MECP Surface Water Comments 24
7.2 MECP Groundwater Comments 24

8. Conclusions 25

9. Recommendations 25

10. References 26

Figure Index

Figure 1.1	Site Location Map
Figure 1.2	Site Plan
Figure 3.1	Groundwater and Surface Water Monitoring Locations
Figure 3.2	Renewi Property Groundwater and Surface Water Monitoring Locations
Figure 4.1	Unconfined Shallow Groundwater Elevations – May 15-16, 2018
Figure 4.2	Unconfined Shallow Groundwater Elevations – November 7-9, 2018
Figure 4.3	Bedrock Groundwater Elevations – May 15-16, 2018
Figure 4.4	Bedrock Groundwater Elevations – November 7-9, 2018
Figure 4.5	Median 2018 Ammonia Concentration Isopleths
Figure 4.6	Median 2018 Dissolved Iron Concentration Isopleths
Figure 4.7	Median 2018 Dissolved Manganese Concentration Isopleths
Figure 4.8	Median 2018 Dissolved Organic Carbon Concentration Isopleths
Figure 4.9.1	Temporal Plots Selected Parameters - MW1-08
Figure 4.9.2	Temporal Plots Selected Parameters - MW2-08
Figure 4.9.3	Temporal Plots Selected Parameters - MW3-08
Figure 4.9.4	Temporal Plots Selected Parameters - MW4-08 & MW4-09
Figure 4.9.5	Temporal Plots Selected Parameters - MW5-09
Figure 4.9.6	Temporal Plots Selected Parameters - MW101-09 & MW101-13
Figure 4.9.7	Temporal Plots Selected Parameters - MW102-09
Figure 4.9.8	Temporal Plots Selected Parameters - MW103-09
Figure 4.9.9	Temporal Plots Selected Parameters - MW104-13
Figure 4.9.10	Temporal Plots Selected Parameters - MW105-13
Figure 4.9.11	Temporal Plots Selected Parameters - MW106-15
Figure 4.9.12	Temporal Plots Selected Parameters - EW107-15
Figure 4.10	Northern Ditch Topography with May 15-16, 2018 Groundwater Contours
Figure 4.11.1	Temporal Plots Selected Parameters - TW-7
Figure 4.11.2	Temporal Plots Selected Parameters - TW-4
Figure 4.11.3	Temporal Plots Selected Parameters – TW-8
Figure 4.12	Temporal Plot Select Parameter – SW-4

Table Index

Table 2.1	Monitoring Location Details
Table 3.1	Monitoring Program Schedule
Table 4.1	Groundwater Elevations
Table 4.2	Shallow Unconfined Aquifer Groundwater Analytical Results
Table 4.2A	MW103 09 Analytical Results – PWQO Comparison
Table 4.3	Deep Bedrock Aquifer Groundwater Analytical Results
Table 4.4	Surface Water Analytical Results
Table 4.5	SW4-09 Monthly Sampling Analytical Results
Table 5.1	EW107-15 Daily Pumping Log

Appendix Index

Appendix A	Environmental Compliance Approval (No. 7251-8GKRPD and No. 2844-9YNGZC)	
Appendix B	Background Correspondence	
	Appendix B1	Compliance and Trigger Level Program Memorandum
	Appendix B2	Monitoring Program Rationalization Memorandum
	Appendix B3	Groundwater Assessment and Work Plan Memorandum
Appendix C	Stratigraphic and Instrumentation Logs	
	Appendix C1	Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs
	Appendix C2	Deep Bedrock Water Well and Stratigraphic Logs
Appendix D	QA/QC Assessment Memorandum and Laboratory Analytical Reports	
Appendix E	2010 – 2017 Analytical Data	

1. Introduction

GHD was retained by Renewi Canada Ltd. (formerly Orgaworld Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Renewi Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

A Site location map is provided on Figure 1.1.

The 2018 Monitoring Program was completed in general accordance with the requirements of the Facility's Industrial Sewage Works Environmental Compliance Approval (No. 2844-9YNGZC) as amended on February 1, 2017 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A which is included on the USB Drive at the end of this report. Please note that all Appendices are included on the USB Drive.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Renewi is a tenant of Tomlinson.

Between June and August 2008, GHD conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO facility in the southwest portion of the HIP (CRA, 2008a). GHD submitted the ESAs to the City of Ottawa on behalf of Renewi.

Site clearing and preparation was completed in 2008, Facility was constructed during 2009, and initial receipt of materials for processing was in January of 2010.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates Ltd. (Golder) conducted a pumping test and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, GHD was tasked by Renewi to generate the Monitoring Program, based on a request from the Ministry of Environment, Conservation & Parks (MECP) through the process of reviewing the ECA application. In March 2010, the Monitoring Program was modified through an ECA amendment to reflect Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the former ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, GHD prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/2015. The TLP was submitted to the MECP along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 5. For reference, a copy of the memorandum sent to the MECP that outlines the updated TLP is included in Appendix B1.

GHD prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure that groundwater and surface water was being adequately monitored. This was accomplished through a review of the monitoring program and removal of any redundant or unnecessary monitoring. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of GHD's memorandum outlining the MPR is included in Appendix B2.

On February 1, 2017, the MECP issued a revised ECA (No. 2844-9YNGZC) for the facility. The revised ECA incorporates the updated TLP submitted to the MECP in March 2015.

The 2018 monitoring program was completed in accordance to the schedules in the revised ECA. A copy of the revised ECA is included in Appendix A.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2018.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of a large processing plant with a delivery/receiving area, administrative office, septic bed area, and emission stack. An asphalt skirt extends around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system. The on-Site perimeter ditch system drains to the storm water management (SWM) pond located at the east side of the Site. The layout of the SWM and the drainage ditches are illustrated on Figure 1.2.

Surface water run-off from the Site generally drains to the on-Site perimeter ditch system which, in turn, drains to the on-Site SWM pond where it is impounded for re-use in the Facility process or until it is

manually released off-Site. Water that is released flows through local roadside ditches within the HIP subdivision, which discharge to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, levelled fill material, and a few shrubs and grass scrub.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects as backfill, and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to convey groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry (all located west/southwest of the Site) has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), leaf & yard waste, food wastes, commercial waste (restaurant wastes, etc.) and certain organic sludges. Organics are processed into a Non-Agricultural Source Material (NASM) and into animal bedding, or for other similar agriculturally beneficial applications. The Facility is designed to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts that are a result of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond and is retained for use in Renewi's process, in accordance with the Site's ECA. If excess water is available in the SWM pond, then Renewi undertakes analysis and testing of the pond water. If analysis and testing show acceptable water quality, the excess stormwater is discharged into the HIP roadside ditch network.

1.4 MECP Correspondence to Date

The correspondence below documents selected communications between Renewi and the MECP with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 2844-9YNGZC (formerly covered under ECA No. 7251-8GKRPD):

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b).
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009).
- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009).

- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a).
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010).
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011).
- Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013).
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014).
- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 3, 2015a).
- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015b).
- Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2015d).
- Memorandum RE: Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa- Hydrogeologic Assessment from Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region (MECP, January 3, 2017a).
- Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MECP, February 1 ,2017b).

2. Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and through examination of the stratigraphic logs.

A total of 19 monitoring wells and one extraction well have been completed in the shallow unconfined aquifer unit throughout the HIP subdivision, 16 of which have been completed within the limits of the Renewi Site.

Test wells (TW-1 to TW-6) were completed by Golder in 1993 and 2008. TW-1 through TW-6 extend into the deep bedrock aquifer unit which was identified as the Nepean bedrock formation (Golder Associates, 2008).

In May 2010, GHD oversaw the installation of two on-Site deep bedrock test wells (TW-7 and TW-8). The stratigraphic logs from GHD's monitoring wells confirmed the presence of sandstone but also identified limestone at TW-8.

Ontario Geologic Survey (OGS) mapping shows the Oxford Formation (Dolostone) covers much of the Site with the March and Nepean Formations (Dolostone/Sandstone formations) exist in the Northern portions of the HIP (OGS, Map 1508A).

The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix C for the overburden and deep bedrock wells. Monitoring location details are provided in Table 2.1.

Examination of the stratigraphic logs prepared by GHD indicates that the geology is generally consistent across the HIP subdivision. Five main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer
- Alluvial sand and silts
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, marine deposits with some removal by fluvial erosion. The Site is located on a former quarry and thus filling activities have been carried out since the early 1990's which have significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the ground surface; however the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by GHD indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick), occasionally some clay, boulders, and dredged sediment. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was dark brown to black in colour, and was generally loose and moist. Topsoil was found in most locations that were not used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface outcrops to a depth of approximately 7.6 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to identify and characterize the bedrock. The bedrock at MW2-08 and MW4-08 was described as fractured grey limestone. The bedrock was generally found to be fractured in the upper meter, where core recovery ranged from 93 to 94 percent and Rock Quality Designation (RQD) ranged from 63 to 75 percent. At depths in excess of 1 m into the bedrock, at MW2-08, the bedrock was found to be more competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- A shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock.
- A deep confined bedrock unit (referred to as the deep bedrock aquifer).

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

As part of GHD's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. During the pumping test, water levels gathered from the shallow unconfined aquifer unit indicated no corresponding drawdown between the shallow and deep wells. Water levels in the deep bedrock aquifer unit lowered from 1.2 to 3.7 m during the 6-hour period. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface water run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to the on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch which runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually out letting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Renewi Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by GHD shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs (Appendix C2). Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. As necessary, TW-4 is also used as an alternative refilling source for replenishing the fire suppression water holding tank.

3. Monitoring Program

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), GHD has completed ongoing monitoring from 2009 to present.

The following monitoring activities were completed at the Site during the current monitoring period:

- May 2018 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples

- August 2018 - Tri-annual sampling:
  - Hydraulic monitoring and sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW106-15)
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples
- November 2018 - Semi-annual sampling::
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples

3.1 Monitoring Network

Currently the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer unit: twelve groundwater monitoring wells and one extraction well: MW01-08, MW2-08, MW3-08, MW4-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, MW106-15, and EW107-15.
- Deep bedrock aquifer unit: three monitoring wells: TW-4, TW-7, and TW-8.

Surface water quality is monitored through four surface water monitoring locations (SW-1 to SW-4). Surface water level monitoring in the northern ditch is monitored by the four staff gauges (SG-1 through SG-4).

Table 3.1 provides a summary of the 2018 monitoring program.

The groundwater and surface water monitoring locations within the HIP subdivision are provided on Figure 3.1. Figure 3.1 also shows the Site limits included in the Renewi lease and the boundary of the HIP subdivision.

Figure 3.2 shows the groundwater and surface water locations on the Renewi Property.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following GHD's field method guideline protocols, which are consistent with MECP requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling techniques with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled following stabilized field readings.

Due to the greater depth to groundwater, deep bedrock aquifer unit monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

During mid-2016, a dedicated sampling port was installed in the Facility to facilitate sampling from EW107-15. The sample is collected after the extraction well and sample port are purged for several minutes to ensure the sample port and associated lines are clear of stagnant water.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted to ALS Environmental (ALS) of Waterloo, Ontario for analysis under standard chain-of-custody protocol. Analytical results are discussed in Section 4.

The analytical parameter list for groundwater is summarized in Table 3.1.

The original laboratory analytical reports are provided in Appendix D.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW-1 to SW-4) following GHD's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch, creek or pond water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, dissolved oxygen, oxidation reduction potential (ORP), turbidity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. It should be noted that potential dissolution of particulates by the acid preservative in the metals sample bottles can artificially increase parameter concentrations in surface water samples. Acid preservation is a standard method for preserving water samples for metals analysis. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

Hydraulic level monitoring is completed at four staff gauges located throughout the roadside ditch adjacent to the Site along the south side of Somme Street. The depth to standing-surface water was visually observed to be nil/dry during all three of the staff gauge monitoring events in 2018.

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2018 analytical data were made through the QA/QC assessment.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix D. The qualifications indicated in Appendix D do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

4. Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 - Groundwater Hydraulic Monitoring
- Section 4.2 - Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow unconfined aquifer unit, deep bedrock aquifer unit, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the May and November 2018 monitoring events are consistent with those observed historically at the Site, and were used to develop groundwater contour figures, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the May 2018 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2018 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.46 to 98.32 metres above mean sea level (m AMSL) at MW103-09 and MW3-08 during the May monitoring event and 90.47 to 98.51 mAMSL at MW103-09 and MW3-08 during the November event. The depth below grade to the shallow aquifer water table varied from 0.79 to 5.23 metres below ground surface (mBGS) at MW5-09 and MW3-08 during the May monitoring event and 0.15 and 5.04 mBGS at MW2-08 and MW3-08 during the November event. The groundwater elevations measured at MW1-08 during 2018 were above the surveyed ground surface elevation by 0.08 and 0.05 m for the May and November events respectively. This is due to the low ground surface elevation around the stormwater management pond. Based on the groundwater elevations gathered in May and November 2018, flow occurs in an east-northeast direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the May and November 2018 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.02 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 40 percent for the shallow unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)

K = hydraulic conductivity (L/T)

i = horizontal hydraulic gradient (unitless)

n = effective porosity

Based on this equation, the local groundwater velocity is estimated to range from a few millimeters per year to a high of approximately 6.4 m per year in the fill deposits and shallow fractured bedrock. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

During the 2018 monitoring period, the deep bedrock aquifer unit groundwater levels ranged from a low of 83.30 m AMSL (TW-8) to high of 90.54 m AMSL (TW-7). The seasonal water level fluctuation ranged from 0.20 m (TW-4) to 0.99 m (TW-8). Based on the 2018 groundwater elevations, groundwater in the deep bedrock aquifer unit flows in a west-southwest direction, which is opposite to the flow direction of the shallow unconfined aquifer unit. It is likely that the presence of a quarry to the west and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit. This is consistent with previous interpretations of groundwater flow across the Site.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.018 and 0.015 m/m for the May and November 2018 events, respectively.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in an east-northeast direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08 and MW4-09
- Upgradient/cross gradient wells: MW2-08
- Facility Area: EW107-15, MW101-13, and MW105-13
- Downgradient: MW1-08, MW5-09, MW102-09, MW103-09, MW104-13, and MW106-15

Tabulated analytical results for the shallow unconfined aquifer from the 2018 sampling program are provided in Table 4.2.

On behalf of Renewi, GHD completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment, Appendix B3). The Groundwater Assessment evaluated the 2013 and historical groundwater quality in order to determine appropriate parameters of concern for the Site.

Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of an ammonia plume within the shallow unconfined aquifer unit.

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MECP criteria listed in the Ontario Drinking Water Standards (ODWS) (MOE, 2003, as amended). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

Ammonia and DOC are commonly used as indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2018 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleth figures are useful for evaluating and presenting spatial patterns in groundwater chemistry.

On Figures 4.5 through 4.8, the presence of elevated concentrations of the indicator parameters are identified in close proximity to, or just downgradient from, the Facility. The elevated concentrations appear to extend from the Facility to the east-northeast following the direction of groundwater flow. Some decreases in concentrations are observed with increased distance from the facility (following the path of groundwater flow in the shallow unconfined aquifer) for ammonia in particular and concentrations remain low to the west, south, and southeast of the Facility. Note that due to the highly variable concentrations of iron and manganese at EW107-15 water quality from this location has not been included in the contouring presented on Figures 4.6 and 4.7. Periodic pumping at EW107-15 is suspected to contribute to the highly variable water quality observed at this location. Further discussion of the extraction well is provided in Section 5.

The pattern of iron and manganese concentrations presented on Figures 4.6 and 4.7 is different than that observed for ammonia and DOC in that the concentrations reported in close proximity to the Facility are lower than those reported at the downgradient Site boundary. 2018. Continued monitoring will provide insight into the evolution of these parameters near and downgradient from the Facility.

This distribution of elevated concentrations of ammonia, DOC, and to a lesser extent iron, and manganese is consistent with a contaminant plume related to an organic contaminant source.

The 2018 median concentrations show that elevated DOC, iron, and manganese concentrations extend to MW103-09, located in the northeastern corner of the Site, but that elevated ammonia is limited to the western side of the stormwater management pond or the Northern Ditch (in the vicinity of MW102-09). This indicates that there may be an additional source of DOC, iron and manganese contributing to the elevated concentrations at MW103-09 possibly not related to the Facility.

Figures 4.9.1 to 4.9.12 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges for ammonia in the shallow unconfined aquifer:

Location	Trend	Ammonia Concentration Range (mg/L)	
		Historic (pre-2018)	**2018**
MW4-09	↑	ND(0.050) – 0.294	0.063 – 0.554
MW3-08	↑	ND(0.020) – 0.264	0.218 – 0.224
MW2-08	↑	ND(0.020) – 0.161	0.133 – 0.171
EW107-15	↓	0.123 – 88.0/91.1	0.927 – 28.2/28.3
MW105-13	↓	4.88 – 76.0	12.2 – 33.0/33.2
MW101-13	Stable	0.237 – 34.9	11.5 – 23.0
MW104-13	Stable to ↑	1.20 – 14.3	6.13 – 20.0
MW5-09	↓ (2015-2017) and ↑ (2018)	0.32 – 31.4	10.7 – 19.2
MW102-09	↑	ND(0.050) – 10.6	9.8/10.8 – 15.2
MW1-08	↑	0.335 – 2.08J	2.24 – 3.67
MW103-09	Stable	0.508 –2.35	0.217/0.255 – 1.55/1.74
MW106-15	↑	1.91 – 10.0	5.44 – 18.6

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

As presented above, each of the upgradient locations have shown relatively stable and low ammonia levels. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have shown some evidence of increases in recent monitoring, however concentrations remain low.

During the 2018 reporting year, overall trends in ammonia concentrations have been decreasing, particularly near the facility. Ammonia concentrations at MW105-13 and MW101-13 previously showed increasing trends. Current analytical data indicates declining and stable trends at each facility area well. The analytical results for EW107-15 show highly variable concentrations during the period of operation of this extraction well. Active pumping at this location is suspected to be the source of the observed variability. Notwithstanding the fluctuations, the presence of elevated ammonia in the extraction well indicates that active groundwater extraction at this location is an appropriate remedial strategy.

Ammonia concentrations at MW5-09 followed a clear increasing trend between 2009 and mid-2015. Monitoring results from 2016 through 2018 demonstrate a stable trend with ammonia concentrations ranging between 10 mg/L and 20 mg/L. Renewi's efforts to eliminate the source of subsurface discharge through the improved maintenance of the existing ammonia scrubber, along with the remediation of the zone of elevated ammonia adjacent to the facility through operation of EW107-15, are likely responsible for the observed improvements in water quality at MW5-09 during this period. It should be noted that Renewi

intends to implement capital improvements through replacement of the existing ammonia scrubber with three new replacement units.

Ammonia concentrations at downgradient locations showed a reversal in the improving trends from prior to 2017 with elevated concentrations in 2018. Monitoring locations MW1-08, MW102-09, MW104-13, and MW106-15 all had ammonia results that exceeded the historical ranges from each location. The ammonia trends downgradient of the facility are all increasing with the exception of MW103-09 which continues to show stable concentrations. Further sampling will determine if these trends continue. MW5-09 and MW102-09 continue to exhibit elevated concentrations downgradient of the Facility and adjacent to the run-off ditches to the north the Site.

The following table summarizes recent trends in iron and manganese concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
		Historic (pre-2018)	**2018**	**Historic (pre-2018)**	**2018**
MW4-09	↓	0.045 – 1.86	ND(0.010) – 0.15	0.0711 – 1.25	0.0556 – 0.154
MW3-08	Stable	ND(0.010) – 1.04	ND(0.010) – 0.015	ND(0.00050)– 0.0987	0.00054 – 0.0027
MW2-08	Stable	ND(0.010) – ND(0.10)	ND(0.010)	0.00058 – 0.207	0.00107 – 0.00112
EW107-15	↑ and ↓	0.022 – 2.56	ND(0.10) – 4.20	0.065 – 4.52/4.57	0.435/0.441 – 1.42
MW105-13	↑ **and** ↓	0.080/0.095 – 7.61	2.96 – 4.91/4.98	0.145 – 1.06	0.253/0.254 – 0.717
MW101-13	↓	ND(0.050) – 34.5	0.109 – 0.58	0.0114 – 2.24	0.864 – 0.892
MW104-13	↓	0.071 – 23.9	0.128 – 8.8	0.548 -19.4	0.945 – 6.51
MW5-09	↑ and ↓	1.99 – 14.5	3.20 – 5.96/5.97	1.09 – 5.33	1.84 – 1.87/1.90
MW102-09	↓ and Stable	ND(0.010) – 24.0/24.7	3.09 – 6.28	ND(0.00050) – 5.16	1.80 – 2.97
MW1-08	↓	0.897 – 16.6/17.2	1.74 – 3.46	0.539 – 10.9/11.0	0.825 – 0.913
MW103-09	↓	1.24/1.3 – 22.9/23.8	0.60 – 3.30/3.73	1.43/1.46 – 7.70/7.77	0.458/0.460 – 3.04/3.15
MW106-15	Stable	0.838 – 6.05	1.83 – 3.98	1.06 – 2.62	1.34 – 1.83

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

Elevated concentrations of dissolved iron and manganese are apparent in the facility area and downgradient of the facility, with the most elevated concentrations being reported at MW105-13, MW104-13, MW5-09, MW102-09, MW106-15, and MW1-08. As discussed above, iron and manganese concentrations in the interpreted source area adjacent to the facility were observed to decrease in 2017-2018 as compared to previous monitoring years.

The principal observation with respect to trends in iron and manganese concentrations within shallow groundwater at the Site is that concentrations have generally followed trends of decreasing levels over time. The exception to this observation is near the downgradient Site boundary where iron concentrations

continue to increase. It is expected that these concentrations will stabilize and decrease with time in response to Renewi's efforts to control releases to the subsurface.

The following table summarizes recent trends in DOC concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	DOC Concentration Range (mg/L)	
		Historic (pre-2018)	**2018**
MW4-09	Stable	1.0 – 3.5	2.0 – 2.36
MW3-08	Stable	1.5 – 3.5/9.0	1.9 – 5.09
MW2-08	↑	1.5 – 10.0	4.6 – 7.67
EW107-15	Stable	3.2 – 965/1,030	9.28 – 12.1
MW105-13	Stable to ↑	2.6 – 16.0	5.64 – 10.1/10.7
MW101-13	Stable	3.6 – 14.8	8.86 – 14.6
MW104-13	↓	5.5 – 51.2	10.2 – 11.4
MW5-09	Stable	5.4 – 13.0	7.5/8.4 – 12.4
MW102-09	↓	ND(1.0) – 18.5	9.6/9.7 – 12.5
MW1-08	Stable	6.2 – 10.7	8.8 – 9.05
MW103-09	Stable	3.0/8.9 – 17.9	8.0 – 15.1/16.9
MW106-15	Stable	8.0 – 13.0	9.4 – 10.3

Notes:
ND non-detect at the associated value.
/ - indicates duplicate analytical results

The current levels of DOC have remained consistent with some minor decreasing trends at MW104-13 and MW102-09. Concentrations of DOC are relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility had previously demonstrated trends of elevated and increasing levels of DOC. Over the past monitoring year many of the concentrations have demonstrated decreasing or stable trends. Water quality at EW107-15 is highly variable, likely due to intermittent pumping at this location.

In general, the increases in DOC concentrations downgradient of the facility relative to upgradient concentrations are minor compared to those observed for ammonia, iron or manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MECP on the 2012 annual report, the MECP requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of future annual monitoring reports. Table 4.2A provides the 2018 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during the current monitoring period. The following provides a summary of those exceedances:

- Iron – 4 of 4 samples
- Phosphorus – 2 of 4 samples
- Field Measured Dissolved Oxygen – 2 of 2 measurements

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included that staff gauges be installed at four points within the northern ditch system and that a topographic survey of the northern portion of the Site, including the ditch, be undertaken.

Topographic surveying of the northern ditch system (including the ditch which drains into the SWM Pond and the ditch that continues towards Findlay Creek – the HIP Ditch) was completed and the four staff gauges were installed in early 2015. The Site's northern ditch was dry at each of the staff gauge locations during each monitoring event in 2018, which provides some evidence that a significant volume of groundwater is not likely continuously discharging to the creek.

Figure 4.10 presents the results of the topographic surveying of the northern ditch overlain by the May 2018 groundwater contours. The topographic contours are provided in 0.5 m intervals with the lowest elevation presented representing the bottom of the ditch.

As shown in Figure 4.10, the topography of the ditches is 'w' shaped. The two ditch valleys or troughs travel parallel to the northern Site boundary with the on-Site ditch (that drains to the SWM Pond) found south of the HIP ditch. The inferred groundwater elevations from May 2018 coincide closely with the bottom elevation of the ditches, and are above the bottom of the northern (roadside) ditch in several locations. These locations are illustrated on Figure 4.10 and are interpreted to be areas where shallow groundwater is discharging to the northern ditch. It should be noted that cattails and other hydrophyllic vegetation are present in portions of this ditch providing further evidence support to the interpretation that some groundwater is discharging to the ditch.

Figure 4.10 further shows that a substantial portion of the ditch bottom is higher than groundwater elevations where the ditch is intersected by the extrapolated contours. Therefore, groundwater is likely discharging to the ditch, particularly during periods of high groundwater levels (typically during the spring).

However, as noted above each of the staff gauge locations did not contain sufficient standing or flowing water for sampling during the 2018 monitoring events (or during any previous monitoring events). Based on the information available, the volume of groundwater seeping into the ditch is too low to maintain a consistent base flow. It is likely that groundwater seepage into the ditch is largely lost to evapotranspiration.

In conclusion, small volumes of groundwater are likely seeping to the north roadside ditch but the volumes are insufficient to form a base flow. Based on current available information, groundwater discharging to the ditch is unlikely to cause any adverse impacts to the surface water bodies in the vicinity of the Site.

4.2.2 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2018 sampling program are provided in Table 4.3.

Because the deep bedrock aquifer is a potential source of drinking water in the vicinity of the Site, Table 4.3 also provides a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOE, June 2003, revised June 2006 and July 2017).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2018:

Location	ODWQS Exceedances	
	June 2018	November 2018
TW-7 (upgradient)	Iron, manganese, turbidity (field)	pH (field), turbidity (field)
TW-4 (downgradient)	Iron, manganese, alkalinity, turbidity (field)	Iron, manganese, E. Coli, turbidity (field)
TW-8 (downgradient)	Iron, manganese, turbidity (field)	Turbidity (field)

ODWQS Operational Guidelines as well as the criteria for temperature and turbidity do not relate directly to water samples collected from monitoring wells. The criteria for each are included in the ODWQS as they related to the effectiveness of water treatment and are thus not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and thus these Guidelines are not relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer was poor in 2018 (this is consistent with historical water quality within the deep bedrock aquifer – Appendix E). Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer.

Water quality results from the both downgradient wells show that operations at the Facility may have potentially affected the already poor water quality. Figures 4.11.1 to 4.11.3 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

		Ammonia Concentration Range (mg/L)		DOC Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2018)**	**2018**	**Trend**	**Historic (pre-2018)**	**2018**
TW-7	↑ to stable	ND(0.05) – 0.825	ND(0.128) – ND(0.282)	↓	2.1 -15.1	2.7 – 6.14
TW-4	↑ to stable	0.218 – 3.72	ND(0.812/0.871) – 13.0	stable	4.4 – 8.0	5.6/5.7 – 10.4
TW-8	↓ to stable	ND(0.050) – 4.60	ND(0.063) – ND(0.385/0.395)	↓	1.9 – 13.5	ND(2.95) – 2.1/3.7

		Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2018)**	**2018**	**Trend**	**Historic (pre-2018)**	**2018**
TW-7	↓	ND(0.010) – 11.1	ND(0.010) – 0.331	↓	0.0352 – 1.71	0.0428 – 0.175
TW-4	↓	ND(0.050) – 3.30	0.69/0.75 – 2.26	↑	0.496 – 1.94	1.42 - 1.42/ 1.51
TW-8	↓	ND(0.050) – 6.25	0.024 – 0.34/0.50	↓	0.0256 – 2.95	0.00640 – 0.185/0.187

Concentrations of ammonia showed notable decreases between late 2014 and 2016 at the downgradient monitoring wells; however, the presence of ammonia at concentrations elevated above upgradient levels suggests that Facility operations may have had a minor effect on water quality in the deep bedrock aquifer. Ammonia concentrations in the upgradient monitoring well have steadily remained below or near the detection limits, with the exception of the unusually elevated ammonia concentration in the November 2017 sample.

The ammonia concentration reported at TW-4 in November 2018 (13.0 mg/L) is inconsistent with previous concentration ranges. Further monitoring is required to verify if this result is indicative of water quality at this location.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. The overall pattern of groundwater quality within the deep bedrock aquifer suggests that water quality is naturally poor. It is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential facility-related water quality impacts. If trends of deteriorating water quality are consistent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy. Based on the monitoring results from the 2018 monitoring period, no additional investigation or remedial activities are necessary at this time, however indicator parameter concentrations at TW-4 should be closely monitored during future monitoring events.

4.2.3 Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW-4) and local ditch monitoring locations (SW-1 through SW-3) are presented in Table 4.4 and compared to the Provincial Water Quality Objectives (PWQO). The following table summarizes the surface water monitoring parameters that did not meet the PWQO during the 2018 sampling events.

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-2	Iron	0.3	0.513	0.230
SW-2	Phosphorus	0.01	0.0232	0.0152
SW-3	Iron	0.3	0.410	0.216
SW-3	Phosphorus	0.01	0.0219	0.0192
SW-3	Escherichia Coli	100*	270*	18*

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-4	Phosphorus	0.01	0.0886/0.0935	0.0748
SW-4	Dissolved Oxygen	<5.0/<4.0**	3.73	-

Notes:
*- Escherichia Coli concentrations are in colony forming units per 100 mL (CFU/100 mL)
** - temperature and species dependent
0.0537/0.0653 indicates duplicate analytical results

In general, water quality at the downstream surface water monitoring location (SW-3) is similar to upstream surface water monitoring location (SW-2), which indicates that contributions to surface water flow from the Renewi facility aren't impacting downstream water quality.

Concentrations of phosphorus were consistently above the PWQO at each of the monitoring locations, with the exception of SW-1 in 2018. In addition, elevated iron concentrations were noted at SW-2 and SW-3. E. coli levels were in exceedance of the PWQO in the spring 2018 sample from SW-3.

Previous assessments of the Site concluded that concentrations of ammonia were showing increases at SW-4. Temporal concentration versus time plots for ammonia, DOC, manganese, and iron levels at SW-4 are presented on Figure 4.12. Figure 4.12 shows that ammonia concentrations are variable with elevated concentrations reported during late 2014, 2016 and late 2017 to early 2018. An overall trend of increases in ammonia concentrations within SW-4 between 2011 and 2018, as illustrated on Figure 4.12. As discussed below, Renewi installed six aerators within the stormwater management pond during 2018 to improve water quality within this pond.

As discussed in Section 4.2.1, the potential for shallow groundwater to discharge to surface exists within the northern ditch and stormwater management pond. The presence of un-ionized ammonia at elevated concentrations in SW-4 is likely related to the discharge of impacted groundwater directly to the SWP or via overland flow of impacted runoff entering the pond.

A total of 11 additional samples were collected by Renewi staff at surface water monitoring location SW-4 during the 2018 monitoring period. Renewi staff collected monthly samples when the surface water was unfrozen (the pond was frozen in January and February). Renewi collected two samples during May. The analytical results for these samples have been included in Table 4.5 with results highlighted that did not meet their respective PWQO and the ECA discharge criteria. As indicated in Table 4.5, parameter concentrations that did not meet their respective PWQO were noted for:

- Escherichia Coli
- Phenols
- Total Phosphorus
- Un-Ionized Ammonia
- Field Measured Dissolved Oxygen

Water was discharged from the stormwater management pond twice during the 2018 monitoring period in April and late June into July. The surface water quality results were compared to the trigger level

parameters presented in the ECA prior to discharges to determine that the concentrations of trigger parameters were below the discharge criteria. All analytical results for samples collected prior to discharge were below their respective trigger levels. On this basis, all stormwater management pond discharge events were in compliance with the ECA trigger levels (outlined in Table 2 of the ECA) during 2018.

The stormwater management pond had a total of six aerators installed to improve the water quality by agitating and oxygenating the ponded water. The first aerator was installed on July 10, 2018 and an additional five were installed on November 28, 2018. 2019 sample results will provide insight into the effect of the aerators on the surface water quality in the pond.

Based on the results of the surface water monitoring, there were no measureable effects on downstream surface water quality from the discharges during the 2018 monitoring period.

5. Shallow Groundwater Extraction System

Beginning on October 4, 2016 regular pumping from shallow groundwater extraction well EW107-15 commenced. The daily volumes pumped from EW107-15 from October 4, 2016 through December 31, 2017 are summarized in Table 5.1. The 2018 pumping data was intermittently recorded due to downtime associated with the tie-in of the extraction well pump controller to the Facility's SCADA system and the removal of the existing flow meter. EW107-15 was not pumped frequently from January 1 to June 1, 2018 with only a total volume of 0.1896 m^3 pumped during this period. The pumped volumes between June 1 and October 1, 2018 were not recorded due to the SCADA system tie-in downtime described above. The well was intermittently pumped during this period. On October 1, 2018 the SCADA system was brought online and the volumes pumped during October, November, and December are summarized in Table 5.1.

As previously mentioned, EW107-15 was sampled three times during the current reporting period with all three samples collected via the dedicated sampling port. The following table provides a summary of the 2018 indicator parameters:

Parameter (mg/L)	May 16, 2018	August 15, 2018	November 9, 2018
Ammonia-N	28.2/28.3	3.79	0.927
Iron (dissolved)	ND(0.10)	4.20	0.18
Manganese (dissolved)	0.435/0.441	1.42	1.21
DOC	12.1	12.0	9.28

Notes:
0.537/0.653 indicates duplicate analytical results

There is a notable difference in the concentrations reported in the all three sample results. Groundwater quality at the Site is seasonally variable and the extent to which the groundwater extraction well was active prior to the sample collection, as shown in Table 5.1, also likely contributes to the variability in the results. The May sample was collected during a period of no pumping and the November sample was collected during a period of more regular pumping. As mentioned above, there is no record of pumping during August due to the SCADA tie-in period but the Site staff indicated that the well was indeed being pumped intermittently during this period.

There is currently insufficient data to quantify the effectiveness of the extraction well at controlling or reducing groundwater impacts at the Site, however water quality results for the 2016 through 2018 monitoring periods suggest some improvement in water quality in the vicinity of EW107-15. This improvement is likely related to Facility improvements made to control the source of discharge and active groundwater extraction within the interpreted historical source area. It is expected that continued/improved operation of the shallow groundwater extraction well will, over time, remove the most impacted groundwater from the facility area. This will result in improved water quality in both the facility area and downgradient plume which should, in turn, reduce the occurrence of Tier I trigger exceedances.

Future assessments of water quality (i.e., the 2019 annual report) will be used to evaluate the effectiveness of the extraction well at controlling the downgradient migration of Facility-related groundwater quality impacts.

6. Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA (2011) requires the development of trigger level criteria in accordance with MECP Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MECP, dated February 27, 2015, GHD provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B1. The memo provides a detailed history of developing the TLP as well as the three tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

6.1 Trigger Parameters

A focused set of parameters which are related to the sources of potential impacts from on-Site activities were selected for the purposes of the TLP. The TLP parameter list includes the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and E. Coli. Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic sources due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

6.2 Trigger Concentrations

The following table provides the trigger levels for the above-referenced trigger parameters.

The trigger levels for the shallow unconfined aquifer are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail on how the trigger concentrations were calculated is provided in Appendix B1.

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.)

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow and deep bedrock aquifer units.

Parameter	Shallow Unconfined Aquifer Trigger Level	Deep Bedrock Aquifer Trigger Level
Ammonia	4.0 mg/L	0.2 mg/L
Phosphorus	7.2 mg/L	0.5 mg/L
Dissolved Organic Carbon	34.6 mg/L	18.4 mg/L
Nitrate	1.3 mg/L	0.5 mg/L
Iron	48.3 mg/L	10.6 mg/L
Manganese	17.1 mg/L	2.1 mg/L
Alkalinity	633 mg/L	996 mg/L
Escherichia Coli	25.6 CFU/100 mL	5.0 CFU/100 mL

6.3 Trigger Level Assessment

The first Tier of the TLP consists of regular monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) include a comparison to the established trigger level concentrations.

Tier II confirmatory monitoring consists of collecting follow-up water quality samples in duplicate from the location(s) that exceed the Tier I trigger levels. The Tier II confirmatory monitoring will be carried-out during the next scheduled monitoring event. Tier I monitoring will resume following confirmatory samples below the Tier I trigger levels.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2018 Tier	Trigger Level Exceedances			2019 Tier
		May	**August**	**November**	
MW1-08	I	None	-	None	I
MW2-08	I	None	-	None	I
MW5-09	II	Ammonia	Ammonia	Ammonia	I
MW101-13	I	Ammonia	Ammonia	**Ammonia, E.Coli**	II
MW102-09	II	Ammonia	**Ammonia, Nitrate**	Ammonia	I
MW103-09	I	None	-	None	I
MW104-13	I	Ammonia	Ammonia	**Ammonia, Nitrate**	II
MW105-13	II	**Alkalinity, Ammonia**	Ammonia	Ammonia	I
MW106-15	I	Ammonia	Ammonia	Ammonia	I

As indicated in the above table, two parameters exceeded their respective trigger levels in samples collected from four wells during 2018. At MW102-09 and MW105-09, only single trigger exceedances persisted in subsequent sampling. Therefore, it is recommended that, in 2019, MW102-09 and MW105-09 be sampled following Tier I protocols and MW101-13 and MW104-13 be sampled in duplicate following the Tier II sampling protocol.

As discussed above, the Site initiated a program of groundwater remediation in 2016 in response to elevated ammonia concentrations in shallow groundwater near and downgradient of the facility. Operation of this system represents implementation of the contingency remedial response to observed groundwater quality impacts. Accordingly, future trigger level assessments should be undertaken for the purpose of tracking the evolution of groundwater quality as it relates to the remedial response, and should not necessarily be used for the purpose of triggering additional remedial response.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2018 Tier	Trigger Level Exceedances		2019 Tier
		May	November	
TW-7	I	None	None	I
TW-4	II	None	Ammonia, E.coli	II
TW-8	II	None	None	I

TW-4 and TW-8 were sampled following Tier II protocols in May 2018 and the trigger level exceedances observed in November 2017 samples were not present. Concentrations of ammonia and E.coli exceeded their respective deep bedrock Tier I trigger levels at TW-4 in the fall 2018 sample. Thus, it is recommended that that Tier II sampling be initiated at this location in the spring of 2019.

7. MECP Correspondence

During the fall of 2018 Renewi received three letters from the MECP with comments in relation to the 2016 and 2017 Groundwater and Surface Water Monitoring Reports (GHD, 2017 and GHD, 2018). Copies of these letters are included in Appendix B.

7.1 MECP Surface Water Comments

In a letter dated September 4, 2018 the MECP presented their review of the surface water monitoring portions of the 2016 and 2017 reports (GHD, 2017 and GHD, 2018). The letter describes the MECP's general concurrence with the interpretations and conclusions provided in the 2016 and 2017 Annual Monitoring Reports.

In addition, the letter provides a brief description of the available information related to grab sampling of pond discharge water by Golder Associates in April 2018. With respect to this sampling, the MECP indicates concurrence that the results of sampling do not constitute ECA non-compliance, as there is no requirement for sampling during discharge.

The MECP provides further concurrence with Renewi's statement that future exceedances of a trigger level within the SWMP during discharge should be addressed through the "Spill Contingency and Pollution Prevention Plan", required under Condition 5(6) of the ECA.

7.2 MECP Groundwater Comments

Renewi received two letters from the MECP dated November 13, 2018 and December 10, 2018 in relation to the 2016 and 2017 reports, respectively (GHD, 2017 and GHD, 2018). The following summarizes the comments provided on the 2016 Annual Monitoring Report:

- Pumping volumes from EW107-15 were insufficient during 2016 and 2017.
- The bedrock aquifer is showing signs of impact.
- Sampling confirms that groundwater was impaired due to elevated nitrate nitrogen levels above the ODQWS MAC of 10 mg/l at MW104-13 on August 16, 2016 and at MW105-13 on August 16, 2016, and November 15, 2016. Impairment of groundwater is a violation of the general provisions of the Ontario Water Resources Act.
- The extraction well must be operated more frequently to avoid further remedial measures and groundwater impairment as required by the Tier III Trigger Level Program.
- MECP reviewer was not in agreement with GHD that the existing single extraction well is the sole remedial measure that may be required to protect groundwater at this site.

In the December 10, 2018 letter the MECP reviewer commented on the 2017 report by noting that several trigger levels exceeded several times in the shallow aquifer and ongoing impact on deep groundwater.

GHD concurs with the MECP's position that groundwater extraction at EW107-15 should remove as much impacted groundwater from the subsurface as is practical. Once the extraction well is in stable operation, the effectiveness of the extraction well should be assessed and recommendations for continued or improved operation or expansion of the current remediation system should be made, as appropriate.

8. Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2018:

1. Based on the groundwater elevations gathered in May and November 2018, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Improvements in water quality at TW-8 have been observed during recent monitoring periods. There is currently insufficient data to confirm if the facility is the source of sporadic water quality within the deep bedrock aquifer.
4. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2018 monitoring period.
5. Surface water was discharged twice from the on-Site Stormwater Management Pond during the 2018 monitoring period (April and late-June into July). All parameters were below their respective trigger levels listed in the Site ECA in samples collected from the Stormwater Management Pond prior to commencing discharging.

9. Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. The groundwater extraction system should be operated in such a manner that as much impacted groundwater from the shallow flow system is removed, as is practical.
2. If continued groundwater extraction cannot be accomplished with the current water demands of the facility, then consideration should be given to exploring alternatives for use, treatment or disposal of collected shallow groundwater.
3. The SCADA monitoring system should be used to accurately record the volume of water pumped.
4. Once the extraction well is in stable operation, the effectiveness of the extraction well should be assessed and recommendations for continued or improved operation or expansion, as appropriate, of the current remediation system should be made.
5. Tier II confirmatory sampling should be completed during the spring 2019 sampling event at MW101-13, MW104-13, and TW-4.
6. Proceed with replacement of existing ammonia scrubber with three new units.

10. References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015a. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015b. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, March 23, 2015c. 2014 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, March 25, 2015d. Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2016 - 2015 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2017- 2016 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 15, 2018 - 2017 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario.

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region, January 3, 2017a. Hydrogeologic Assessment, Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa.

Ministry of the Environment and Climate Change, February 1, 2017b. Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

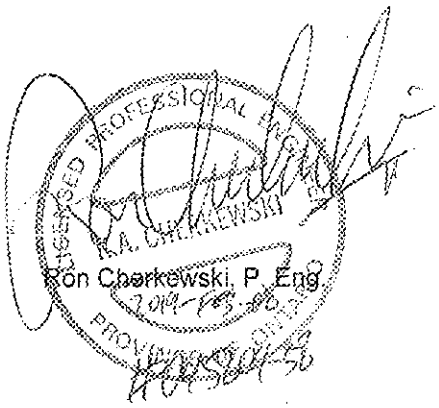
USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

All of Which is Respectfully Submitted,

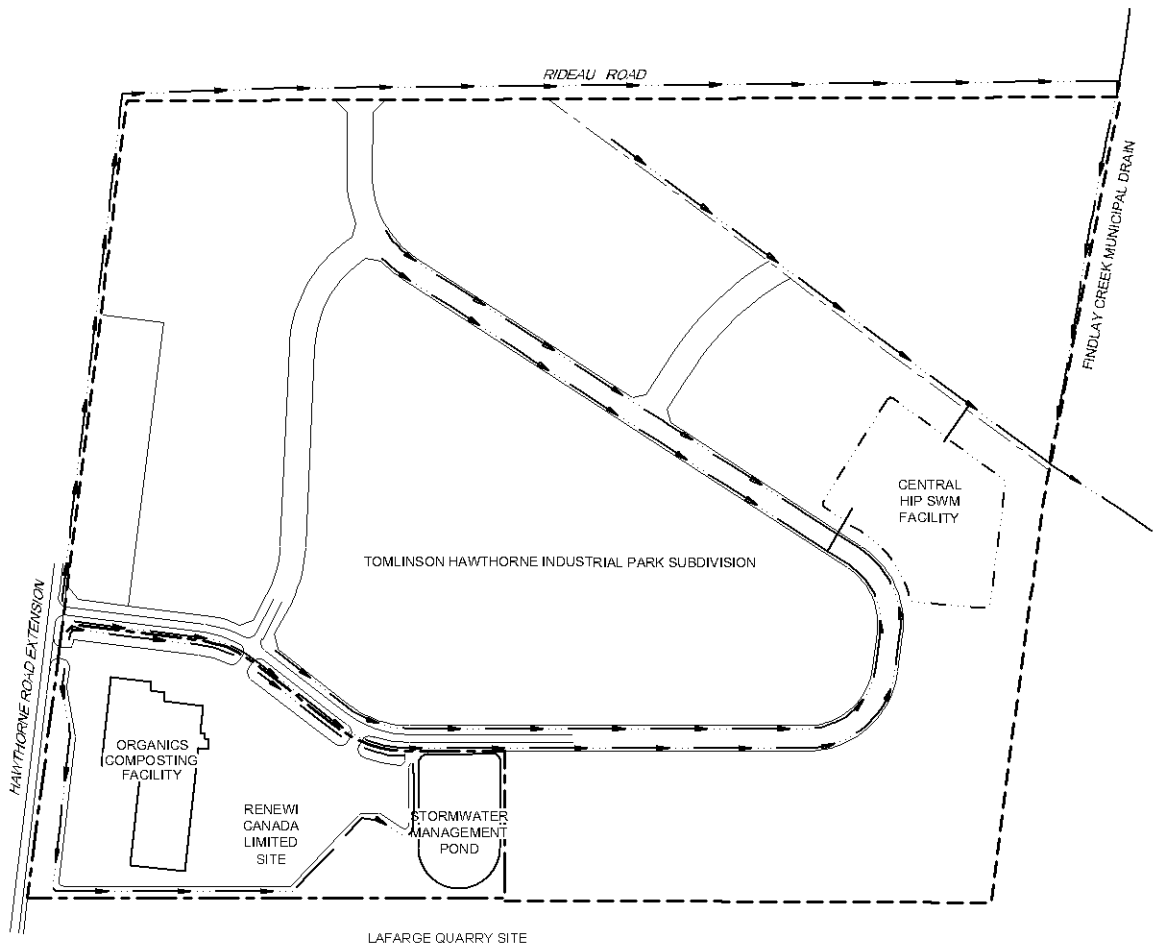
GHD

Ben Kempel, B.E.S.

Shawn Moloney, B.Sc.



Ron Charkewski, P. Eng.



0 50 100 150m

RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

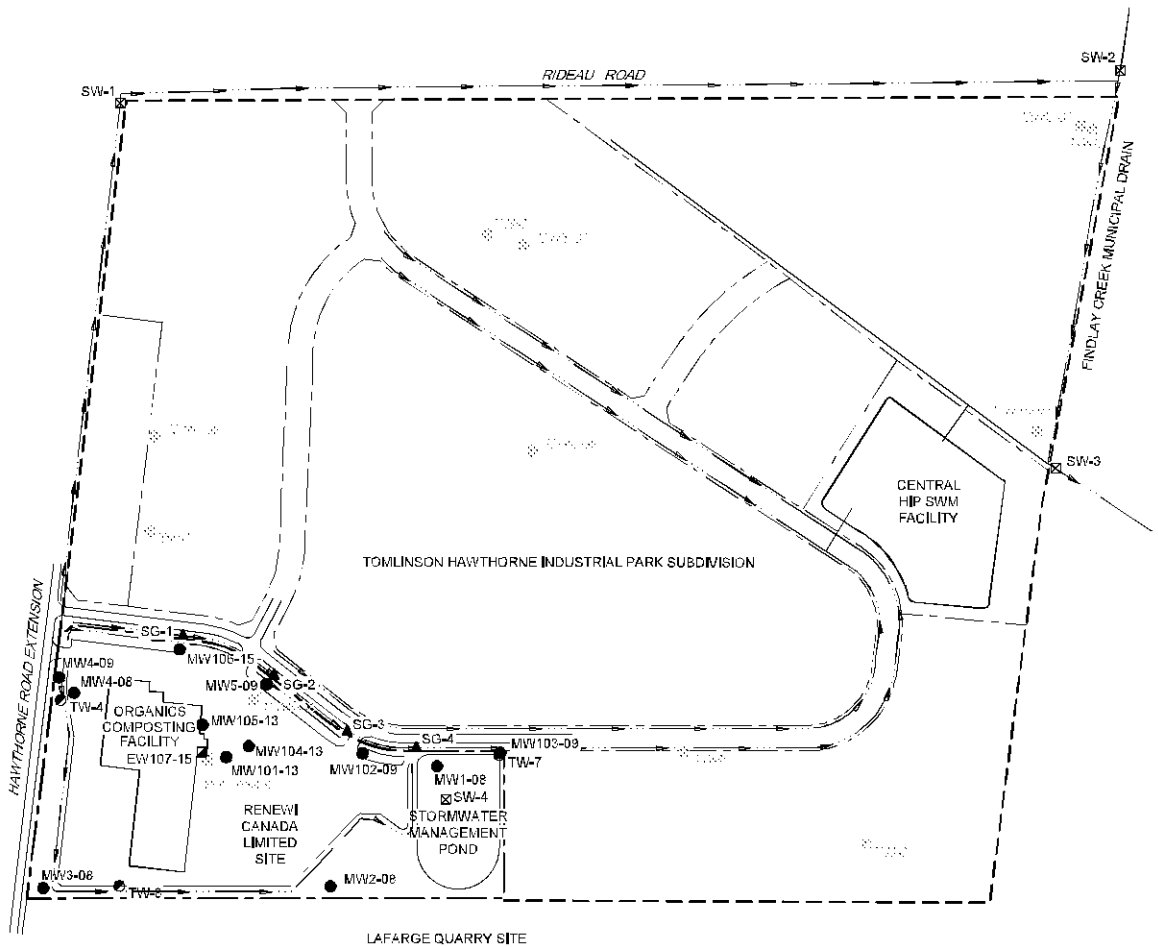
45804-58
Jan 23, 2019

SITE PLAN

figure 1.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58(077)\45804-58(077)GN\45804-58(077)GN-WA001.dwg

002614



LEGEND

- RENEWI SITE BOUNDARY
- TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
- SURFACE WATER DRAIN/DITCH/CREEK
- MW2-08 SHALLOW MONITORING WELL LOCATION
- TW-4 DEEP BEDROCK MONITORING WELL LOCATION
- EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
- SW-3 SURFACE WATER MONITORING LOCATION
- SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
- MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE (SEE NOTE BELOW)

NOTES:

1. SHALLOW AND DEEP MONITORING WELLS LOCATED OUTSIDE OF RENEWI SITE LIMITS ARE NO LONGER ACCESSIBLE TO OCL OR GHD AS OF JANUARY 2010.

0 50 100 150m

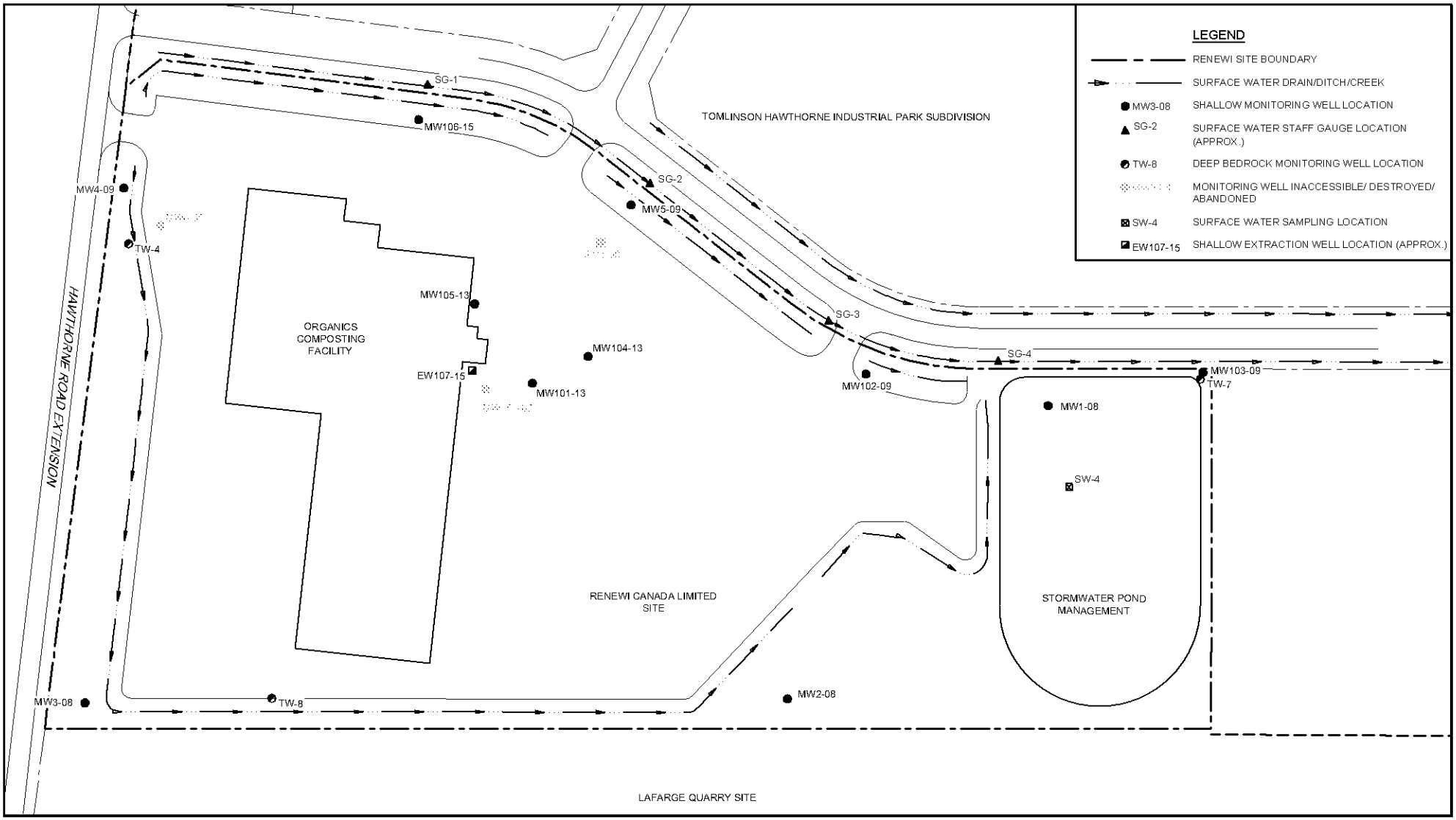
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Jan 23, 2019

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS figure 3.1

CAD FILE: E:\Projects\45000s\45804\45804-58\CAD\45804-58MXD\[45804-58MXD]Fig3-1_GW-SW_Locations.dwg

002615



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

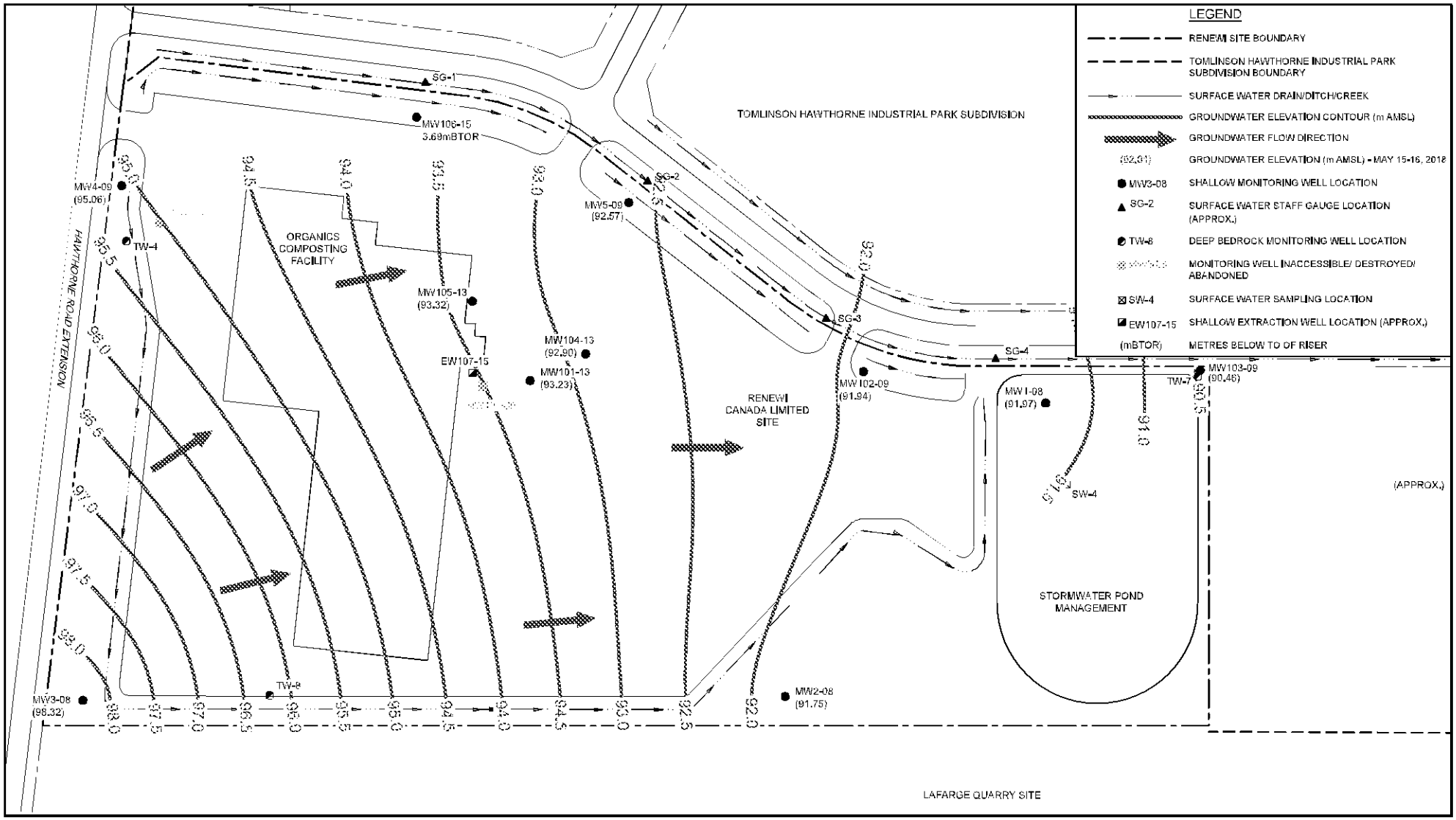
RENEWI PROPERTY GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

45804-58
Jan 25, 2019

figure 3.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58(077)\45804-58(077)GN\45804-58(077)GN-WA003.DWG

002616



0 15 30 45m

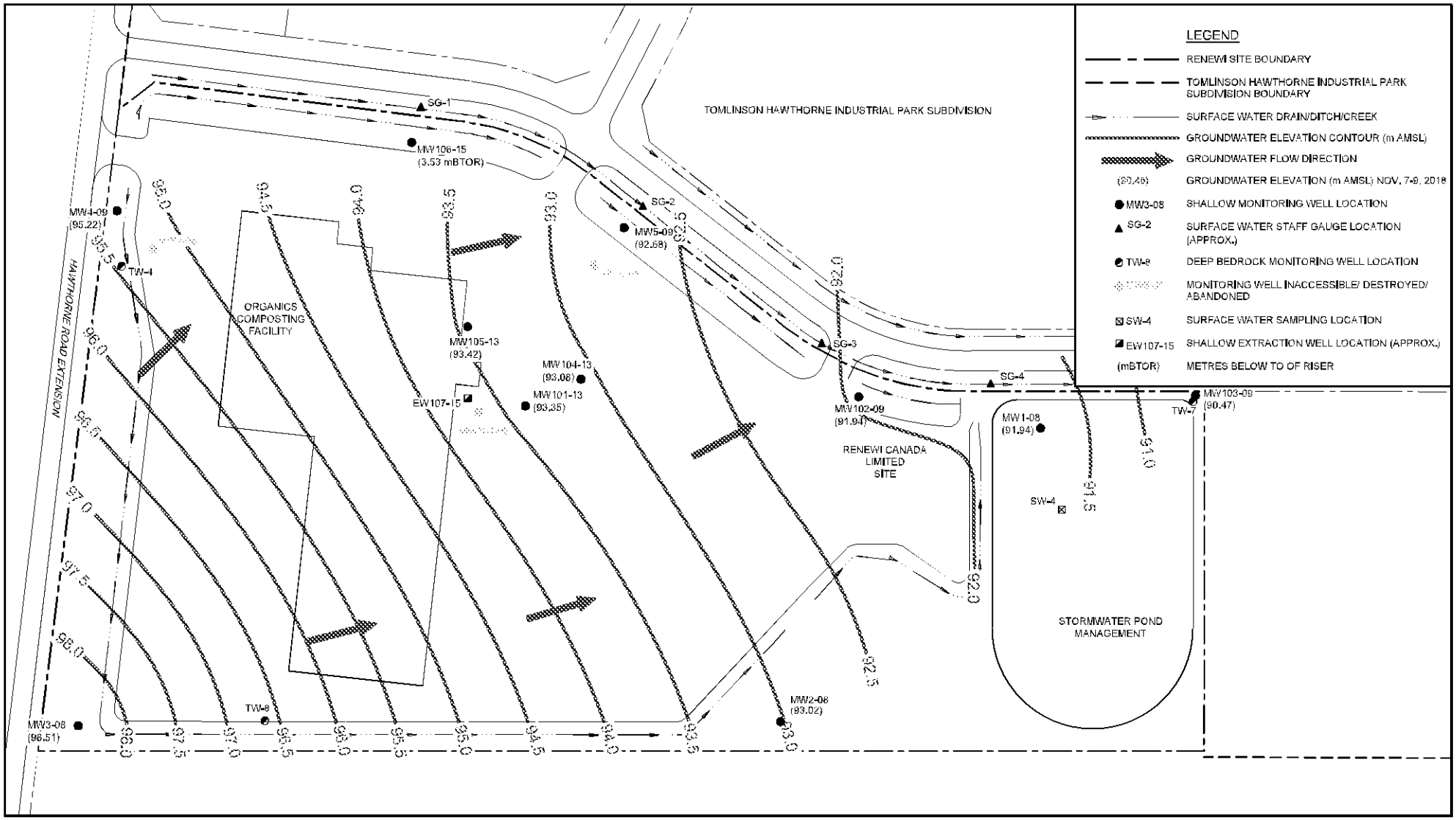
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
MAY 15-16, 2018

45604-58
Jan 23, 2019

figure 4.1

CAD File: P:\drawings\45000s\45604-58\2-reports\45604-58\[077-045604-58-077-GW-004.DWG

002617



0 15 30 45m

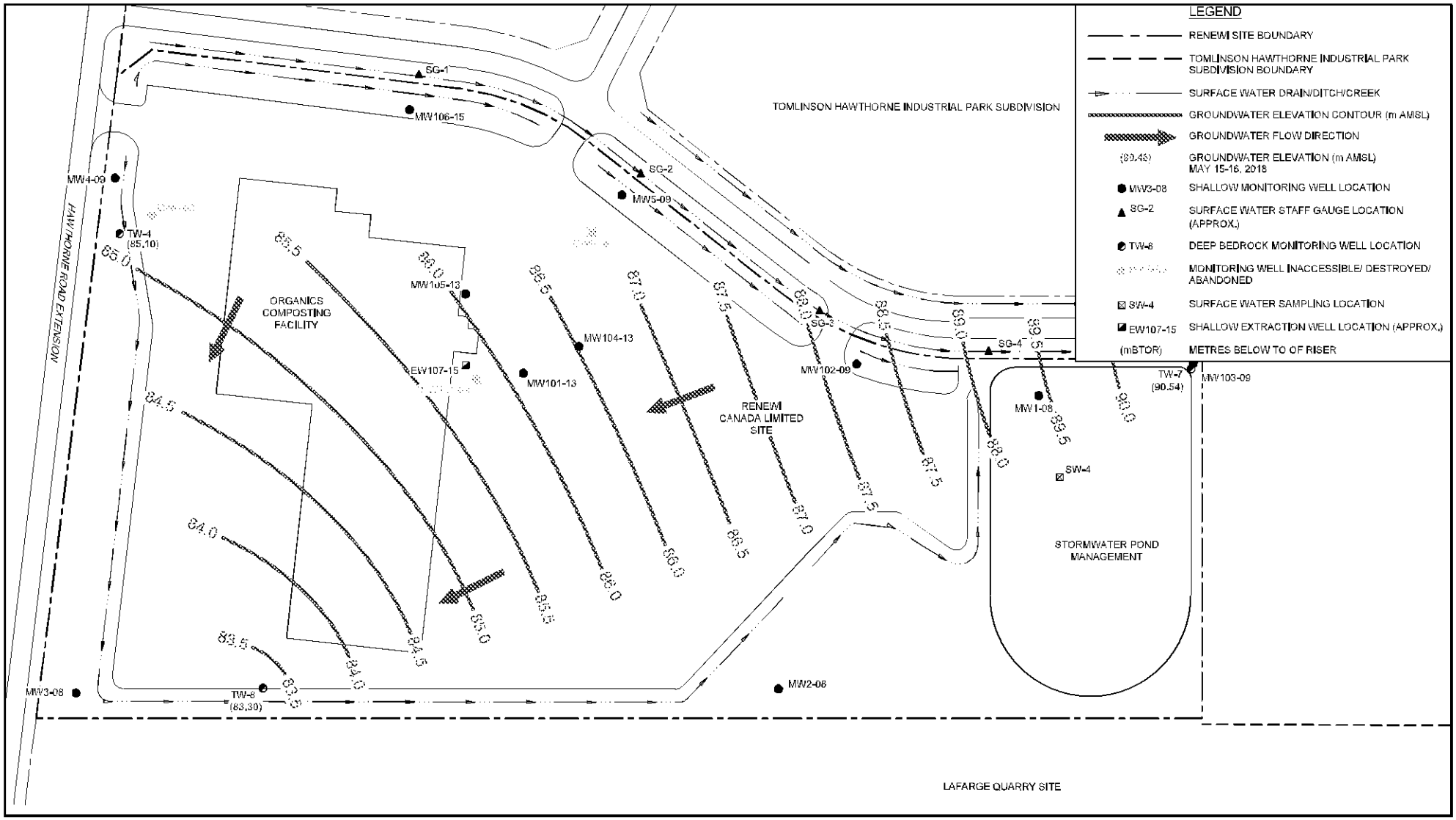
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
NOVEMBER 7-9, 2018

45604-58
Jan 23, 2019

figure 4.2

CAD File: P:\drawings\45000s\45604-58\...\45604-58-GW-005.DWG

002618



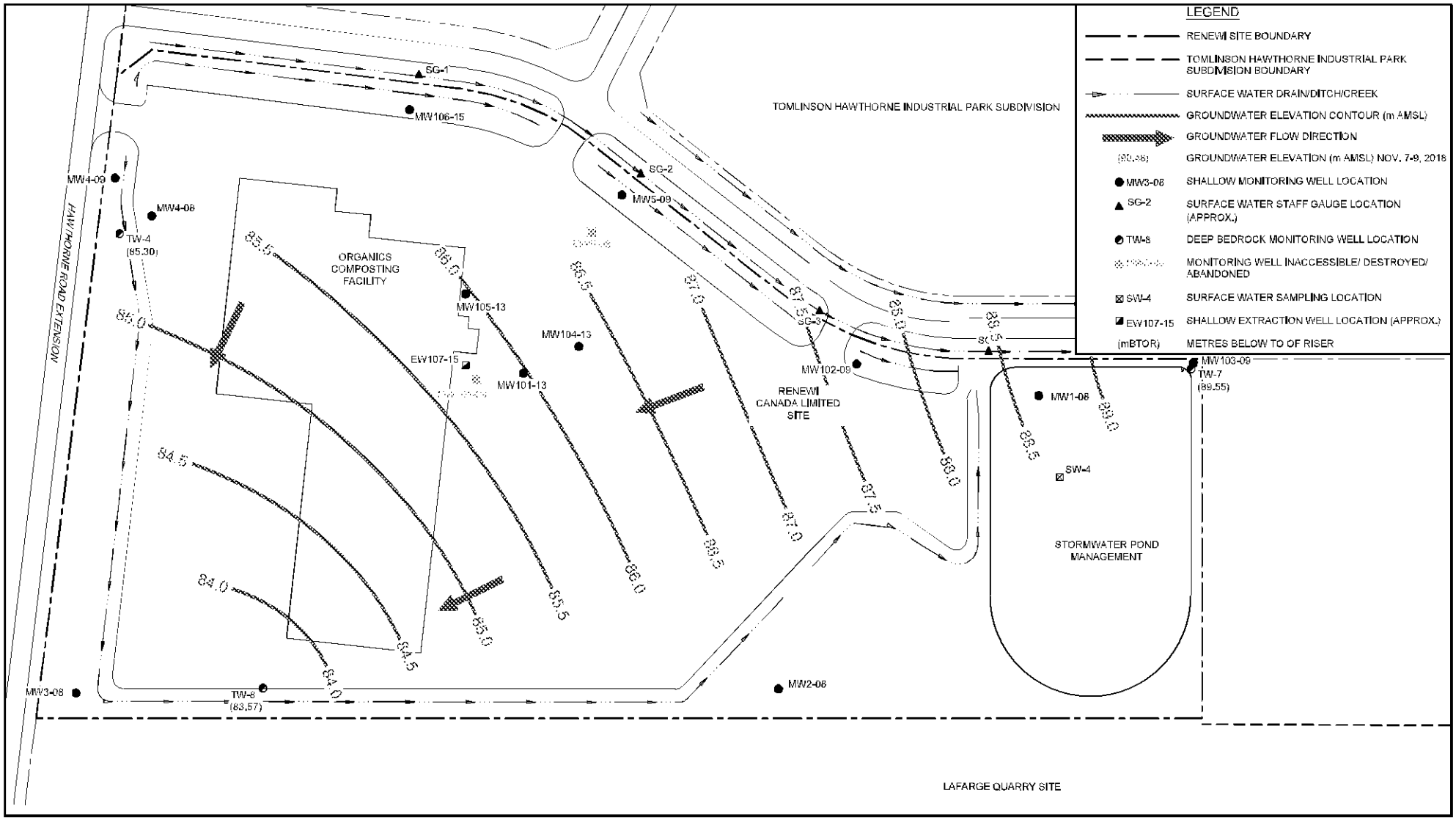
0 15 30 45m

RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
BEDROCK GROUNDWATER ELEVATIONS
MAY 15-16, 2018

45604-58
Jan 23, 2019

figure 4.3

CAD File: P:\drawings\45000s\45604-58\2---reports\45604-58\2018\45604-58_2018_GW_SW_REPORT_FIGURES\45604-58_2018_GW_SW_REPORT_FIGURE_4.3_BEDROCK_GW_ELEVATIONS_MAY_15-16_2018.dwg



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

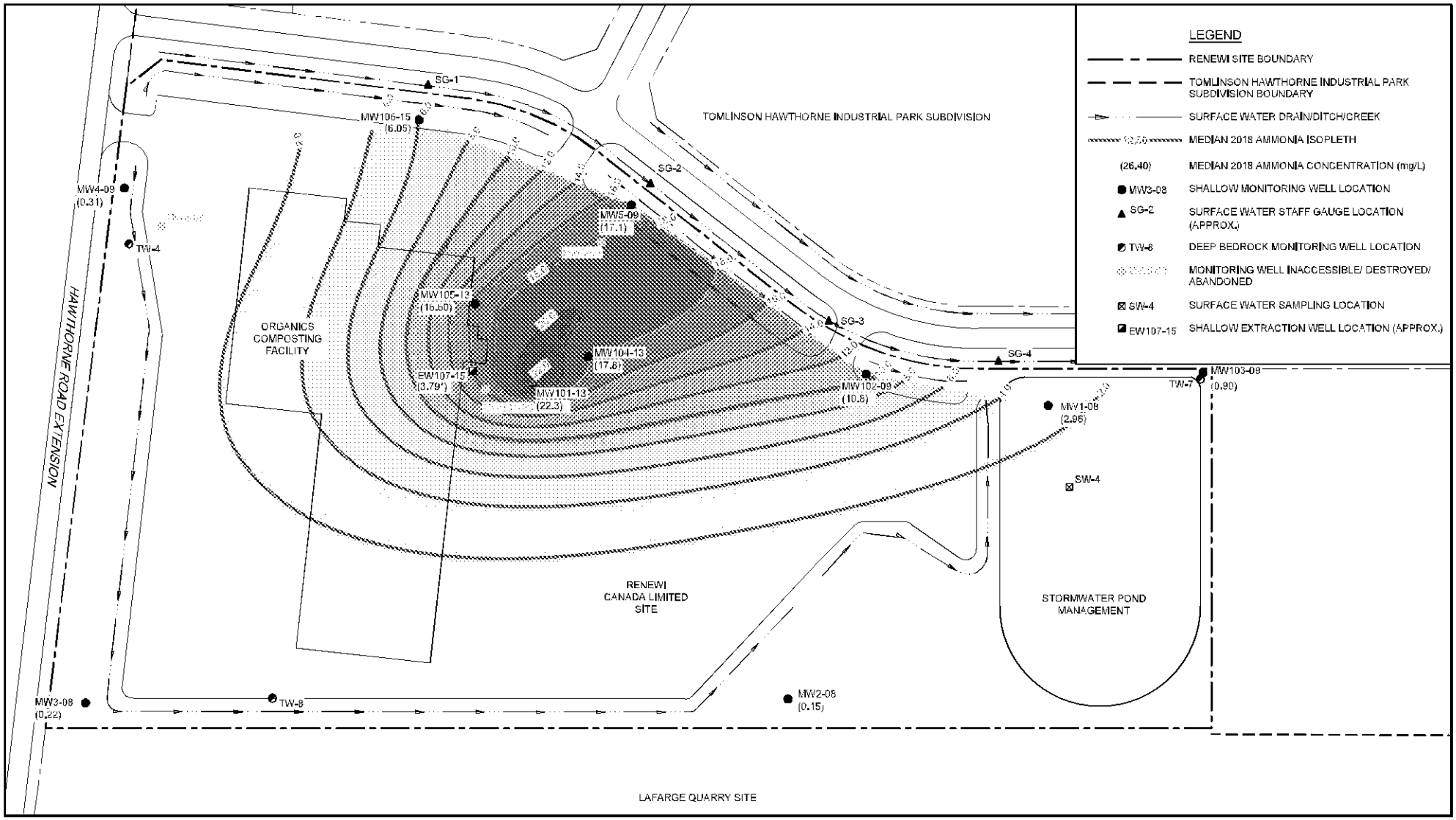
BEDROCK GROUNDWATER ELEVATIONS
NOVEMBER 7-9, 2018

45604-58
Jan 25, 2019

figure 4.4

CAD File: P:\drawings\45000s\45604-58\...\45604-58(077)GN-058-...(077)GNAWA007.DWG

002620



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

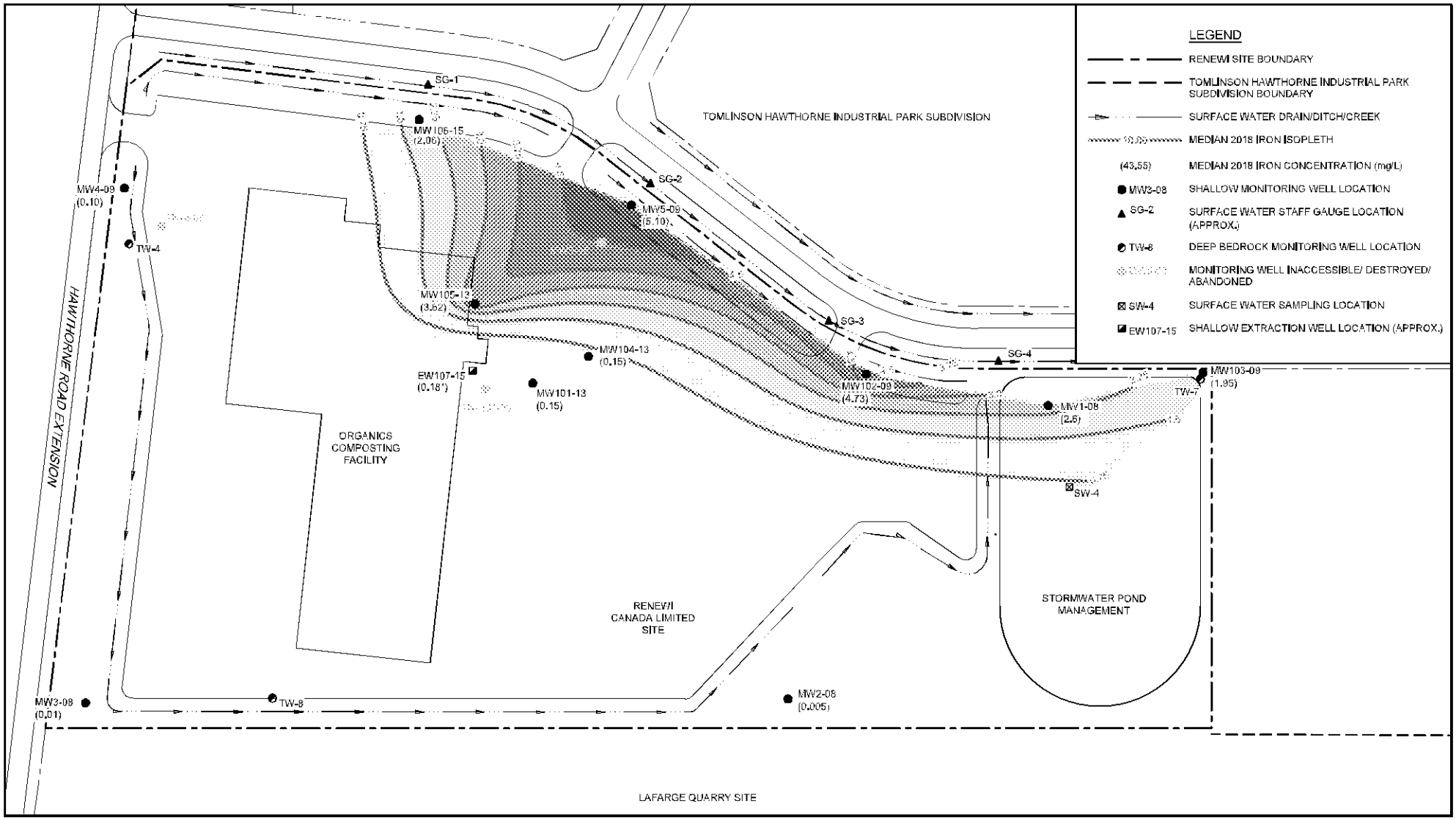
45604-58
Jan 25, 2019

MEDIAN 2018 AMMONIA CONCENTRATION ISOPLETHS

figure 4.5

CAD File: P:\drawings\45000s\45604-58\2---ppoint\45604-58\2774\45604-58\2774\45604-58\2774\45604-58-GW-AMM-006.DWG

002621



0 15 30 45m

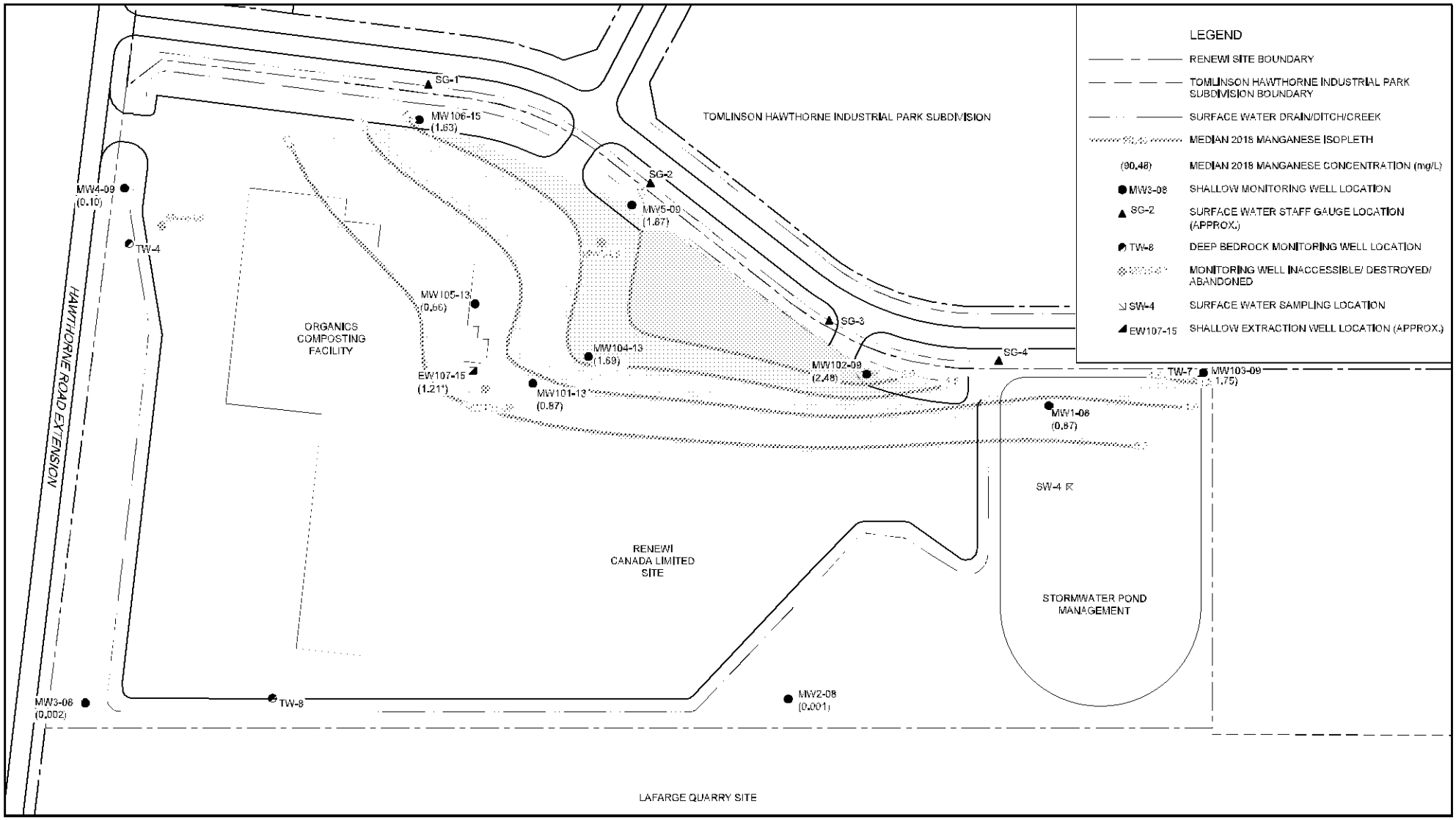
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45604-58
Jan 25, 2019

MEDIAN 2018 DISSOLVED IRON CONCENTRATION ISOPLETHS figure 4.6

CAD File: P:\drawings\45000s\45604-58\...

002622



0 15 30 45m

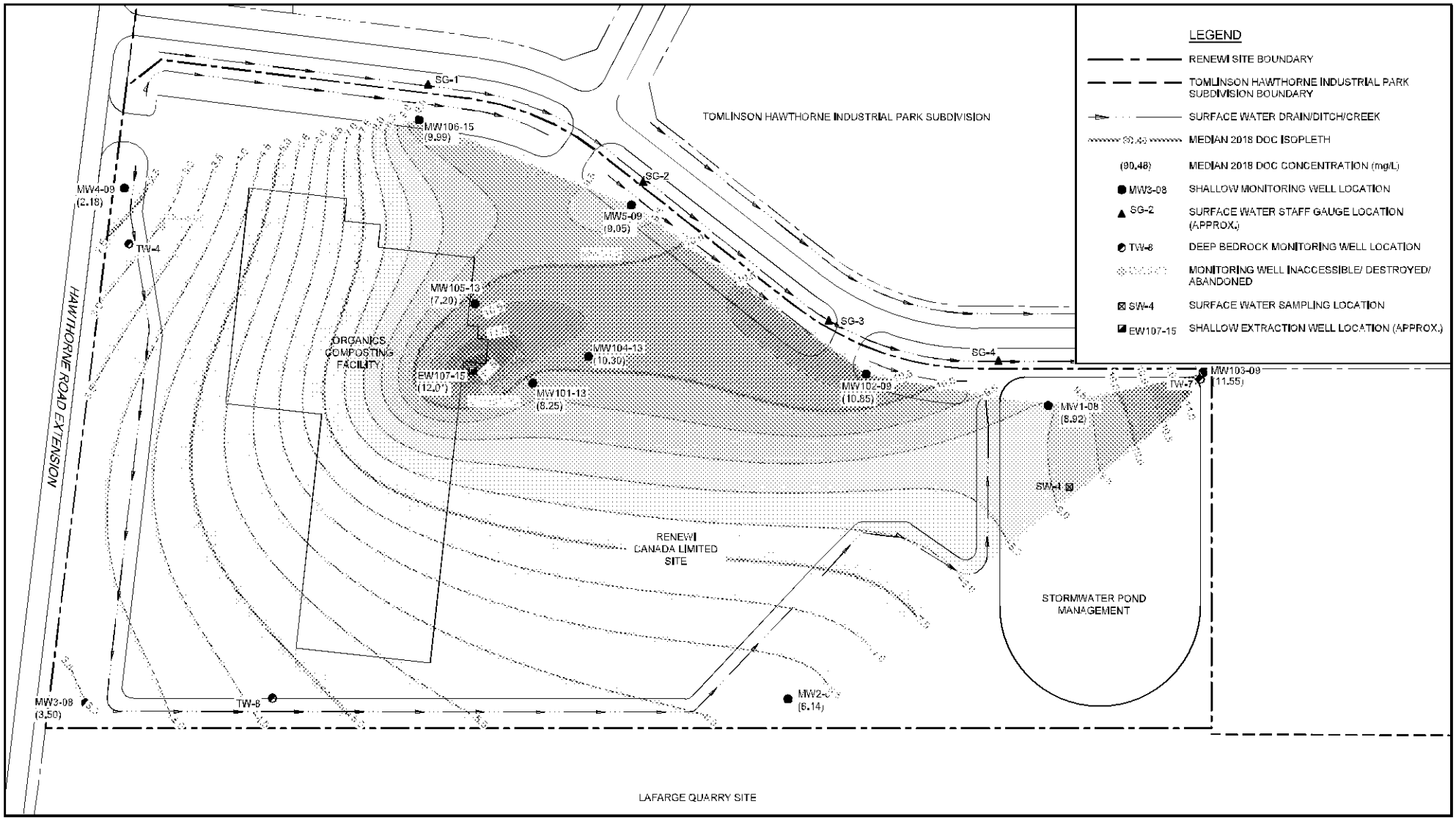
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

MEDIAN 2018 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS

45604-58
Jan 25, 2019

figure 4.7

002623



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

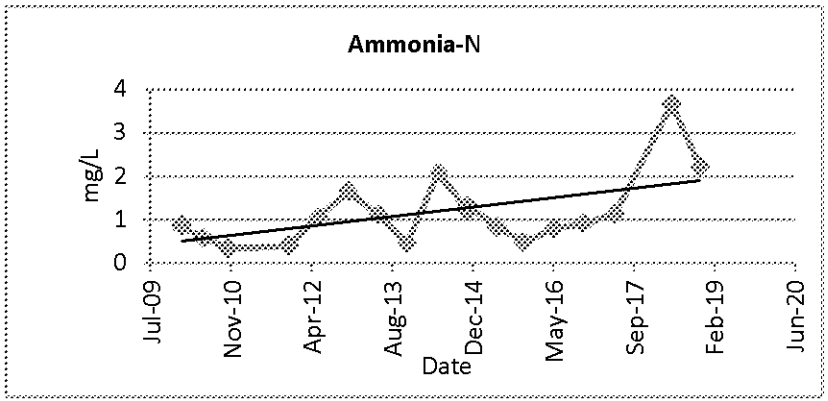
MEDIAN 2018 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS

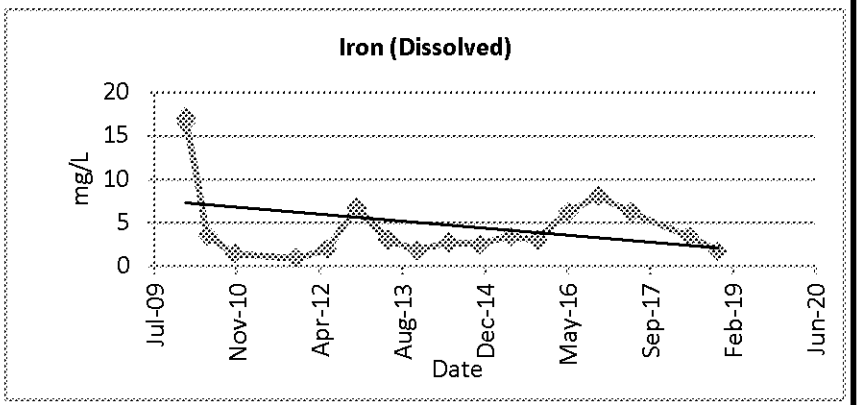
45604-58
Jan 25, 2019

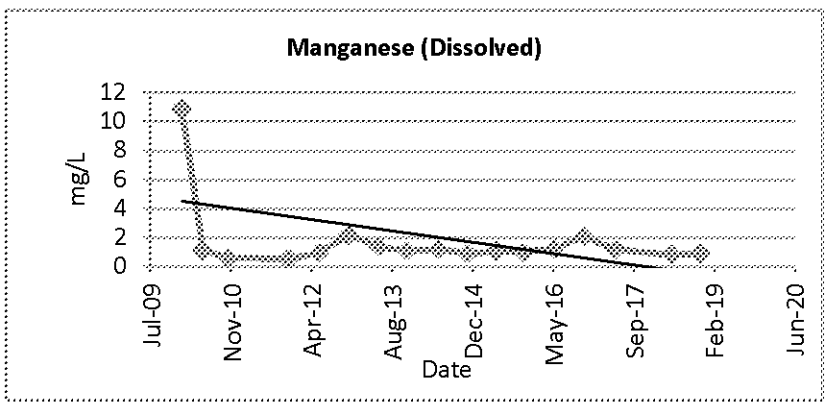
figure 4.8

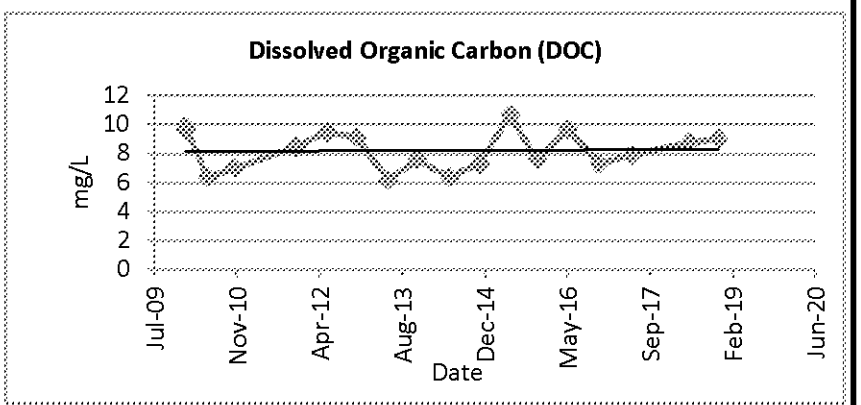
CAD File: P:\drawings\45000s\45604-58\...\45604-58(07)GN-ES01-SHAWA-011.DWG

002624







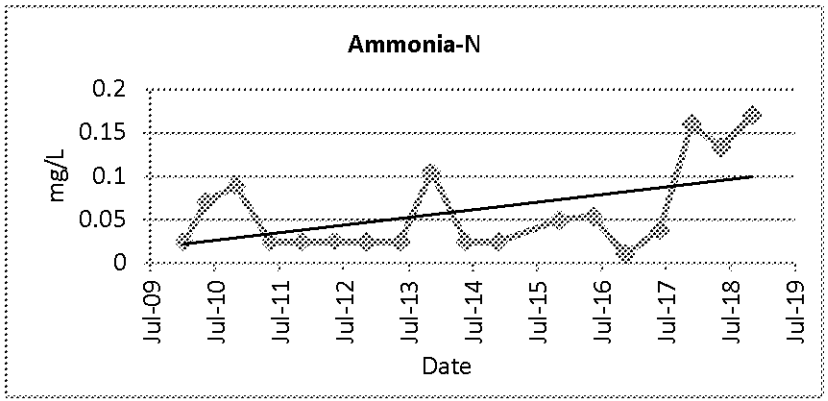


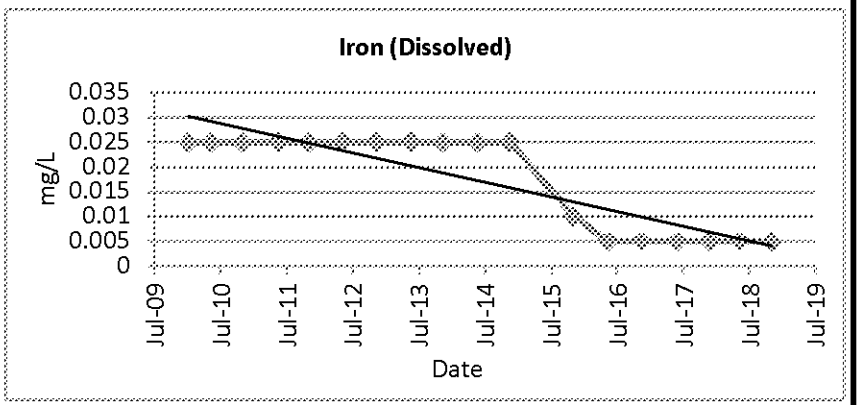
Note: ND results as 1/2 the detection limit

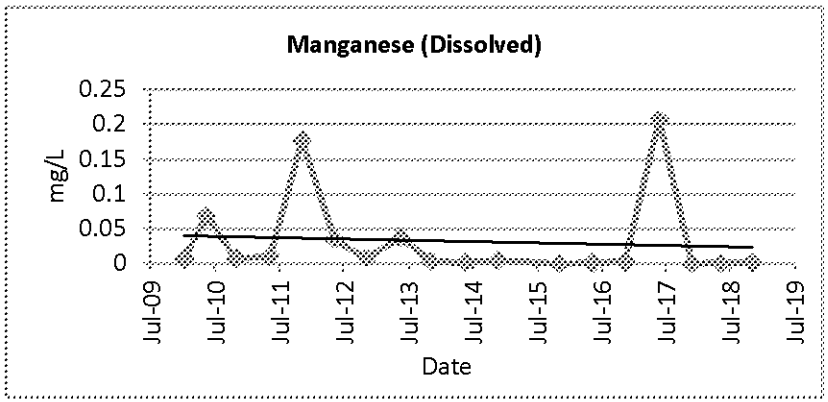
figure 4.9.1

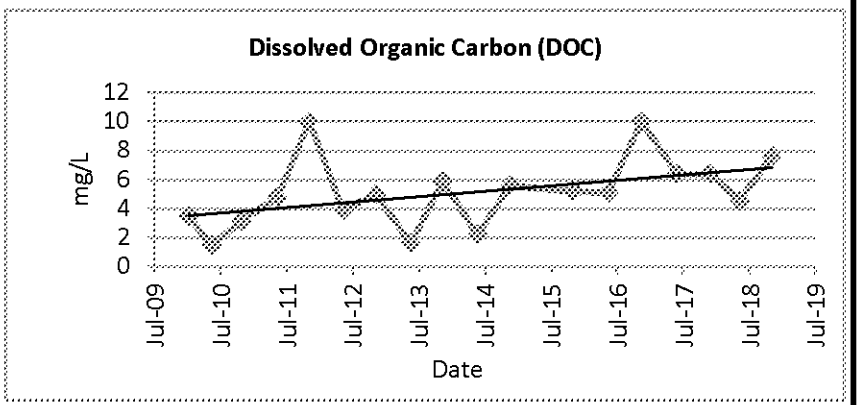
TEMPORAL PLOTS - SELECTED PARAMETERS
MW1-08
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

002625







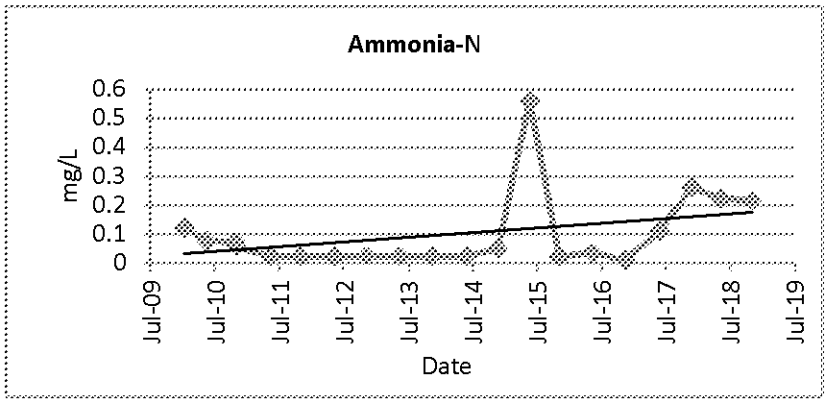


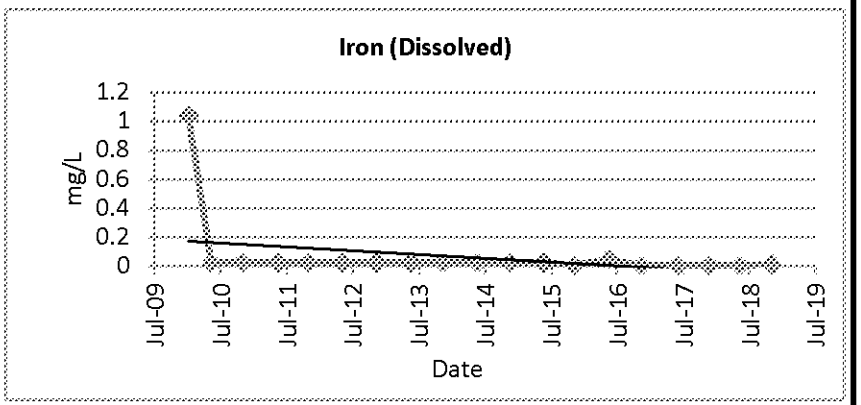
Note: ND results as 1/2 the detection limit

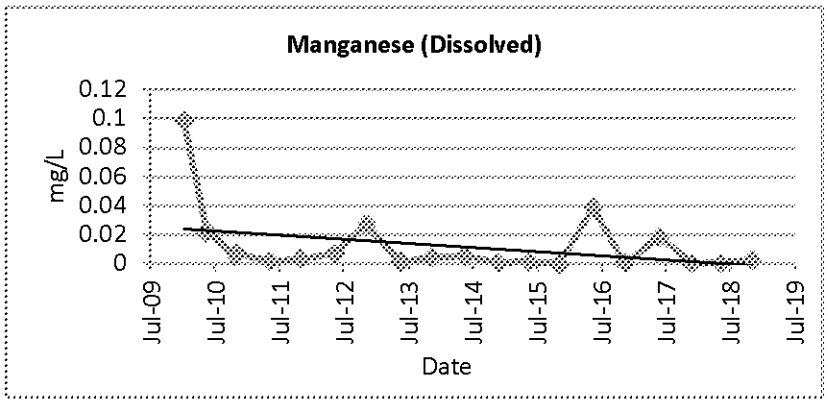
figure 4.9.2

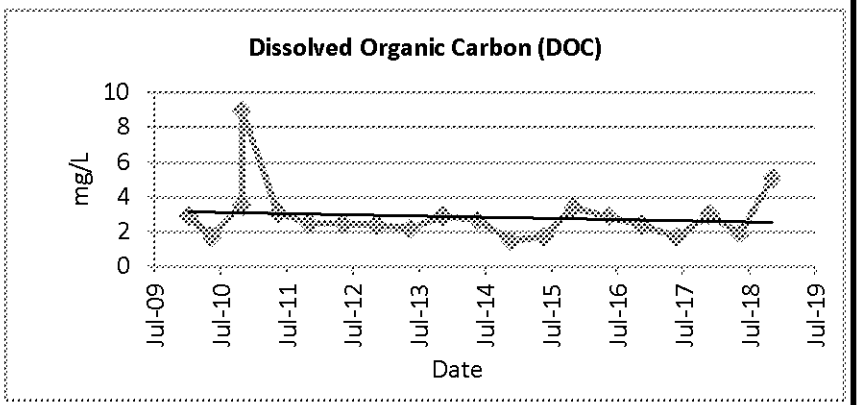
TEMPORAL PLOTS - SELECTED PARAMETERS
MW2-08
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

002626





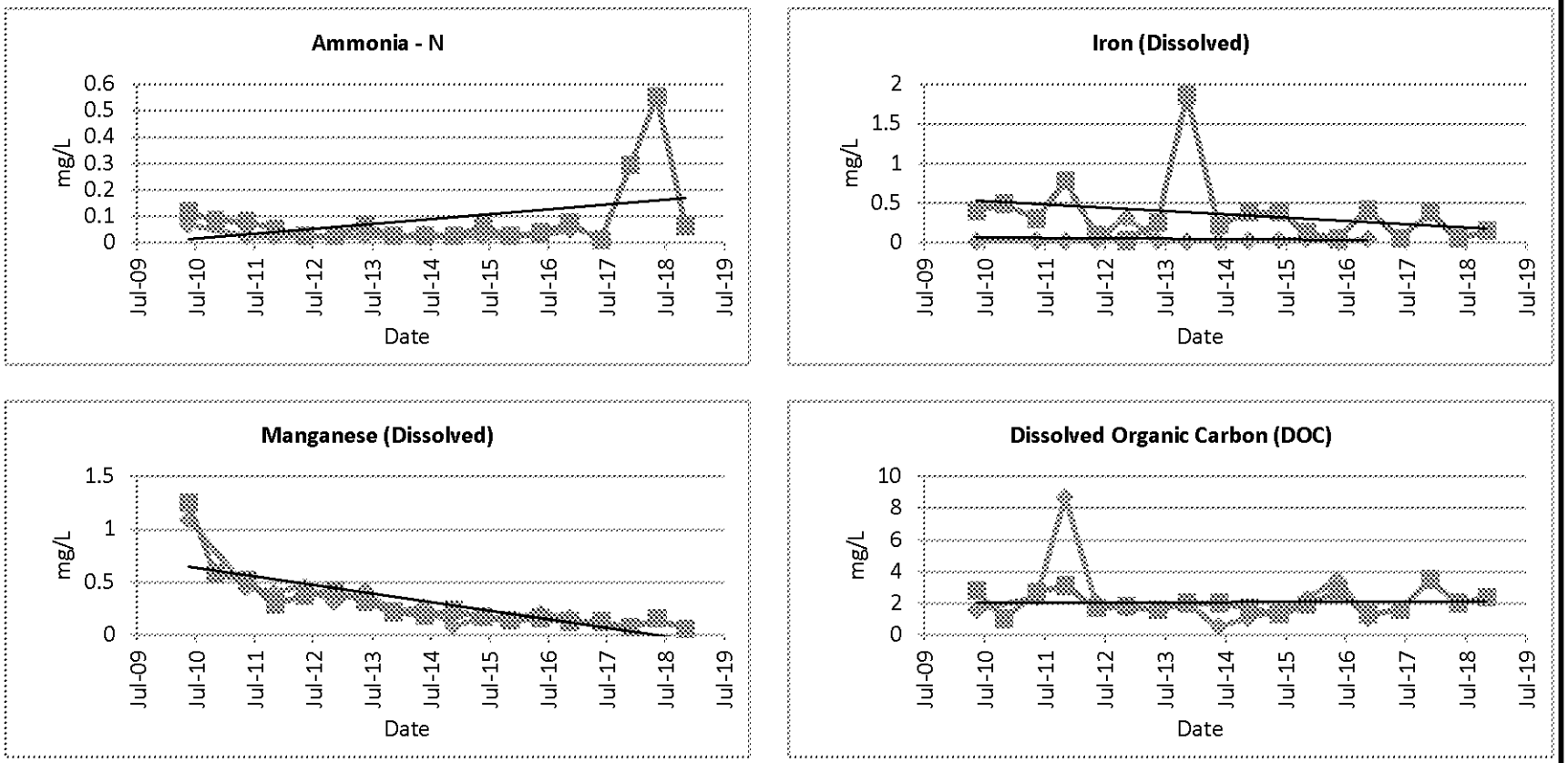




Note: ND results as 1/2 the detection limit

figure 4.9.3

TEMPORAL PLOTS - SELECTED PARAMETERS
MW3-08
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

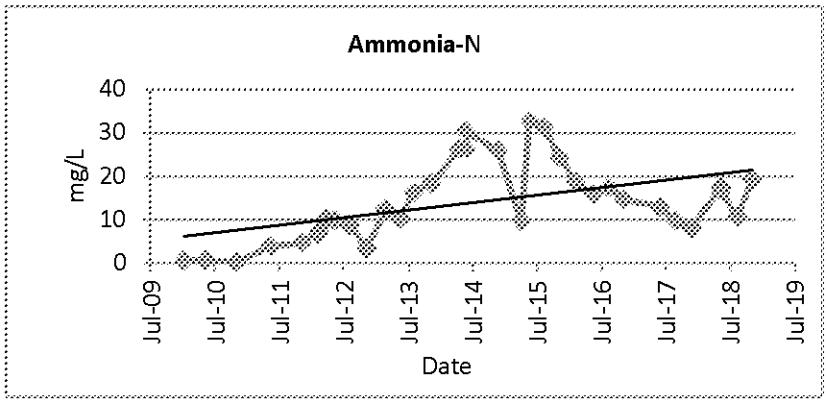


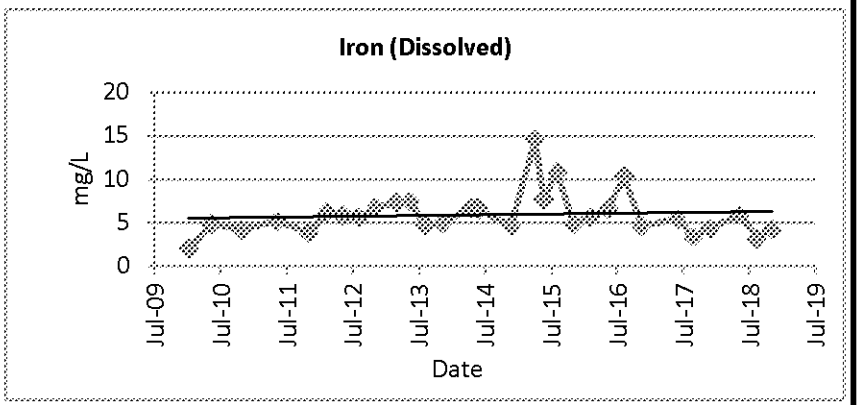
Note: ND results as 1/2 the detection limit

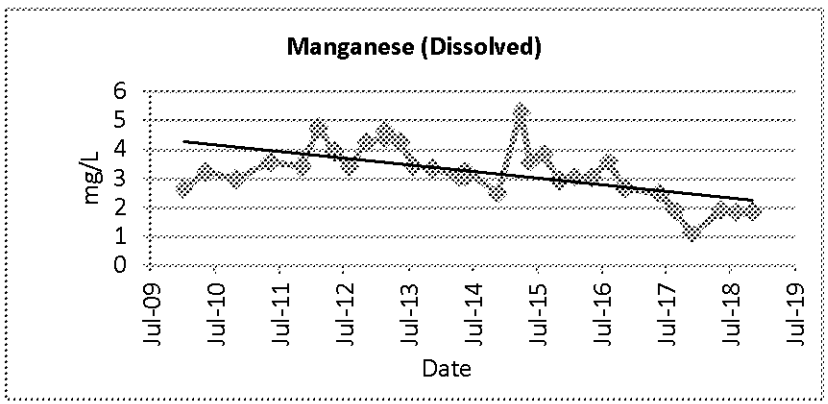
MW4-08
MW4-09

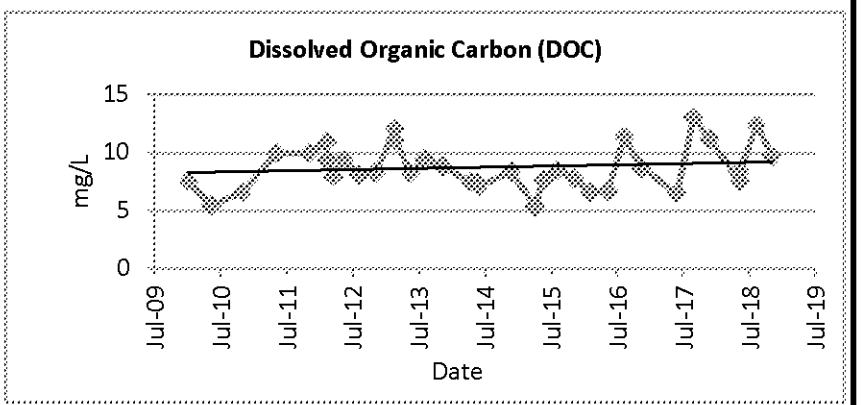
figure 4.9.4

TEMPORAL PLOTS - SELECTED PARAMETERS
MW4-08 & MW4-09
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





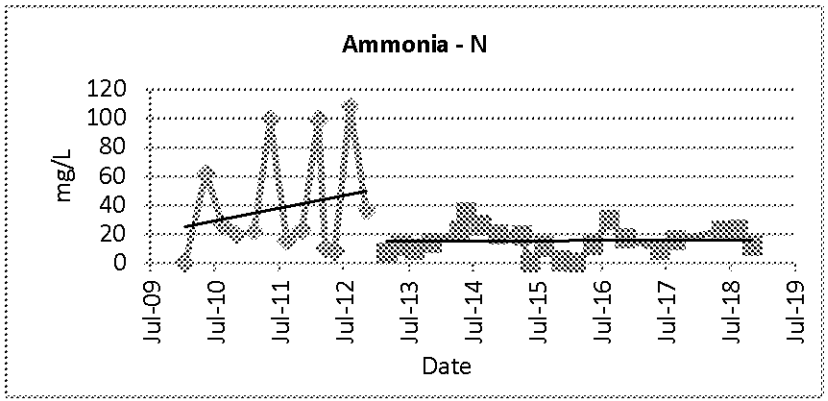


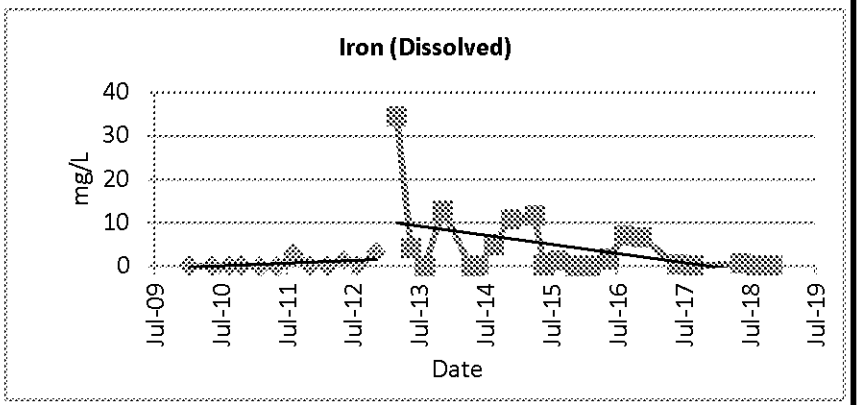


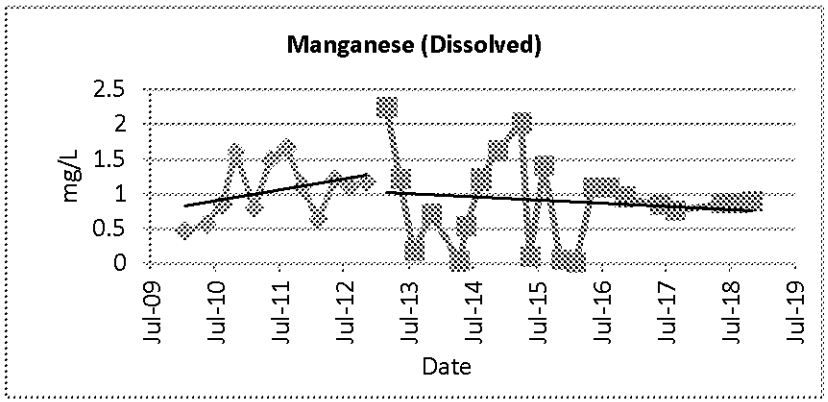
Note: ND results as 1/2 the detection limit

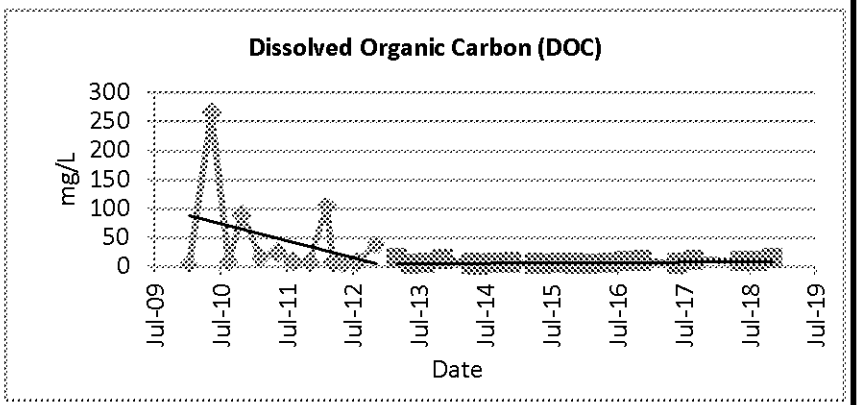
figure 4.9.5

TEMPORAL PLOTS - SELECTED PARAMETERS
MW5-09
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY







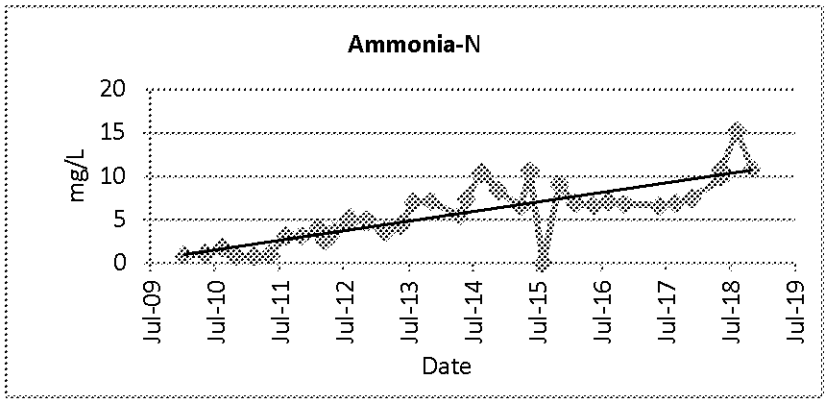


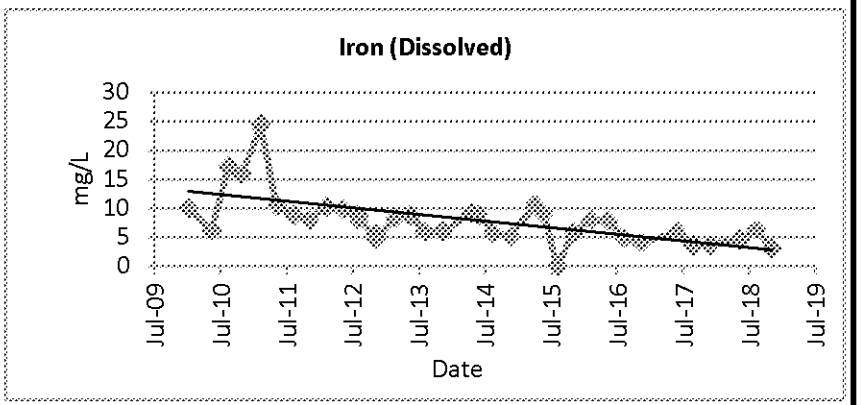
Note: ND results as 1/2 the detection limit

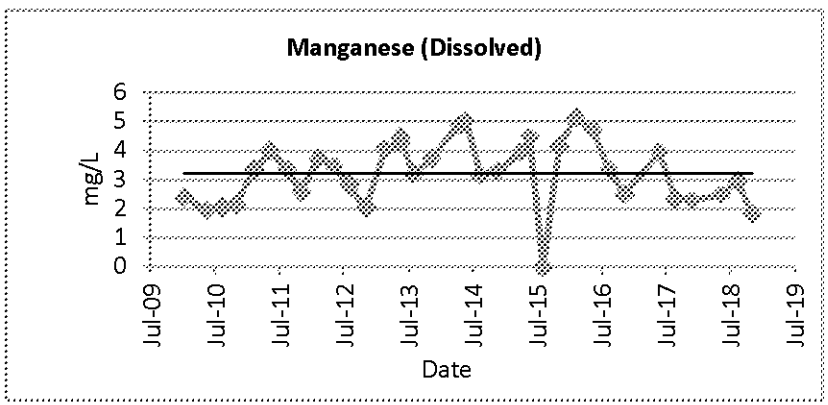
MW101-09
MW101-13

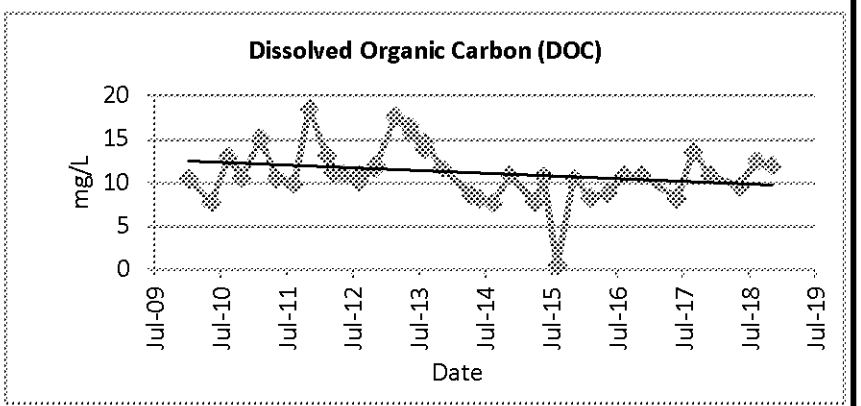
figure 4.9.6

TEMPORAL PLOTS - SELECTED PARAMETERS
MW101-09 & MW101-13
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





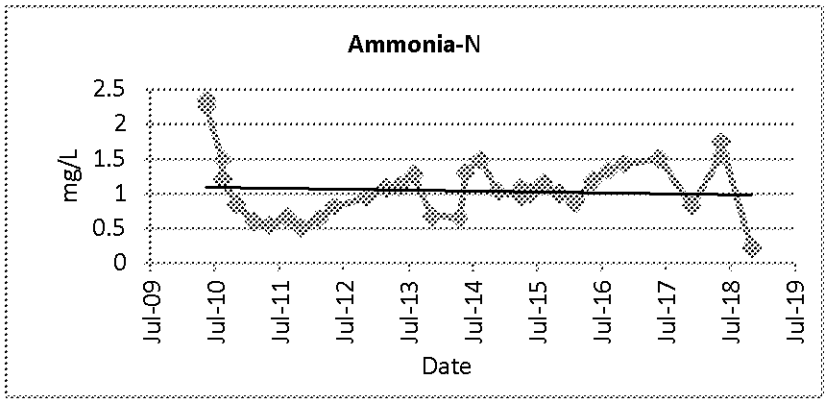


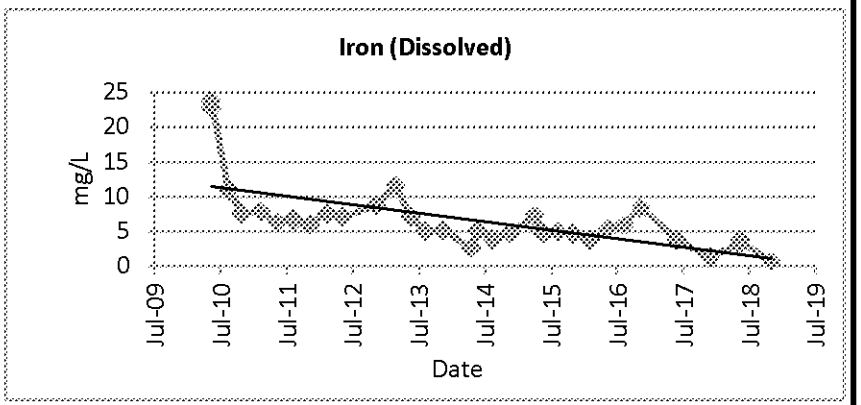


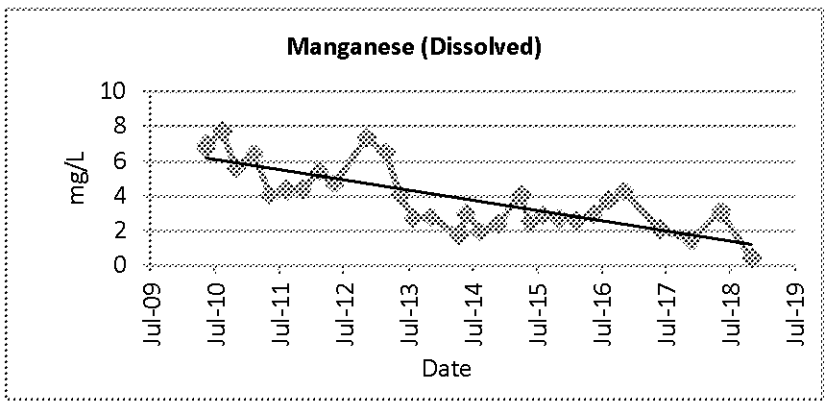
Note: ND results as 1/2 the detection limit

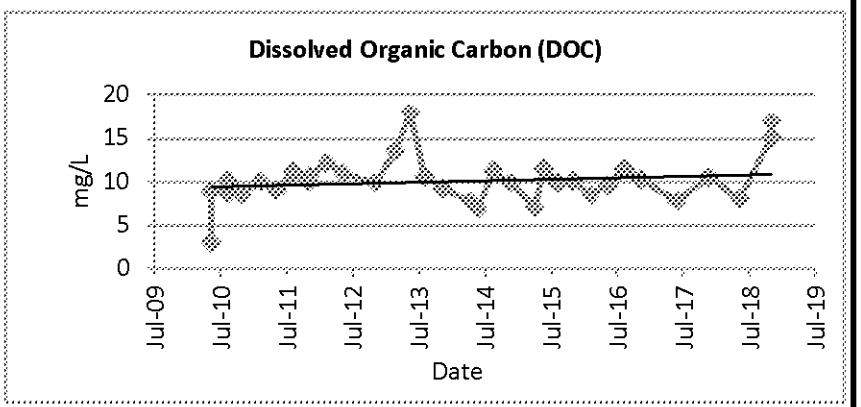
figure 4.9.7

TEMPORAL PLOTS - SELECTED PARAMETERS
MW102-09
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





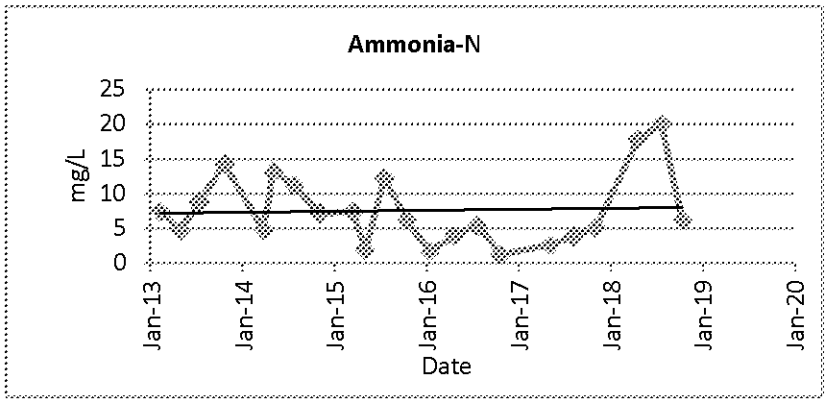


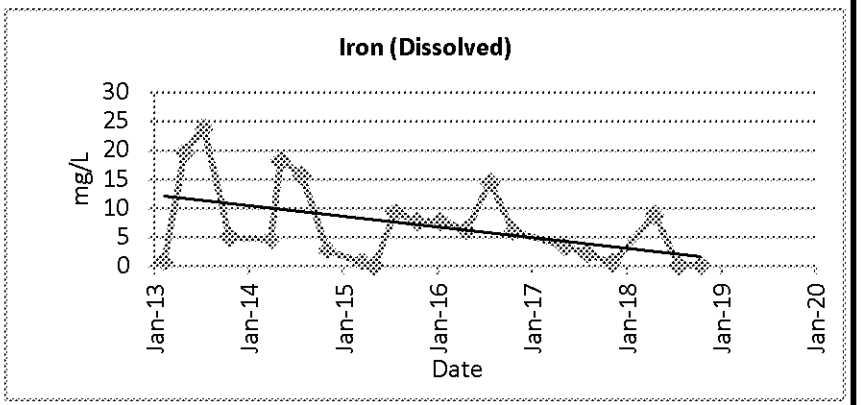


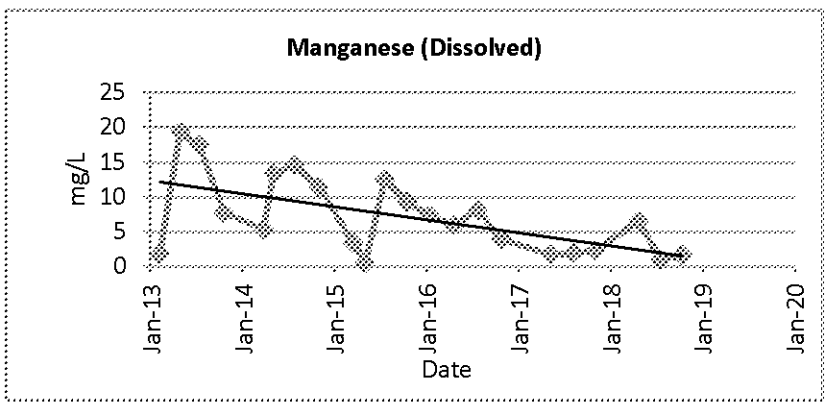
Note: ND results as 1/2 the detection limit

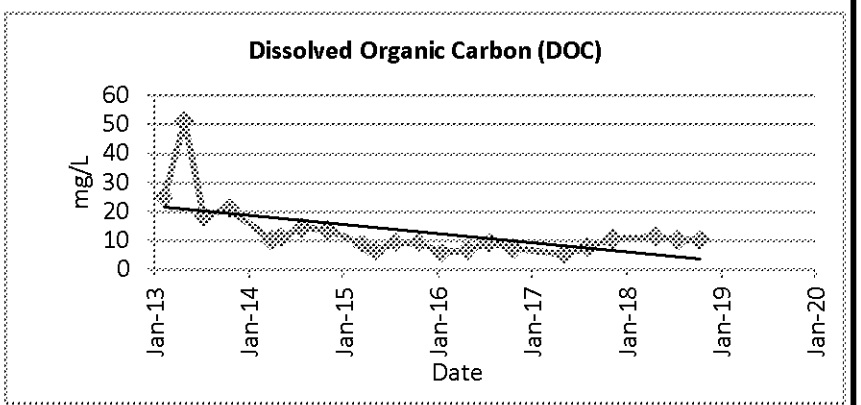
figure 4.9.8

TEMPORAL PLOTS - SELECTED PARAMETERS
MW103-09
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





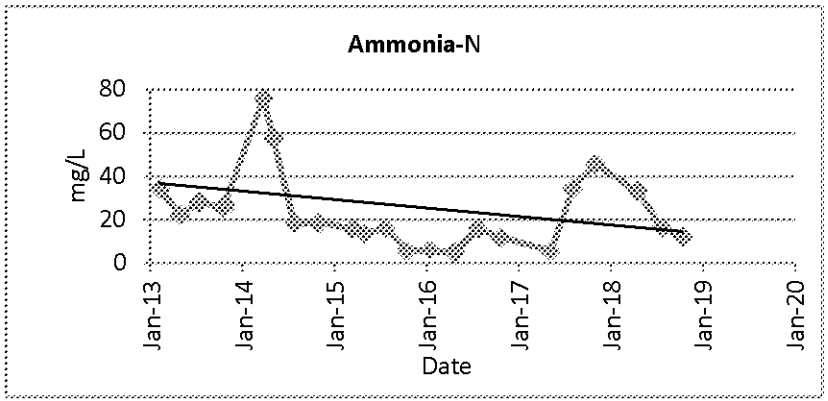


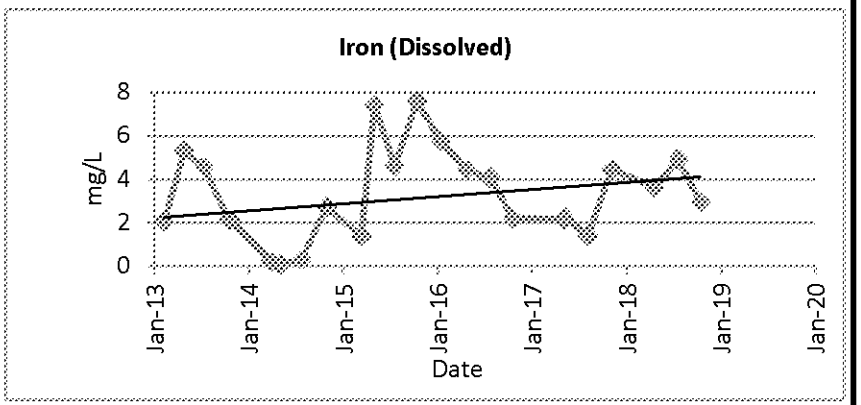


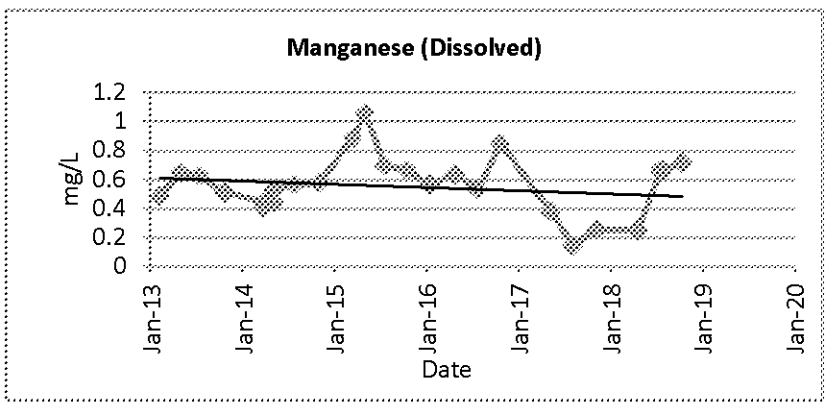
Note: ND results as 1/2 the detection limit

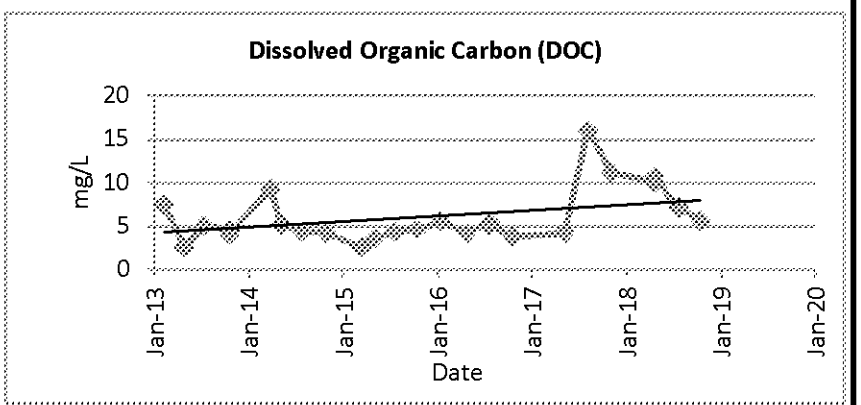
figure 4.9.9

TEMPORAL PLOTS - SELECTED PARAMETERS
MW104-13
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





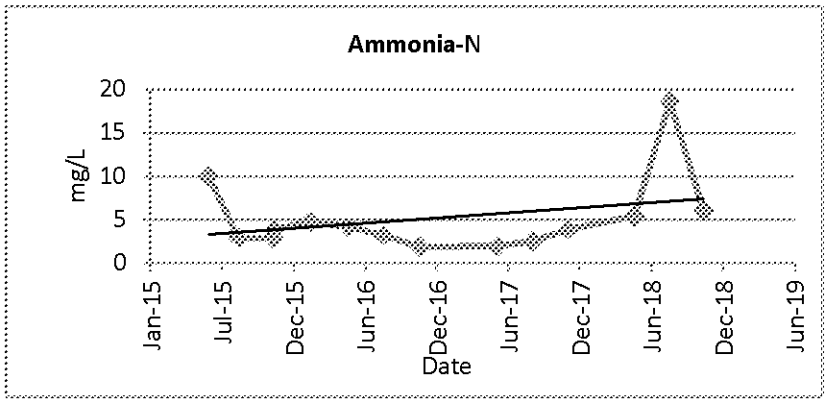


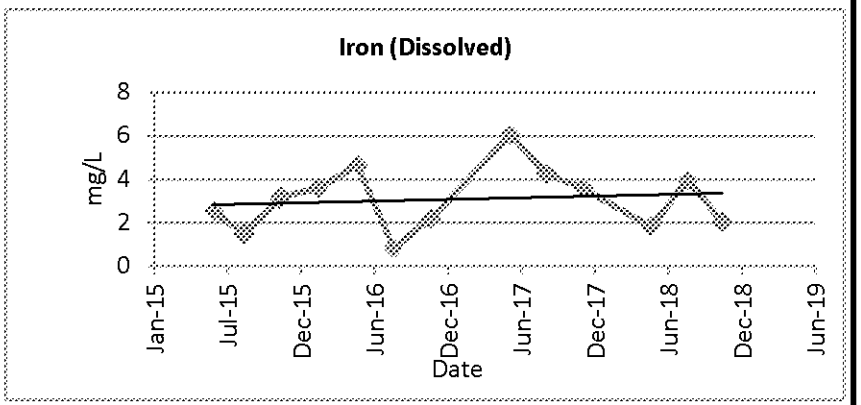


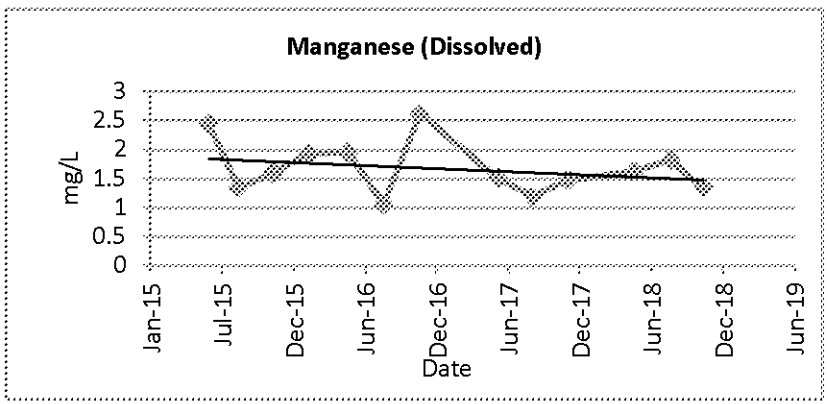
Note: ND results as 1/2 the detection limit

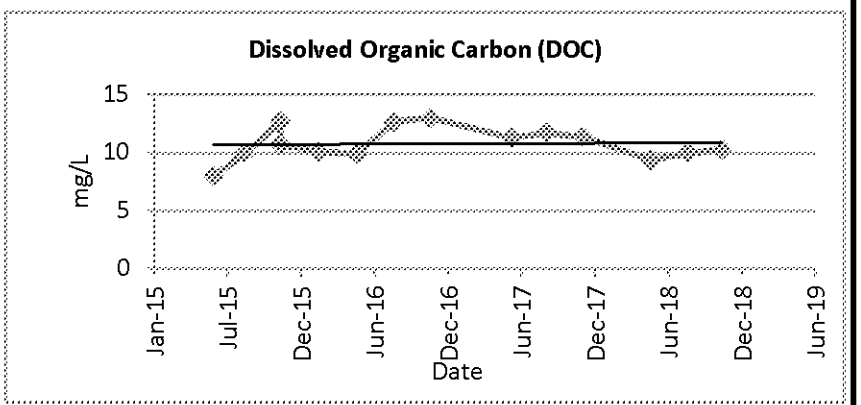
figure 4.9.10

TEMPORAL PLOTS - SELECTED PARAMETERS
MW105-13
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





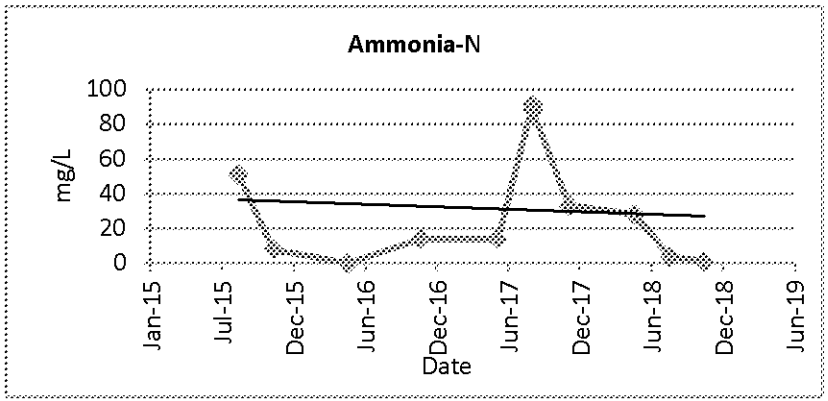


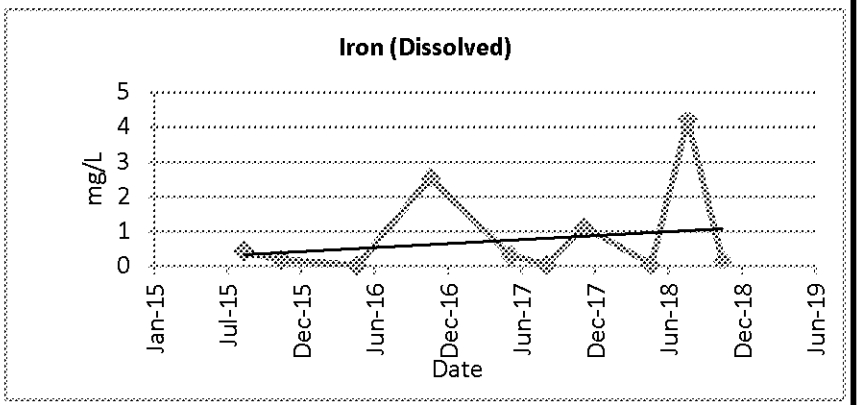


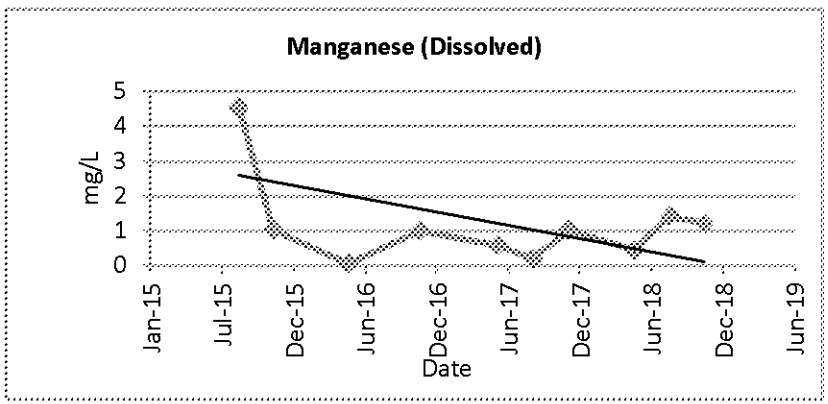
Note: ND results as 1/2 the detection limit

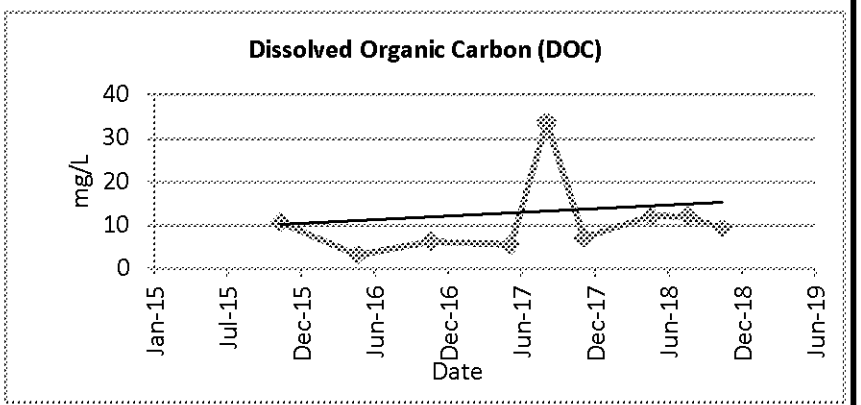
figure 4.9.11

TEMPORAL PLOTS - SELECTED PARAMETERS
MW106-15
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





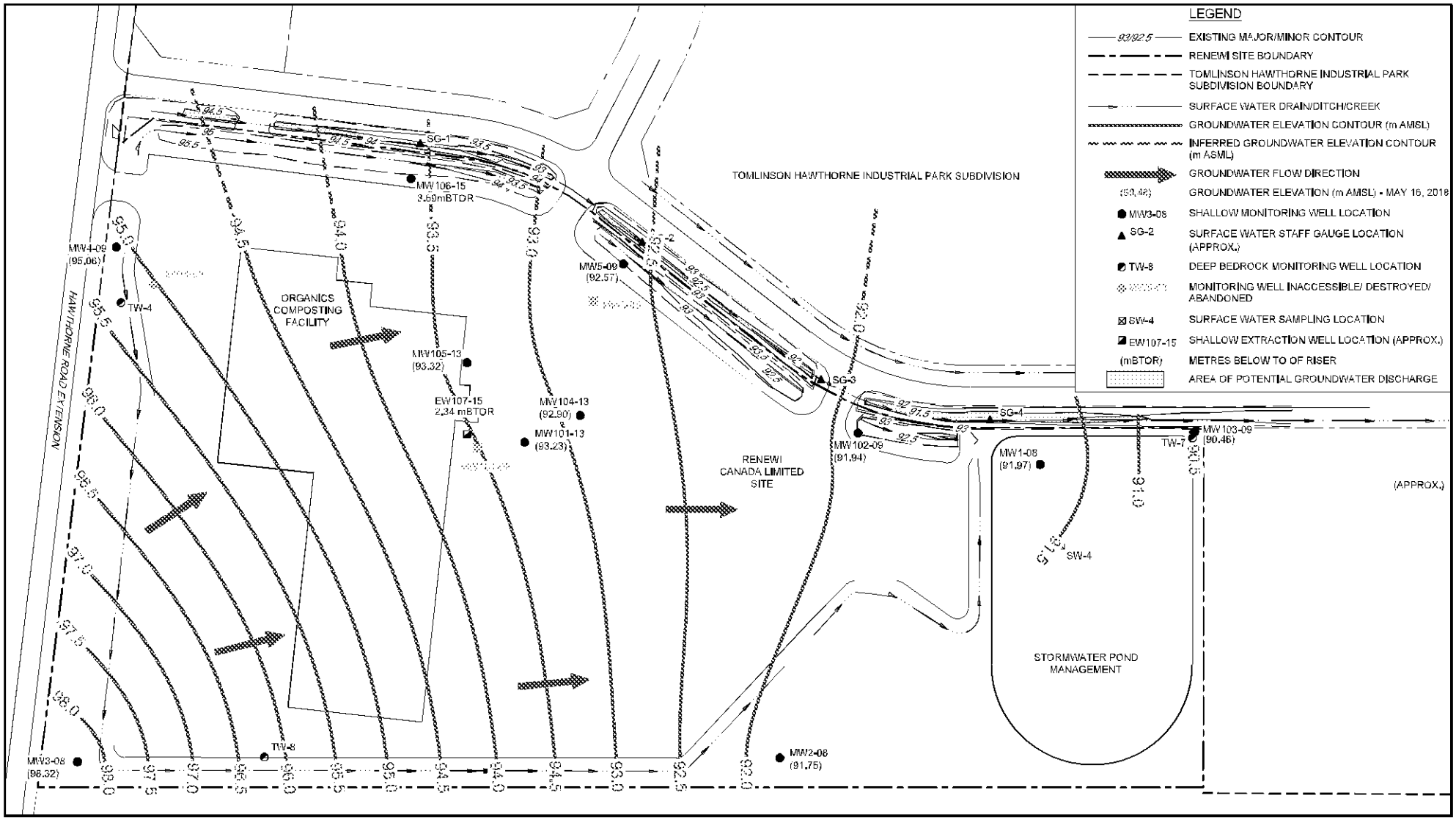




Note: ND results as 1/2 the detection limit
DOC plot omits August 2015 results (965/1030 mg/L)

figure 4.9.12

TEMPORAL PLOTS - SELECTED PARAMETERS
EW107-15
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY



RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

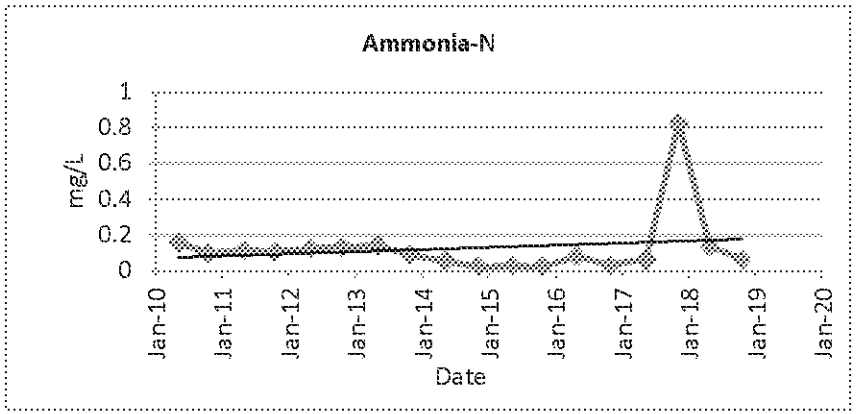
NORTHERN DITCH TOPOGRAPHY WITH MAY 15 -16, 2018 GROUNDWATER CONTOURS

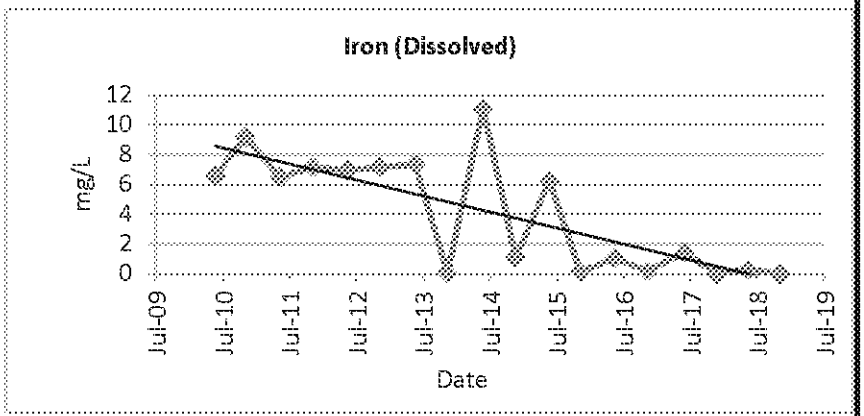
45604-58
Jan 25, 2019

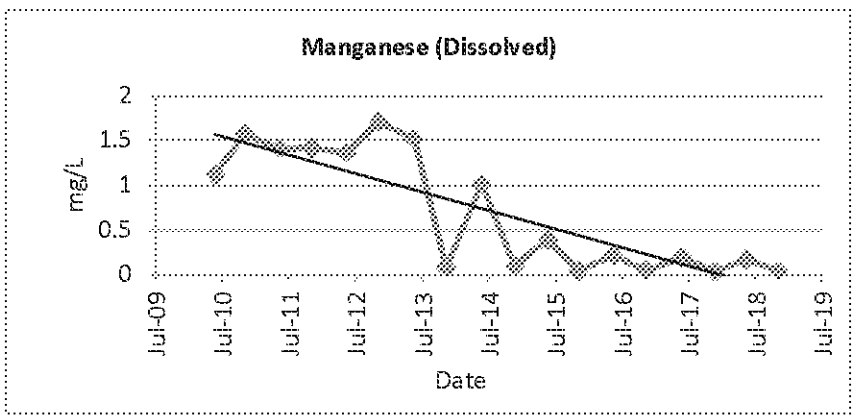
figure 4.10

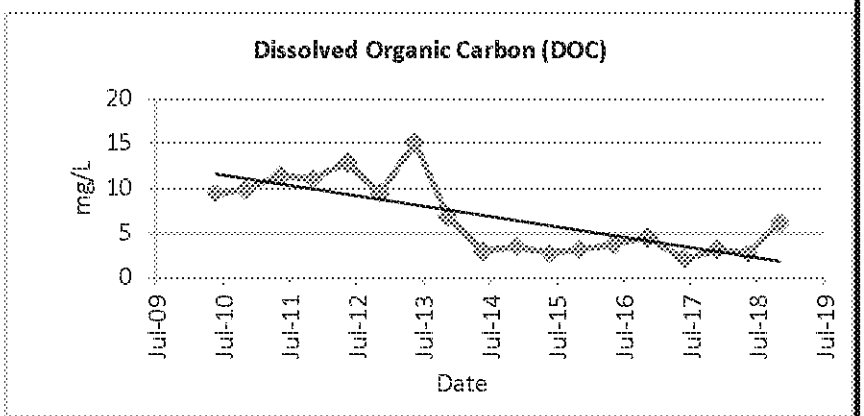
CAD File: P:\drawings\45000s\45604-58\...\45604-58-GW-MAY-2018.DWG

002637









Note: ND results as 1/2 the detection limit

figure 4.11.1

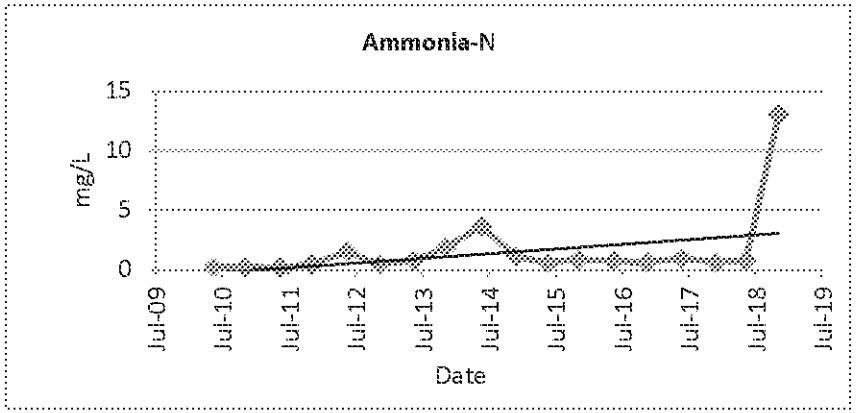
TEMPORAL PLOTS - SELECTED PARAMETERSS

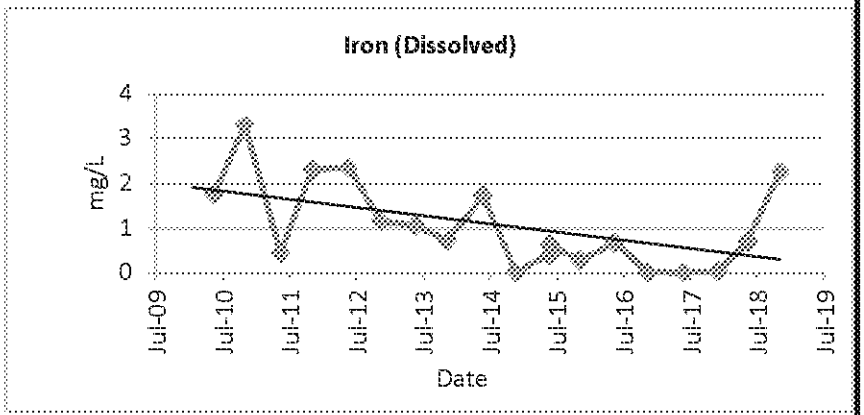
TW-7

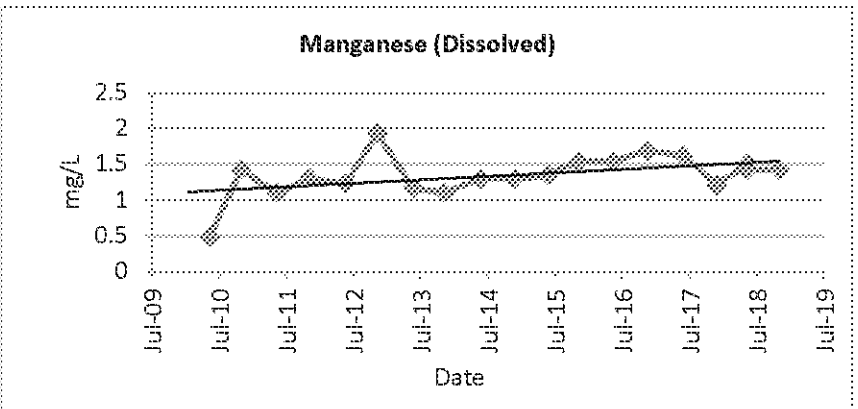
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

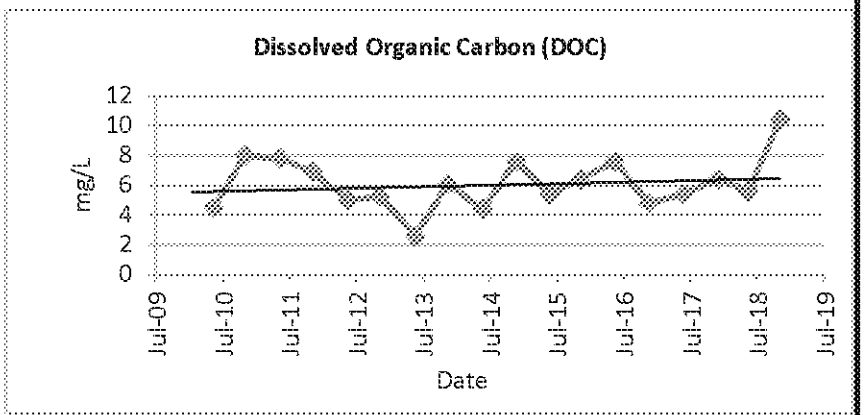
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

002638









Note: ND results as 1/2 the detection limit

figure 4.11.2

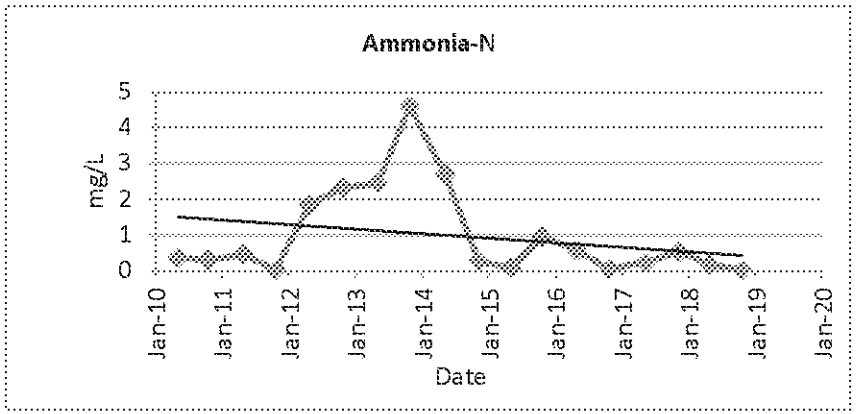
TEMPORAL PLOTS - SELECTED PARAMETERSS

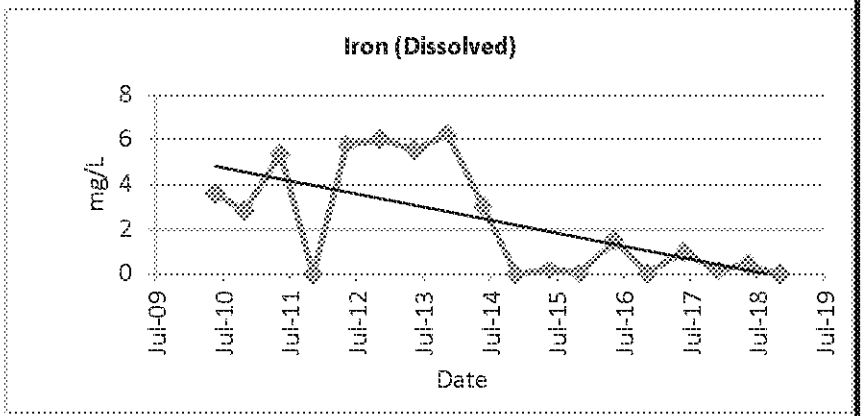
TW-4

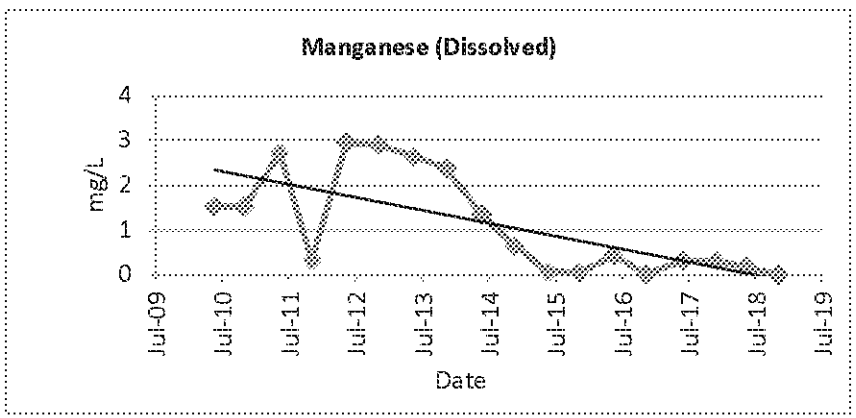
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

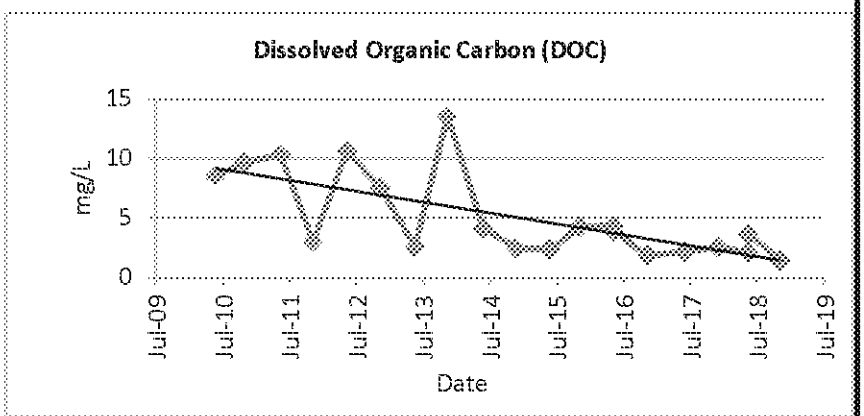
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

002639









Note: ND results as 1/2 the detection limit

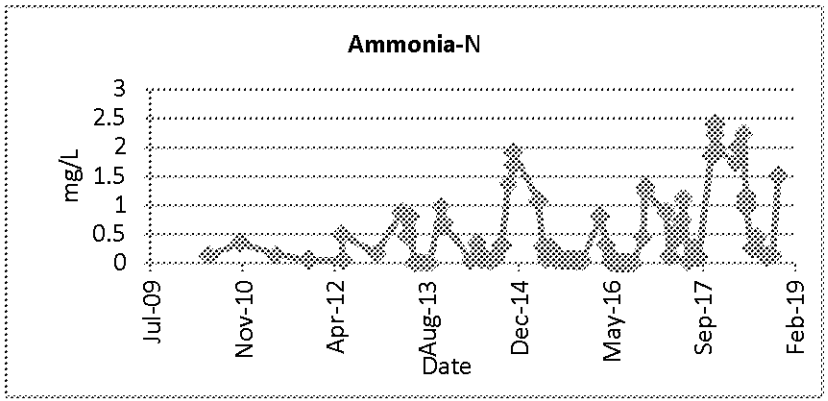
figure 4.11.3

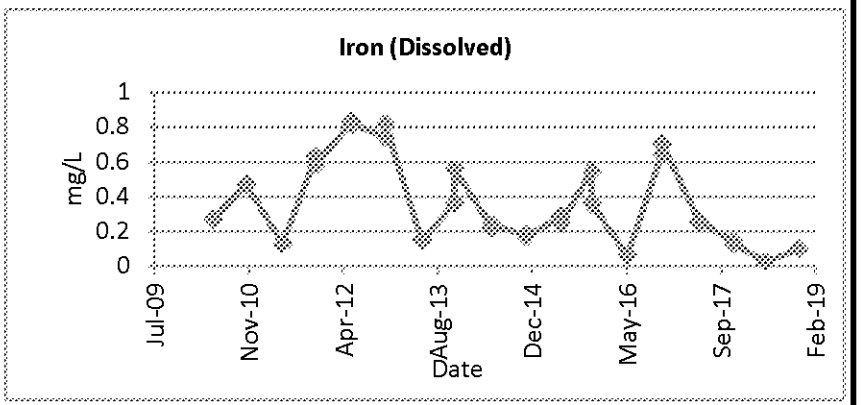
TEMPORAL PLOTS - SELECTED PARAMETERSS

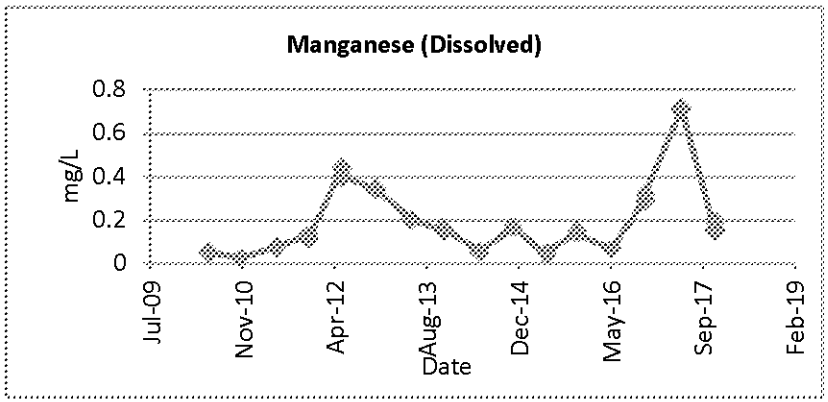
TW-8

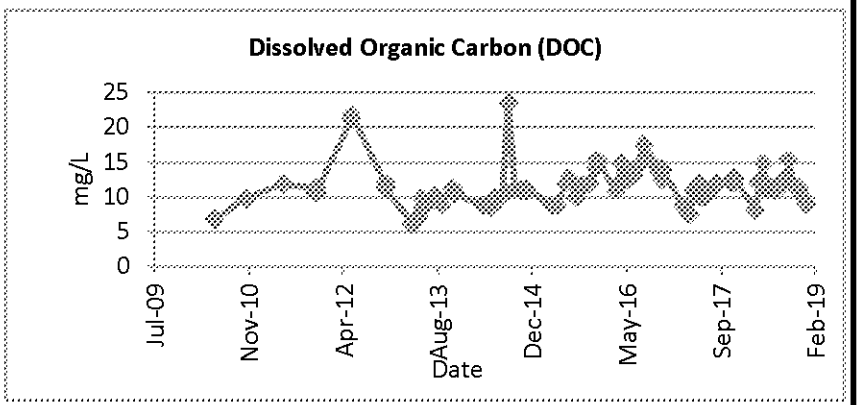
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT

RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure 4.12

TEMPORAL PLOTS - SELECTED PARAMETERS
SW-4
2018 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

Table 2.1

Monitoring Location Details
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Shallow Water Table Wells								
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill	
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)	
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)	
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)	
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand	
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill	Decommissioned, replaced by MW05-09
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand	
MW6-08[4]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface	
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface	No access
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill	No access
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay	No access
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand	No access
MW101-09[5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill	Decommissioned, replaced by MW101-13
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay	
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand	
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel	
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel	
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel	
MW106-15	NS	NS	3.33	6.38	NS	NS	Fill and silty sand till	
EW107-15	NS	NS	2.44	5.49	NS	NS	Fill, Bedrock (fractured)	
Bedrock Wells								
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock	No access
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock	No access
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock	No access
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock	
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock	No access
TW-6 (2008)[4]	83.08	83.73	17.67	25.36	65.41	57.72	Competent Bedrock	No access
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock	
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock	

002642

Table 2.1

Monitoring Location Details
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Surface Water Staff Guages								
SG-1	NS	NS	-	-	-	-	North Drainage Ditch	
SG-2	NS	NS	-	-	-	-	North Drainage Ditch	
SG-3	NS	NS	-	-	-	-	North Drainage Ditch	
SG-4	NS	NS	-	-	-	-	North Drainage Ditch	

Notes:

m AMSL metres above mean sea level.
m bgs metres below ground surface.
NI No Information.
NS Not Surveyed.
(1) The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe, respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010.
The 2015-series wells have not yet been surveyed.
(2) Bedrock wells are open to the rock.
(3) Decommissioned, replaced by MW05-09
(4) Located on Tomlinson property; no longer accessible.
(5) Decommissioned, replaced by MW101-13

002643

Table 3.1

Monitoring Program Schedule
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd
5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters				
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	SW General Chemistry[2]	Metals[3/4]	Bacteriological Components[5]	Collection Method
Surface Water Monitoring Locations (4 locations)								
SW-1		√	√	√		√	√	grab
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Surface Water Northern Ditch Staff Guages (4 locations)								
SG-1	X							
SG-2	X							
SG-3	X							
SG-4	X							
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	√	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	√	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	√	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	√	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Monitoring Program Schedule
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd
5123 Hawthorne Road, Ottawa, Ontario

Notes:

(1)	General chemistry parameters - alkalinity, ammonia, DOC, nitrate, phosphorus turbidity, and un-ionized ammonia
(2)	Additional Surface Water General Chemistry parameters analyzed at SW-4 during monthly sampling - BOD, COD, TKN, nitrite, total phenols, TSS, oil & grease, pH, arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, zinc
(3)	Metals - iron and manganese
(4)	Surface water metals are total while groundwater metals are dissolved.
(5)	5 Escherichia coli (e.coli)
(6)	SW-4 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)
X	Samples to be collected tri-annually (spring, summer, and fall)
\	Samples to be collected semi-annually (spring and fall)

Groundwater Elevations
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Location	Reference Elevation [1] [2] (m AMSL)	May 15-16, 2018		August 15 & 18, 2018		November 7-9, 2018	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations							
MW1-08	93.00	1.03	91.97	NA	NA	1.06	91.94
MW2-08	93.78	2.03	91.75	NA	NA	0.76	93.02
MW3-08	104.22	5.9	98.32	NA	NA	5.71	98.51
MW4-09	97.45	2.39	95.06	NA	NA	2.23	95.22
MW5-09	94.50	1.93	92.57	1.855	92.65	1.82	92.68
MW101-13	94.88	1.65	93.23	1.58	93.30	1.53	93.35
MW102-09	93.79	1.86	91.94	1.76	92.03	1.85	91.94
MW103-09	93.33	2.875	90.46	NA	NA	2.86	90.47
MW104-13	94.55	1.65	92.90	1.57	92.98	1.47	93.08
MW105-13	94.95	1.63	93.32	1.5	93.45	1.53	93.42
MW106-15	NS	3.69	NS	3.68	NS	3.53	NS
Deep Groundwater Elevations							
TW-4	96.90	11.8	85.10	NA	NA	11.6	85.30
TW-7	92.98	2.45	90.54	NA	NA	3.43	89.55
TW-8	94.88	11.58	83.30	NA	NA	11.32	83.57
Extraction Well							
EW107-15	NS	2.34	NS	2.68	NS	2.60	NS
Surface Water Staff Gauge Locations							
SG-1	93.51	dry	dry	dry	dry	dry	dry
SG-2	92.37	dry	dry	dry	dry	dry	dry
SG-3	91.76	dry	dry	dry	dry	dry	dry
SG-4	90.97	dry	dry	dry	dry	dry	dry

Notes:

(1)	Top of Riser for MW
(2)	Top of Cap for TW and EW
m AMSL	meters above mean sea level.
NA	No access.
NS	Not surveyed.

Table 4.2

Overburden Aquifer Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW4-09**	**MW4-09**
Sample ID:			**GW-45804-051518-TS-003**	**GW-45804-110818-TS-010**
Sample Date:			**5/15/2018**	**11/8/2018**
Sample Type:				
Parameters	**Units**	**TLP[1]**		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.10) J	0.15
Manganese (dissolved)	mg/L	17.1	0.154 J	0.0556
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	318 J	294
Ammonia-N	mg/L	4.0	ND(0.554) J	ND(0.063)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	2.0 J	ND(2.36)
Escherichia coli	cfu/100mL	25.6	ND(0) J	ND(0) J
Nitrate (as N)	mg/L	1.3	ND(0.020) J	ND(0.020)
Phosphorus	mg/L	7.2	0.0034 J	0.0162
Unionized Ammonia	mg/L	-	ND(0.0023)	ND(0.0003)
Field Parameters				
Conductivity, field	mS/cm	-	1.62	2.08
Dissolved oxygen (DO), field	mg/L	-	0	2.08
Oxidation reduction potential (ORP), field	millivolts	-	-20	-80
pH, field	s.u.	-	7.3	7.38
Temperature, field	Deg C	-	11.6	11.08
Turbidity, field	NTU	-	20	18.2

Footnotes:

ND	Not detected at the associated reporting limit.
9.99	Exceeded Trigger Level Program Concentration
(1)	TLP- Trigger Level Program Concentration (CRA 2015)
J	Estimated Concentration

Table 4.2a

MW103-09 Analytical Results- PWQO Comparison
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051618-TS-007	GW-45804-051618-TS-008	GW-45804-110718-TS-001	GW-45804-110718-TS-002
Sample Date:			5/16/2018	5/16/2018	11/7/2018	11/7/2018
Sample Type:				Duplicate		Duplicate
Parameters	**Units**	**PWQO[1]**				
Metals						
Iron (dissolved)	mg/L	0.3	3.73	3.30	0.60	0.60
Manganese (dissolved)	mg/L	-	3.04	3.15	0.460	0.458
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	-	305	306	358	353
Ammonia-N	mg/L	-	1.55	1.74	0.217	ND(0.255)
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	8.0	8.0	16.9	15.1
Escherichia coli	cfu/100mL	100	ND(0)	ND(0)	ND(0) J	ND(0) J
Nitrate (as N)	mg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Phosphorus	mg/L	0.01	0.0065	0.0066	0.0148 J	0.0113 J
Unionized Ammonia	mg/L	0.02	0.0046	0.0052	0.0008	ND(0.0010)
Field Parameters						
Conductivity, field	mS/cm	-	0.807	--	1.62	--
Dissolved oxygen (DO), field	mg/L	-	0	--	2.87	--
Oxidation reduction potential (ORP), field	millivolts	-	-50	--	49	--
pH, field	s.u.	6.5-8.5	7.12	--	7.26	--
Temperature, field	NTU	-	12.53	--	11.48	--
Turbidity, field	°C	-	8.9	--	2	--

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
ND Not detected at the associated reporting limit.
J Estimated concentration.
16.7 Exceeded PWQO

002648

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-4**	**TW-4**	**TW-4**
Sample ID:				**GW-45804-051618-TS-019**	**GW-45804-051618-TS-020**	**GW-45804-110818-TS-017**
Sample Date:				**5/16/2018**	**5/16/2018**	**11/9/2018**
Sample Type:					**Duplicate**	
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**			
Metals						
Iron (dissolved)	mg/L	10.6	0.30	0.69[a]	0.76[a]	0.29[a]
Manganese (dissolved)	mg/L	2.1	0.05	1.43[a]	1.51[a]	1.42[a]
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	996	30-500	545[a]	546[a]	402
Ammonia-N	mg/L	0.2	-	ND(0.812)	ND(0.871)	13.0[a]
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	5.6	5.7	10.4
Escherichia coli	cfu/100mL	5	0	ND(0)	ND(0)	15[b]
Nitrate (as N)	mg/L	0.5	10.0	0.112	0.112	0.029
Phosphorus	mg/L	0.5	-	ND(0.0030)	0.0030	0.129
Unionized Ammonia	mg/L	-	-	ND(0.0021)	ND(0.0023)	0.0663
Field Parameters						
Conductivity, field	mS/cm	-	-	2.52	--	2.51
Dissolved oxygen (DO), field	mg/L	-	-	3.8	--	4.45
Oxidation reduction potential (ORP), field	millivolts	-	-	–	--	-10
pH, field	s.u.	-	6.5-8.5	7.05	--	7.35
Temperature, field	NTU	-	15	13.15	--	12.73
Turbidity, field	°C	-	5.0	5.4[a]	--	19.5[a]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015)
ODWQS - Ontario Drinking Water Quality Standards Technical Support
(2) Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)

ND Not detected at the associated reporting limit.

0.561[a] Exceedance of the ODWQS

6.97[b] Exceedance of the Tier I Trigger Level

Deep Bedrock Aquifer Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-7**	**TW-7**
Sample ID:				**GW-45804-051618-TS-009**	**GW-45804-110718-TS-003**
Sample Date:				**5/16/2018**	**11/7/2018**
Sample Type:					
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.331[a]	ND(0.010)
Manganese (dissolved)	mg/L	2.1	0.05	0.175[a]	0.0428
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	152	100
Ammonia-N	mg/L	0.2	-	ND(0.282)	ND(0.128)
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	2.7	6.14
Escherichia coli	cfu/100mL	5	0	ND(0)	ND(0) J
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)
Phosphorus	mg/L	0.5	-	0.0084	0.0035
Unionized Ammonia	mg/L	-	-	ND(0.0100)	ND(0.0137)
Field Parameters					
Conductivity, field	mS/cm	-	-	0.409	0.46
Dissolved oxygen (DO), field	mg/L	-	-	1.14	0.63
Oxidation reduction potential (ORP), field	millivolts	-	-	-209	-2
pH, field	s.u.	-	6.5-8.5	8.21	8.7[a]
Temperature, field	NTU	-	15	12.62	13.34
Turbidity, field	°C	-	5.0	49[a]	8.8[a]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015)

(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)

ND Not detected at the associated reporting limit.

0.961[a] Exceedance of the ODWQS

567[b] Exceedance of the Tier I Trigger Level

J Estimated concentration

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-8**	**TW-8**	**TW-8**
Sample ID:				**GW-45804-051618-TS-017**	**GW-45804-051618-TS-018**	**GW-45804-110818-TS-008**
Sample Date:				**5/16/2018**	**5/16/2018**	**11/8/2018**
Sample Type:					**Duplicate**	
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**			
Metals						
Iron (dissolved)	mg/L	10.6	0.30	0.34 J[a]	0.50 J[a]	0.024
Manganese (dissolved)	mg/L	2.1	0.05	0.187[a]	0.185[a]	0.00640
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	996	30-500	287	291	232
Ammonia-N	mg/L	0.2	-	ND(0.395)	ND(0.385)	ND(0.063)
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	-	3.7 J	2.1 J	ND(2.95)
Escherichia coli	cfu/100mL	5	0	ND(0)	ND(0)	ND(0) J
Nitrate (as N)	mg/L	0.5	10.0	0.049	0.059	9.640[a]
Phosphorus	mg/L	0.5	-	0.0190	0.0263	0.0075
Unionized Ammonia	mg/L	-	-	ND(0.0019)	ND(0.0019)	ND(0.0005)
Field Parameters						
Conductivity, field	mS/cm	-	-	0.661	–	0.937
Dissolved oxygen (DO), field	mg/L	-	-	3.68	–	6.72
Oxidation reduction potential (ORP), field	millivolts	-	-	-36	–	6
pH, field	s.u.	-	6.5-8.5	7.31	–	7.59
Temperature, field	NTU	-	15	13.29	–	10.51
Turbidity, field	°C	-	5.0	343[a]	–	6.6[a]

Notes:

(1)	TLP- Trigger Level Program Concentration (CRA 2015)
(2)	ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017)
ND	Not detected at the associated reporting limit.
0.961[a]	Exceedance of the ODWQS
557[b]	Exceedance of the Tier I Trigger Level
J	Estimated concentration

Table 4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			SW1-09	SW1-09
Sample ID:			SW-45804-051518-TS-003	SW-45804-110718-TS-003
Sample Date:			5/15/2018	11/7/2018
Sample Type:				
Parameters	**Units**	**PWQO[1]**		
Metals				
Iron	mg/L	0.3	0.12	0.073
Manganese	mg/L	-	0.389	0.0760
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	-	202	181
Ammonia-N	mg/L	-	0.189	0.242
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	3.6	3.57
Escherichia coli	cfu/100mL	100	22	2 J
Nitrate (as N)	mg/L	-	0.589	0.967
Phosphorus	mg/L	0.01	0.0062	0.0089
Unionized Ammonia	mg/L	0.02	0.0024	0.0028
Field Parameters				
Conductivity, field	mS/cm	-	2.29	1.85
Dissolved oxygen (DO), field	mg/L	*	6.7	9.43
Oxidation reduction potential (ORP), field	millivolts	-	66	--
pH, field	s.u.	6.5-8.5	7.64	7.86
Temperature, field	Deg C	-	16.18	6.25
Turbidity, field	NTU	-	3.7	0

Footnotes:

(1)	Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
J	Estimated concentration.
ND	Not detected at the associated reporting limit.
5.44	Concentrations is in excess of the PWQO.
*	PWQO for dissolved oxygen is temperature dependent

Table 4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**SW2-09**	**SW2-09**
Sample ID:			**SW-45804-051518-TS-004**	**SW-45804-110718-TS-002**
Sample Date:			**5/15/2018**	**11/7/2018**
Sample Type:				
Parameters	**Units**	**PWQO[1]**		
Metals				
Iron	mg/L	0.3	0.513	0.230
Manganese	mg/L	-	0.205	0.0605
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	-	249	190
Ammonia-N	mg/L	-	0.206	0.204
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	7.0	11.0
Escherichia coli	cfu/100mL	100	84	15 J
Nitrate (as N)	mg/L	-	0.040	0.222
Phosphorus	mg/L	0.01	0.0232	0.0152
Unionized Ammonia	mg/L	0.02	0.0039	0.0026
Field Parameters				
Conductivity, field	mS/cm	-	0.913	0.937
Dissolved oxygen (DO), field	mg/L		6.87	9.85
Oxidation reduction potential (ORP), field	millivolts	*	83	--
pH, field	s.u.	6.5-8.5	7.86	7.92
Temperature, field	Deg C	-	14.76	7.73
Turbidity, field	NTU	-	7.8	0

Footnotes:

(1)	Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
J	Estimated concentration.
ND	Not detected at the associated reporting limit.
5.44	Concentrations is in excess of the PWQO.
*	PWQO for dissolved oxygen is temperature dependent

Table 4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**SW3-09**	**SW3-09**	**SW3-09**
Sample ID:			**SW-45804-051518-TS-005**	**SW-45804-110718-TS-004**	**SW-45804-110718-TS-005**
Sample Date:			**5/15/2018**	**11/7/2018**	**11/7/2018**
Sample Type:					**Duplicate**
Parameters	**Units**	**PWQO[1]**			
Metals					
Iron	mg/L	0.3	5.410	0.216	0.194
Manganese	mg/L	-	0.215	0.0706	0.0689
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	255	182	186
Ammonia-N	mg/L	-	0.263	0.351 J	0.205 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	7.3	9.59	10.3
Escherichia coli	cfu/100mL	100	270	18 J	9 J
Nitrate (as N)	mg/L	-	0.080	0.448	0.443
Phosphorus	mg/L	0.01	0.0219	0.0192 J	0.0120 J
Unionized Ammonia	mg/L	0.02	0.0060	0.0046	0.0027
Field Parameters					
Conductivity, field	mS/cm	-	0.968	1.07	1.07
Dissolved oxygen (DO), field	mg/L	*	6.8	9.55	9.55
Oxidation reduction potential (ORP), field	millivolts	-	100	110	110
pH, field	s.u.	6.5-8.5	7.94	7.93	7.93
Temperature, field	Deg C	-	14.72	7.79	7.79
Turbidity, field	NTU	-	8.6	0	0

Footnotes:

(1)	Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
J	Estimated concentration.
ND	Not detected at the associated reporting limit.
5.44	Concentrations is in excess of the PWQO.
*	PWQO for dissolved oxygen is temperature dependent

Table 4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:			**SW4-09**	**SW4-09**	**SW4-09**
Sample ID:			**SW-45804-051518-TS-001**	**SW-45804-051518-TS-002**	**SW-45804-110718-TS-001**
Sample Date:			**5/15/2018**	**5/15/2018**	**11/7/2018**
Sample Type:				**Duplicate**	
Parameters	**Units**	**PWQO[1]**			
Metals					
Iron	mg/L	0.3	ND(0.050)	ND(0.050)	0.102
Manganese	mg/L	-	0.141	0.145	0.0477
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	254	255	169
Ammonia-N	mg/L	-	1.04	0.973	1.52
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	11.4	11.9	11.4
Escherichia coli	cfu/100mL	100	23	33	95 J
Nitrate (as N)	mg/L	-	1.09	1.04	0.474
Phosphorus	mg/L	0.01	0.0868	0.0838	0.0748
Unionized Ammonia	mg/L	0.02	0.0148	0.0158	0.0177
Field Parameters					
Conductivity, field	mS/cm	-	0.902	0.902	0.795
Dissolved oxygen (DO), field	mg/L	*	3.73	3.73	7.53
Oxidation reduction potential (ORP), field	millivolts	-	39	39	137
pH, field	s.u.	6.5-8.5	7.66	7.66	7.89
Temperature, field	Deg C	-	17.84	17.84	7.47
Turbidity, field	NTU	-	50	50	54.1

Footnotes:

(1)	Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
J	Estimated concentration.
ND	Not detected at the associated reporting limit.
5.44	Concentrations is in excess of the PWQO.
*	PWQO for dissolved oxygen is temperature dependent

Table 4.5

SW-4 Monthly Sampling Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW4-09	SW4-09	SW-4	SW-4	SW-4
Sample ID:				Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond
Sample Type Code:				Original	Original	Original	Original	Original	Duplicate	Original	Original	Original
Sample Date:				3/25/2018	4/9/2018	5/2/2018	5/14/2018	5/15/2018	5/15/2018	6/19/2018	7/12/2018	8/31/2018
Sampler:				Renewi	Renewi	Renewi	Renewi	GHD	GHD	Renewi	Renewi	Renewi
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria [2]**									
Metals												
Arsenic	mg/L	0.005	-	<0.0010	0.00067	0.00131	0.00156	--	--	0.00125	0.00120	0.00092
Boron	mg/L	0.2	-	<0.1	0.02400	0.03500	0.04400	--	--	0.04900	<0.10	0.02600
Cadmium	mg/L	0.0002	-	<0.00005	0.00001	<0.00001	0.000026	--	--	<0.000010	<0.000050	<0.000005
Chromium	mg/L	0.001	-	<0.005	<0.0005	<0.0005	<0.0005	--	--	<0.00050	<0.0050	<0.00050
Cobalt	mg/L	0.0009	-	<0.0010	0.00065	0.00055	0.00038	--	--	0.00023	<0.0010	0.00017
Copper	mg/L	0.005	-	<0.010	0.00150	<0.001	<0.0010	--	--	<0.0010	<0.010	<0.0010
Iron	mg/L	0.3	-	--	--	--	--	ND(0.050)	ND(0.050)	--	--	--
Lead	mg/L	0.005	-	<0.00050	0.00062	0.00011	<0.00010	--	--	<0.00010	<0.00050	<0.00010
Manganese	mg/L	-	-	--	--	--	--	0.141	0.145	--	--	--
Mercury	mg/L	0.0002	-	<0.000010	<0.000010	<0.000010	<0.000010	--	--	<0.000010	<0.000010	<0.000010
Nickel	mg/L	0.025	-	<0.005	0.00296	0.00263	0.00235	--	--	0.00156	<0.0050	0.00122
Zinc	mg/L	0.03	-	<0.030	0.01770	0.00380	0.00370	--	--	0.00340	<0.030	<0.0030
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	-	-	--	--	--	--	254	255	--	--	--
Ammonia-N	mg/L	-	-	1.7400	2.0100	2.2500	1.1600	1.04	0.973	0.2590	0.4560	0.1140
Biochemical oxygen demand	mg/L	-	-	2.5	7.2	12	4.1	--	--	2.2	2.1	4.3
Biochemical oxygen demand (carbonaceous)	mg/L	-	15	2.5	7.5	11.6	3.9	--	--	<2.0	<2.0	3.8
Chemical oxygen demand (COD)	mg/L	-	-	44	64	69	56	--	--	39	45	277
Chloride	mg/L	-	-	--	--	--	--	--	--	--	--	--
Conductivity	mS/cm	-	-	1860.0	979.0	1180.0	1180.0	--	--	1040.0	1030.0	834.0
Dissolved organic carbon (DOC)	mg/L	-	-	8.2	12.1	14.8	11.8	11.4	11.9	11.3	11.0	12.6
Dissolved oxygen (DO)			-	9.28	11.60	8.72	7.71	--	--	9.87	10.40	10.30
Escherichia coli	cfu/100mL	100	100	58	0	19	1	23	33	19	3	22
Nitrate (as N)	mg/L	-	2.93	0.6300	0.0750	0.2690	1.0300	1.09	1.04	0.1290	0.2410	0.02
Nitrite (as N)	mg/L	-	-	<0.05	<0.010	0.0550	0.2840	--	--	0.0710	<0.010	<0.010
Nitrite/Nitrate	mg/L	-	-	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	6.5-8.5	6.5-8.5	7.79	8.18	8.14	8.20	--	--	7.91	8.10	8.12
Phenolics (total)	mg/L	0.001	-	<0.0010	<0.0010	<0.0010	<0.0010	--	--	0.0015	0.0025	0.0083
Phosphorus	mg/L	0.01	0.4	0.1003	0.1250	0.1220	0.1015	0.0985	0.0935	0.1303	0.1082	0.0932
Total kjeldahl nitrogen (TKN)	mg/L	-	-	2.7800	4.3400	6.4800	3.0800	--	--	1.4300	1.6100	1.6700
Total suspended solids (TSS)	mg/L	-	15	5.50	10.80	11.50	6.80	--	--	<2.0	<2.0	12.20
Un-ionized ammonia	mg/L	0.02	0.05	0.01260	0.03346	0.0276	0.02722	0.0148	0.0158	0.00916	0.03490	0.01170
Field Parameters												
Conductivity, field	mS/cm	-	-	--	--	--	--	0.902	--	--	--	--
Dissolved oxygen (DO), field	mg/L	*	-	--	--	--	--	3.73	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-	-	--	--	--	--	39	--	--	--	--
pH, field	s.u.	6.5-8.5	6.5-8.5	--	--	--	--	7.66	--	--	--	--
Temperature, field	Deg C	-	23	2.0	1.0	10	18	17.84	--	19	23.0	23.0
Turbidity, field	NTU	-	-	--	--	--	--	50	--	--	--	--
Petroleum Products												
Oil and Grease	mg/L	-	-	<1.0	<2.0	<2.0	<2.0	--	--	<2.0	<1.0	<1.0

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
Exceedance of the PWQO
Exceedance of the ECA Discharge Criteria
J Estimated concentration.
* The PWQO for dissolved oxygen is temperature dependent

GHD 0458634 (7)

002696

Table 4.5

SW-4 Monthly Sampling Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
6123 Hawthorne Road, Ottawa, ON

Sample Location:				SW-4	SW-4	SW4-09	SW-4	SW-4
Sample ID:				Storm Water Pond Original	Storm Water Pond Original	Storm Water Pond Original	Storm Water Pond Original	Storm Water Pond Original
Sample Type Code:				9/13/2018	10/10/2018	11/7/2018	11/28/2018	12/18/2018
Sample Date:				Renewi	Renewi	GHD	Renewi	Renewi
Sampler:								
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria [2]**					
Metals								
Arsenic	mg/L	0.005	-	<0.0010	0.00061	--	0.00056	<0.0010
Boron	mg/L	0.2	-	<0.10	0.03900	--	0.03400	<0.10
Cadmium	mg/L	0.0002	-	<0.000050	<0.000005	--	<0.000010	<0.000050
Chromium	mg/L	0.001	-	<0.0050	<0.00050	--	<0.00050	<0.0050
Cobalt	mg/L	0.0009	-	<0.0010	0.00019	--	0.00023	<0.0010
Copper	mg/L	0.005	-	<0.010	0.00110	--	<0.0010	<0.010
Iron	mg/L	0.3	-	--	--	0.102	--	--
Lead	mg/L	0.005	-	<0.00050	0.00081	--	0.000201	<0.00050
Manganese	mg/L	-	-	--	--	0.0477	--	--
Mercury	mg/L	0.0002	-	<0.000010	<0.000010	--	<0.000010	<0.000010
Nickel	mg/L	0.025	-	<0.0050	0.00154	--	0.00175	<0.0050
Zinc	mg/L	0.03	-	<0.030	0.01620	--	0.00910	<0.030
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	--	--	169	--	--
Ammonia-N	mg/L	-	-	0.1360	0.1490	1.52	0.8550	0.5290
Biochemical oxygen demand	mg/L	-	-	4.4	<2.0	--	<2.0	<2.0
Biochemical oxygen demand (carbonaceous)	mg/L	-	15	3.7	2.3	--	<2.0	<2.0
Chemical oxygen demand (COD)	mg/L	-	-	57	38	--	58	23
Chloride	mg/L	-	-	--	--	--	--	--
Conductivity	mS/cm	-	-	841.0	788.0	--	982.0	1030.0
Dissolved organic carbon (DOC)	mg/L	-	-	15.3	11.8	11.4	10.0	9.1
Dissolved oxygen (DO)			-	5.59	9.30	--	11.20	--
Escherichia coli	cfu/100mL	100	100	[illegible]	1	95 J	[illegible]	/
Nitrate (as N)	mg/L	-	2.93	<0.10	<0.020	0.474	1.0400	1.1000
Nitrite (as N)	mg/L	-	-	<0.050	0.0210	--	0.0100	<0.050
Nitrite/Nitrate	mg/L	-	-	--	--	--	--	--
pH, lab	s.u.	6.5-8.5	6.5-8.5	7.84	7.98	--	8.07	8.02
Phenolics (total)	mg/L	0.001	-	0.0058	<0.0010	--	<0.0010	0.0042
Phosphorus	mg/L	0.01	0.4	0.0811	0.0530	0.0749	0.0827	0.0567
Total kjeldahl nitrogen (TKN)	mg/L	-	-	1.9400	1.2700	--	1.7200	1.3700
Total suspended solids (TSS)	mg/L	-	15	4.80	2.40	--	4.50	2.20
Un-ionized ammonia	mg/L	0.02	0.05	0.00478	0.00717	0.0177	0.01280	0.00242
Field Parameters								
Conductivity, field	mS/cm	-	-	--	--	0.795	--	--
Dissolved oxygen (DO), field	mg/L	*	-	--	--	7.53	--	--
Oxidation reduction potential (ORP), field	millivolts	-	-	--	--	137	--	--
pH, field	s.u.	6.5-8.5	6.5-8.5	--	--	7.89	--	--
Temperature, field	Deg C	-	23	21.0	21.0	7.4	3.0	-9.5
Turbidity, field	NTU	-	-	--	--	54.1	--	--
Petroleum Products								
Oil and Grease	mg/L	-	-	<1.0	<1.0	--	<1.0	<1.0

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
[illegible] Exceedance of the PWQO
[illegible] Exceedance of the ECA Discharge Criteria
J Estimated concentration.
* The PWQO for dissolved oxygen is temperature dependent

GHD 0458434 (7)

002657

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m3)	Average Daily Volume Pumped (m^3)
10/04/16	1	2,360.2	2.360	2,360.2	2.360	2.360
10/05/16	2	764.6	0.765	3,124.8	3.125	1.562
10/06/16	3	764.6	0.765	3,889.3	3.889	1.296
10/07/16	4	764.6	0.765	4,653.9	4.654	1.163
10/08/16	-	-	-	-	-	-
10/09/16	-	-	-	-	-	-
10/10/16	5	764.6	0.765	5,418.4	5.418	1.084
10/11/16	6	764.5	0.764	6,182.9	6.183	1.030
10/12/16	7	764.7	0.765	6,947.6	6.948	0.993
10/13/16	8	764.6	0.765	7,712.1	7.712	0.964
10/14/16	9	764.6	0.765	8,476.7	8.477	0.942
10/15/16	-	-	-	-	-	-
10/16/16	-	-	-	-	-	-
10/17/16	10	764.6	0.765	9,241.2	9.241	0.924
10/18/16	11	764.6	0.765	10,005.8	10.006	0.910
10/19/16	12	764.6	0.765	10,770.4	10.770	0.898
10/20/16	13	764.6	0.765	11,534.9	11.535	0.887
10/21/16	14	764.6	0.765	12,299.5	12.299	0.879
10/22/16	-	-	-	-	-	-
10/23/16	-	-	-	-	-	-
10/24/16	15	5,351.9	5.352	17,651.4	17.651	1.177
10/25/16	16	1,926.7	1.927	19,578.1	19.578	1.224
10/26/16	17	1,926.7	1.927	21,504.7	21.505	1.265
10/27/16	18	1,926.7	1.927	23,431.4	23.431	1.302
10/28/16	19	1,926.7	1.927	25,358.0	25.358	1.335
10/29/16	-	-	-	-	-	-
10/30/16	-	-	-	-	-	-
10/31/16	20	0.0	0.000	25,358.0	25.358	1.268
11/01/16	21	0.7	0.001	25,358.7	25.359	1.208
11/02/16	22	0.0	0.000	25,358.7	25.359	1.153
11/03/16	23	0.0	0.000	25,358.7	25.359	1.103
11/04/16	24	0.0	0.000	25,358.7	25.359	1.057
11/05/16	-	-	-	-	-	-
11/06/16	-	-	-	-	-	-
11/07/16	25	0.0	0.000	25,358.7	25.359	1.014
11/08/16	26	0.0	0.000	25,358.7	25.359	0.975
11/09/16	27	0.0	0.000	25,358.7	25.359	0.939
11/10/16	28	0.0	0.000	25,358.7	25.359	0.906
11/11/16	29	0.0	0.000	25,358.7	25.359	0.874
11/12/16	-	-	-	-	-	-
11/13/16	-	-	-	-	-	-
11/14/16	30	0.0	0.000	25,358.7	25.359	0.845
11/15/16	31	1,328.1	1.328	26,686.8	26.687	0.861
11/16/16	32	0.0	0.000	26,686.8	26.687	0.834
11/17/16	33	224.5	0.225	26,911.3	26.911	0.815
11/18/16	34	0.0	0.000	26,911.3	26.911	0.792
11/19/16	-	-	-	-	-	-
11/20/16	-	-	-	-	-	-
11/21/16	35	0.0	0.000	26,911.3	26.911	0.769
11/22/16	36	149.5	0.150	27,060.8	27.061	0.752
11/23/16	37	0.0	0.000	27,060.8	27.061	0.731
11/24/16	38	0.0	0.000	27,060.8	27.061	0.712
11/25/16	39	6.2	0.006	27,067.0	27.067	0.694
11/26/16	-	-	-	-	-	-
11/27/16	-	-	-	-	-	-
11/28/16	40	0.0	0.000	27,067.0	27.067	0.677
11/29/16	41	0.0	0.000	27,067.0	27.067	0.660
11/30/16	42	2.1	0.002	27,069.1	27.069	0.645
12/01/16	43	6.7	0.007	27,075.8	27.076	0.630
12/02/16	44	0.0	0.000	27,075.8	27.076	0.615
12/03/16	-	-	-	-	-	-

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m3)	Average Daily Volume Pumped (m^3)
12/04/16	-	-	-	-	-	-
12/05/16	45	0.0	0.000	27,075.8	27.076	0.602
12/06/16	46	17.3	0.017	27,093.1	27.093	0.589
12/07/16	47	0.0	0.000	27,093.1	27.093	0.576
12/08/16	48	0.0	0.000	27,093.1	27.093	0.564
12/09/16	49	54.9	0.055	27,148.0	27.148	0.554
12/10/16	-	-	-	-	-	-
12/11/16	-	-	-	-	-	-
12/12/16	50	12,745.0	12.745	39,893.0	39.893	0.798
12/13/16	51	10,918.2	10.918	50,811.2	50.811	0.996
12/14/16	52	23.7	0.024	50,834.9	50.835	0.978
12/15/16	53	0.0	0.000	50,834.9	50.835	0.959
12/16/16	54	334.8	0.335	51,169.7	51.170	0.948
12/17/16	-	-	-	-	-	-
12/18/16	-	-	-	-	-	-
12/19/16	55	6.6	0.007	51,176.3	51.176	0.930
12/20/16	56	0.0	0.000	51,176.3	51.176	0.914
12/21/16	57	0.0	0.000	51,176.3	51.176	0.898
12/22/16	58	11.4	0.011	51,187.7	51.188	0.883
12/23/16	59	0.0	0.000	51,187.7	51.188	0.868
12/24/16	-	-	-	-	-	-
12/25/16	-	-	-	-	-	-
12/26/16	60	0.0	0.000	51,187.7	51.188	0.853
12/27/16	61	0.0	0.000	51,187.7	51.188	0.839
12/28/16	62	0.0	0.000	51,187.7	51.188	0.826
12/29/16	63	6.0	0.006	51,193.7	51.194	0.813
12/30/16	64	0.0	0.000	51,193.7	51.194	0.800
12/31/16	-	-	-	-	-	-
	Total Available Pumping Days	**Total Days Pumping**	**Percent of Days with pumping**	**Total Volume Pumped (L)**	**Total Volume Pumped (m3)**	**Average Daily Volume Pumped (m^3)**
2016 TOTALS	**64**	**35**	**54.69%**	**51,193.7**	**51.194**	**0.800**

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
01/01/17	--	--	--	--	--	--
01/02/17	1	0	0.000	0	0.000	0.000
01/03/17	2	0	0.000	0	0.000	0.000
01/04/17	3	0	0.000	0	0.000	0.000
01/05/17	4	0	0.000	0	0.000	0.000
01/06/17	5	0	0.000	0	0.000	0.000
01/07/17	--	--	--	--	--	--
01/08/17	--	--	--	--	--	--
01/09/17	6	0	0.000	0	0.000	0.000
01/10/17	7	0	0.000	0	0.000	0.000
01/11/17	8	0	0.000	0	0.000	0.000
01/12/17	9	0	0.000	0	0.000	0.000
01/13/17	10	0	0.000	0	0.000	0.000
01/14/17	--	--	--	--	--	--
01/15/17	--	--	--	--	--	--
01/16/17	11	0	0.000	0	0.000	0.000
01/17/17	12	0	0.000	0	0.000	0.000
01/18/17	13	0	0.000	0	0.000	0.000
01/19/17	14	0	0.000	0	0.000	0.000
01/20/17	15	0	0.000	0	0.000	0.000
01/21/17	--	--	--	--	--	--
01/22/17	--	--	--	--	--	--
01/23/17	16	0	0.000	0	0.000	0.000
01/24/17	17	0	0.000	0	0.000	0.000
01/25/17	18	0	0.000	0	0.000	0.000
01/26/17	19	0	0.000	0	0.000	0.000
01/27/17	20	0	0.000	0	0.000	0.000
01/28/17	--	--	--	--	--	--
01/29/17	--	--	--	--	--	--
01/30/17	21	0	0.000	0	0.000	0.000
01/31/17	22	0.2	0.000	0.2	0.000	0.000

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
02/01/17	23	0	0.000	0.2	0.000	0.000
02/02/17	24	0	0.000	0.2	0.000	0.000
02/03/17	25	0	0.000	0.2	0.000	0.000
02/04/17	--	--	--	--	--	--
02/05/17	--	--	--	--	--	--
02/06/17	26	0.7	0.001	0.9	0.001	0.000
02/07/17	27	0	0.000	0.9	0.001	0.000
02/08/17	28	0	0.000	0.9	0.001	0.000
02/09/17	29	0	0.000	0.9	0.001	0.000
02/10/17	30	0	0.000	0.9	0.001	0.000
02/11/17	--	--	--	--	--	--
02/12/17	--	--	--	--	--	--
02/13/17	31	0	0.000	0.9	0.001	0.000
02/14/17	32	0	0.000	0.9	0.001	0.000
02/15/17	33	0	0.000	0.9	0.001	0.000
02/16/17	34	0	0.000	0.9	0.001	0.000
02/17/17	35	0	0.000	0.9	0.001	0.000
02/18/17	--	--	--	--	--	--
02/19/17	--	--	--	--	--	--
02/20/17	36	0	0.000	0.9	0.001	0.000
02/21/17	37	0	0.000	0.9	0.001	0.000
02/22/17	38	0	0.000	0.9	0.001	0.000
02/23/17	39	0	0.000	0.9	0.001	0.000
02/24/17	40	0	0.000	0.9	0.001	0.000
02/25/17	--	--	--	--	--	--
02/26/17	--	--	--	--	--	--
02/27/17	41	0	0.000	0.9	0.001	0.000
02/28/17	42	0	0.000	0.9	0.001	0.000
03/01/17	43	0	0.000	0.9	0.001	0.000
03/02/17	44	0	0.000	0.9	0.001	0.000
03/03/17	45	0	0.000	0.9	0.001	0.000

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
03/04/17	--	--	--	--	--	--
03/05/17	--	--	--	--	--	--
03/06/17	46	0	0.000	0.9	0.001	0.000
03/07/17	47	0	0.000	0.9	0.001	0.000
03/08/17	48	0	0.000	0.9	0.001	0.000
03/09/17	49	0	0.000	0.9	0.001	0.000
03/10/17	50	0	0.000	0.9	0.001	0.000
03/11/17	--	--	--	--	--	--
03/12/17	--	--	--	--	--	--
03/13/17	51	0	0.000	0.9	0.001	0.000
03/14/17	52	0	0.000	0.9	0.001	0.000
03/15/17	53	0	0.000	0.9	0.001	0.000
03/16/17	54	0	0.000	0.9	0.001	0.000
03/17/17	55	0	0.000	0.9	0.001	0.000
03/18/17	--	--	--	--	--	--
03/19/17	--	--	--	--	--	--
03/20/17	56	0	0.000	0.9	0.001	0.000
03/21/17	57	0	0.000	0.9	0.001	0.000
03/22/17	58	0	0.000	0.9	0.001	0.000
03/23/17	59	0	0.000	0.9	0.001	0.000
03/24/17	60	0	0.000	0.9	0.001	0.000
03/25/17	--	--	--	--	--	--
03/26/17	--	--	--	--	--	--
03/27/17	61	0	0.000	0.9	0.001	0.000
03/28/17	62	0	0.000	0.9	0.001	0.000
03/29/17	63	0	0.000	0.9	0.001	0.000
03/30/17	64	0	0.000	0.9	0.001	0.000
03/31/17	65	0	0.000	0.9	0.001	0.000
04/01/17	--	--	--	--	--	--
04/02/17	--	--	--	--	--	--
04/03/17	66	0	0.000	0.9	0.001	0.000

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
04/04/17	67	0	0.000	0.9	0.001	0.000
04/05/17	68	0	0.000	0.9	0.001	0.000
04/06/17	69	0	0.000	0.9	0.001	0.000
04/07/17	70	0	0.000	0.9	0.001	0.000
04/08/17	--	--	--	--	--	--
04/09/17	--	--	--	--	--	--
04/10/17	71	0	0.000	0.9	0.001	0.000
04/11/17	72	0	0.000	0.9	0.001	0.000
04/12/17	73	0	0.000	0.9	0.001	0.000
04/13/17	74	0	0.000	0.9	0.001	0.000
04/14/17	75	0	0.000	0.9	0.001	0.000
04/15/17	--	--	--	--	--	--
04/16/17	--	--	--	--	--	--
04/17/17	76	0	0.000	0.9	0.001	0.000
04/18/17	77	0	0.000	0.9	0.001	0.000
04/19/17	78	0	0.000	0.9	0.001	0.000
04/20/17	79	0	0.000	0.9	0.001	0.000
04/21/17	80	0	0.000	0.9	0.001	0.000
04/22/17	--	--	--	--	--	--
04/23/17	--	--	--	--	--	--
04/24/17	81	0	0.000	0.9	0.001	0.000
04/25/17	82	0	0.000	0.9	0.001	0.000
04/26/17	83	0	0.000	0.9	0.001	0.000
04/27/17	84	0	0.000	0.9	0.001	0.000
04/28/17	85	0	0.000	0.9	0.001	0.000
04/29/17	--	--	--	--	--	--
04/30/17	--	--	--	--	--	--
05/01/17	86	0.3	0.000	1.2	0.001	0.000
05/02/17	87	0.2	0.000	1.4	0.001	0.000
05/03/17	88	0.1	0.000	1.5	0.002	0.000
05/04/17	89	0	0.000	1.5	0.002	0.000

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
05/05/17	90	0	0.000	1.5	0.002	0.000
05/06/17	--	--	--	--	--	--
05/07/17	--	--	--	--	--	--
05/08/17	91	0	0.000	1.5	0.002	0.000
05/09/17	92	0	0.000	1.5	0.002	0.000
05/10/17	93	0	0.000	1.5	0.002	0.000
05/11/17	94	0	0.000	1.5	0.002	0.000
05/12/17	95	0	0.000	1.5	0.002	0.000
05/13/17	--	--	--	--	--	--
05/14/17	--	--	--	--	--	--
05/15/17	96	0	0.000	1.5	0.002	0.000
05/16/17	97	0	0.000	1.5	0.002	0.000
05/17/17	98	0	0.000	1.5	0.002	0.000
05/18/17	99	0	0.000	1.5	0.002	0.000
05/19/17	100	0	0.000	1.5	0.002	0.000
05/20/17	--	--	--	--	--	--
05/21/17	--	--	--	--	--	--
05/22/17	101	0	0.000	1.5	0.002	0.000
05/23/17	102	0	0.000	1.5	0.002	0.000
05/24/17	103	0	0.000	1.5	0.002	0.000
05/25/17	104	0	0.000	1.5	0.002	0.000
05/26/17	105	0	0.000	1.5	0.002	0.000
05/27/17	--	--	--	--	--	--
05/28/17	--	--	--	--	--	--
05/29/17	106	0	0.000	1.5	0.002	0.000
05/30/17	107	0	0.000	1.5	0.002	0.000
05/31/17	108	0	0.000	1.5	0.002	0.000
06/01/17	109	0	0.000	1.5	0.002	0.000
06/02/17	110	0	0.000	1.5	0.002	0.000
06/03/17	--	--	--	--	--	--
06/04/17	--	--	--	--	--	--

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
06/05/17	111	371	0.371	372.5	0.373	0.003
06/06/17	112	146.7	0.147	519.2	0.519	0.005
06/07/17	113	21897.3	21.897	22416.5	22.417	0.198
06/08/17	114	0	0.000	22416.5	22.417	0.197
06/09/17	115	0	0.000	22416.5	22.417	0.195
06/10/17	--	--	--	--	--	--
06/11/17	--	--	--	--	--	--
06/12/17	116	0	0.000	22416.5	22.417	0.193
06/13/17	117	0	0.000	22416.5	22.417	0.192
06/14/17	118	0	0.000	22416.5	22.417	0.190
06/15/17	119	0	0.000	22416.5	22.417	0.188
06/16/17	120	173.5	0.174	22590	22.590	0.188
06/17/17	--	--	--	--	--	--
06/18/17	--	--	--	--	--	--
06/19/17	121	0	0.000	22590	22.590	0.187
06/20/17	122	1378.5	1.379	23968.5	23.969	0.196
06/21/17	123	37.9	0.038	24006.4	24.006	0.195
06/22/17	124	10	0.010	24016.4	24.016	0.194
06/23/17	125	0	0.000	24016.4	24.016	0.192
06/24/17	--	--	--	--	--	--
06/25/17	--	--	--	--	--	--
06/26/17	126	0	0.000	24016.4	24.016	0.191
06/27/17	127	6645.2	6.645	30661.6	30.662	0.241
06/28/17	128	0	0.000	30661.6	30.662	0.240
06/29/17	129	678.7	0.679	31340.3	31.340	0.243
06/30/17	130	2422	2.422	33762.3	33.762	0.260
07/01/17	--	--	--	--	--	--
07/02/17	--	--	--	--	--	--
07/03/17	131	38836.5	38.837	72598.8	72.599	0.554
07/04/17	132	18306.4	18.306	90905.2	90.905	0.689
07/05/17	133	8177.7	8.178	99082.9	99.083	0.745

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
07/06/17	134	0	0.000	99082.9	99.083	0.739
07/07/17	135	0	0.000	99082.9	99.083	0.734
07/08/17	--	--	--	--	--	--
07/09/17	--	--	--	--	--	--
07/10/17	136	4435.4	4.435	103518.3	103.518	0.761
07/11/17	137	0	0.000	103518.3	103.518	0.756
07/12/17	138	0	0.000	103518.3	103.518	0.750
07/13/17	139	216	0.216	103734.3	103.734	0.746
07/14/17	140	23350	23.350	127084.3	127.084	0.908
07/15/17	--	--	--	--	--	--
07/16/17	--	--	--	--	--	--
07/17/17	141	22852	22.852	149936.3	149.936	1.063
07/18/17	142	34603.4	34.603	184539.7	184.540	1.300
07/19/17	143	0	0.000	184539.7	184.540	1.290
07/20/17	144	0	0.000	184539.7	184.540	1.282
07/21/17	145	0	0.000	184539.7	184.540	1.273
07/22/17	--	--	--	--	--	--
07/23/17	--	--	--	--	--	--
07/24/17	146	0	0.000	184539.7	184.540	1.264
07/25/17	147	0	0.000	184539.7	184.540	1.255
07/26/17	148	0	0.000	184539.7	184.540	1.247
07/27/17	149	0	0.000	184539.7	184.540	1.239
07/28/17	150	157.6	0.158	184697.3	184.697	1.231
07/29/17	--	--	--	--	--	--
07/30/17	--	--	--	--	--	--
07/31/17	151	6161.6	6.162	190858.9	190.859	1.264
08/01/17	152	9299.6	9.300	200158.5	200.159	1.317
08/02/17	153	544.4	0.544	200702.9	200.703	1.312
08/03/17	154	8811.8	8.812	209514.7	209.515	1.360
08/04/17	155	6375.6	6.376	215890.3	215.890	1.393
08/05/17	--	--	--	--	--	--

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
08/06/17	--	--	--	--	--	--
08/07/17	156	13876	13.876	229766.3	229.766	1.473
08/08/17	157	8	0.008	229774.3	229.774	1.464
08/09/17	158	0	0.000	229774.3	229.774	1.454
08/10/17	159	0	0.000	229774.3	229.774	1.445
08/11/17	160	1563	1.563	231337.3	231.337	1.446
08/12/17	--	--	--	--	--	--
08/13/17	--	--	--	--	--	--
08/14/17	161	3869.2	3.869	235206.5	235.207	1.461
08/15/17	162	962.6	0.963	236169.1	236.169	1.458
08/16/17	163	0	0.000	236169.1	236.169	1.449
08/17/17	164	39.9	0.040	236209	236.209	1.440
08/18/17	165	876.6	0.877	237085.6	237.086	1.437
08/19/17	--	--	--	--	--	--
08/20/17	--	--	--	--	--	--
08/21/17	166	4480.7	4.481	241566.3	241.566	1.455
08/22/17	167	0.9	0.001	241567.2	241.567	1.447
08/23/17	168	0	0.000	241567.2	241.567	1.438
08/24/17	169	0	0.000	241567.2	241.567	1.429
08/25/17	170	1352.1	1.352	242919.3	242.919	1.429
08/26/17	--	--	--	--	--	--
08/27/17	--	--	--	--	--	--
08/28/17	171	0.4	0.000	242919.7	242.920	1.421
08/29/17	172	3123.3	3.123	246043	246.043	1.430
08/30/17	173	0	0.000	246043	246.043	1.422
08/31/17	174	1380	1.380	247423	247.423	1.422
09/01/17	175	0	0.000	247423	247.423	1.414
09/02/17	--	--	--	--	--	--
09/03/17	--	--	--	--	--	--
09/04/17	176	1704.3	1.704	249127.3	249.127	1.415
09/05/17	177	0	0.000	249127.3	249.127	1.407

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
09/06/17	178	0	0.000	249127.3	249.127	1.400
09/07/17	179	37007	37.007	286134.3	286.134	1.599
09/08/17	180	8.7	0.009	286143	286.143	1.590
09/09/17	--	--	--	--	--	--
09/10/17	--	--	--	--	--	--
09/11/17	--	--	--	--	--	--
09/12/17	181	4.9	0.005	286147.9	286.148	1.581
09/13/17	182	0	0.000	286147.9	286.148	1.572
09/14/17	183	0	0.000	286147.9	286.148	1.564
09/15/17	184	0	0.000	286147.9	286.148	1.555
09/16/17	--	--	--	--	--	--
09/17/17	--	--	--	--	--	--
09/18/17	185	0	0.000	286147.9	286.148	1.547
09/19/17	186	0	0.000	286147.9	286.148	1.538
09/20/17	187	0	0.000	286147.9	286.148	1.530
09/21/17	188	0	0.000	286147.9	286.148	1.522
09/22/17	189	0	0.000	286147.9	286.148	1.514
09/23/17	--	--	--	--	--	--
09/24/17	--	--	--	--	--	--
09/25/17	190	0	0.000	286147.9	286.148	1.506
09/26/17	191	0	0.000	286147.9	286.148	1.498
09/27/17	192	14093	14.093	300240.9	300.241	1.564
09/28/17	193	0	0.000	300240.9	300.241	1.556
09/29/17	194	5151.8	5.152	305392.7	305.393	1.574
09/30/17	--	--	--	--	--	--
10/01/17	--	--	--	--	--	--
10/02/17	195	1459.6	1.460	306852.3	306.852	1.574
10/03/17	196	0	0.000	306852.3	306.852	1.566
10/04/17	197	0.9	0.001	306853.2	306.853	1.558
10/05/17	198	0	0.000	306853.2	306.853	1.550
10/06/17	199	2543.1	2.543	309396.3	309.396	1.555

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
10/07/17	--	--	--	--	--	--
10/08/17	--	--	--	--	--	--
10/09/17	200	0	0.000	309396.3	309.396	1.547
10/10/17	201	0.2	0.000	309396.5	309.397	1.539
10/11/17	202	0	0.000	309396.5	309.397	1.532
10/12/17	203	0	0.000	309396.5	309.397	1.524
10/13/17	204	0	0.000	309396.5	309.397	1.517
10/14/17	--	--	--	--	--	--
10/15/17	--	--	--	--	--	--
10/16/17	205	0	0.000	309396.5	309.397	1.509
10/17/17	206	0	0.000	309396.5	309.397	1.502
10/18/17	207	513.5	0.514	309910	309.910	1.497
10/19/17	208	18.8	0.019	309928.8	309.929	1.490
10/20/17	209	0	0.000	309928.8	309.929	1.483
10/21/17	--	--	--	--	--	--
10/22/17	--	--	--	--	--	--
10/23/17	210	0	0.000	309928.8	309.929	1.476
10/24/17	211	0	0.000	309928.8	309.929	1.469
10/25/17	212	0	0.000	309928.8	309.929	1.462
10/26/17	213	0	0.000	309928.8	309.929	1.455
10/27/17	214	0	0.000	309928.8	309.929	1.448
10/28/17	--	--	--	--	--	--
10/29/17	--	--	--	--	--	--
10/30/17	215	0	0.000	309928.8	309.929	1.442
10/31/17	216	29.3	0.029	309958.1	309.958	1.435
11/01/17	217	12.2	0.012	309970.3	309.970	1.428
11/02/17	218	0	0.000	309970.3	309.970	1.422
11/03/17	219	0.6	0.001	309970.9	309.971	1.415
11/04/17	--	--	--	--	--	--
11/05/17	--	--	--	--	--	--
11/06/17	220	1.4	0.001	309972.3	309.972	1.409

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
11/07/17	221	0	0.000	309972.3	309.972	1.403
11/08/17	222	20.5	0.021	309992.8	309.993	1.396
11/09/17	223	0	0.000	309992.8	309.993	1.390
11/10/17	224	0	0.000	309992.8	309.993	1.384
11/11/17	--	--	--	--	--	--
11/12/17	--	--	--	--	--	--
11/13/17	225	0	0.000	309992.8	309.993	1.378
11/14/17	226	0	0.000	309992.8	309.993	1.372
11/15/17	227	0	0.000	309992.8	309.993	1.366
11/16/17	228	0	0.000	309992.8	309.993	1.360
11/17/17	229	0	0.000	309992.8	309.993	1.354
11/18/17	--	--	--	--	--	--
11/19/17	--	--	--	--	--	--
11/20/17	230	554.9	0.555	310547.7	310.548	1.350
11/21/17	231	0.1	0.000	310547.8	310.548	1.344
11/22/17	232	0	0.000	310547.8	310.548	1.339
11/23/17	233	0	0.000	310547.8	310.548	1.333
11/24/17	234	0	0.000	310547.8	310.548	1.327
11/25/17	--	--	--	--	--	--
11/26/17	--	--	--	--	--	--
11/27/17	235	23.5	0.024	310571.3	310.571	1.322
11/28/17	236	0	0.000	310571.3	310.571	1.316
11/29/17	237	0.3	0.000	310571.6	310.572	1.310
11/30/17	238	0	0.000	310571.6	310.572	1.305
12/01/17	239	37.7	0.038	310609.3	310.609	1.300
12/02/17	--	--	--	--	--	--
12/03/17	--	--	--	--	--	--
12/04/17	240	32.7	0.033	310642	310.642	1.294
12/05/17	241	21.4	0.021	310663.4	310.663	1.289
12/06/17	242	0	0.000	310663.4	310.663	1.284
12/07/17	243	0	0.000	310663.4	310.663	1.278

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
12/08/17	244	0	0.000	310663.4	310.663	1.273
12/09/17	--	--	--	--	--	--
12/10/17	--	--	--	--	--	--
12/11/17	245	0	0.000	310663.4	310.663	1.268
12/12/17	246	0	0.000	310663.4	310.663	1.263
12/13/17	247	0	0.000	310663.4	310.663	1.258
12/14/17	248	0	0.000	310663.4	310.663	1.253
12/15/17	249	0	0.000	310663.4	310.663	1.248
12/16/17	--	--	--	--	--	--
12/17/17	--	--	--	--	--	--
12/18/17	250	0	0.000	310663.4	310.663	1.243
12/19/17	251	0.1	0.000	310663.5	310.664	1.238
12/20/17	252	0	0.000	310663.5	310.664	1.233
12/21/17	253	0	0.000	310663.5	310.664	1.228
12/22/17	254	0	0.000	310663.5	310.664	1.223
12/23/17	--	--	--	--	--	--
12/24/17	--	--	--	--	--	--
12/25/17	--	--	--	--	--	--
12/26/17	255	0	0.000	310663.5	310.664	1.218
12/27/17	256	0	0.000	310663.5	310.664	1.214
12/28/17	257	0	0.000	310663.5	310.664	1.209
12/29/17	258	0	0.000	310663.5	310.664	1.204
12/30/17	--	--	--	--	--	--
12/31/17	--	--	--	--	--	--

	Total Available Pumping Days	Total Days Pumping	Percent of Days with pumping	Total Volume Pumped (m^3)	Average Daily Volume Pumped over Total Available Days (m^3)	Average Daily Volume Pumped over Total Days Pumping (m^3)
2017 TOTALS	**258**	**67**	**25.97%**	**310.664**	**1.204**	**4.637**

EW107-15 Daily Pumping Log
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Period Start	Period End	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
		--	--	--
1-Jan-18	1-Jun-18	189.6	0.1896	0.00126
1-Jun-18	2-Oct-18	Scada system error. Unknown volume pumped.		
2-Oct-18	31-Oct-18	28,000	28.000	0.96552
1-Nov-18	30-Nov-18	34,000	34.000	1.17241
1-Dec-18	31-Dec-18	0	0.000	0.00000

	Total Volume Pumped (m^3)	Average Daily Volume Pumped (m^3)
2018 TOTALS	**62.190 a**	**0.535 a**

Notes

a- total volume and average daily volume based on recorded periods only

Appendices

Appendix A
Environmental Compliance Approval
(No. 7251 8GKRPD and No. 2844 9YNGZC)

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2844-9YNGZC
Issue Date: February 1, 2017

Orgaworld Canada Ltd.
150 Kent Street
London, Ontario
N6A 1L3

Site Location: Source Separated Organics Processing Facility
5123 Hawthorne Road South
Part of West Half of Lot 27, Concession 6
City of Ottawa
K1G 3Y3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters

below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	**Elevation** (metre)	**Storage Volume** (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

    - inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

    - overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide

over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water

002677

and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

all in accordance with supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Application" means the application for an environmental compliance approval submitted to the Ministry for approval by or on behalf of the Owner and dated March 11, 2015;

"Approval" means this entire document and any schedules attached to it, and the Application;

"BOD_5"(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"$CBOD_5$"means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"COD" means Chemical Oxygen Demand;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"DOC" means Dissolved Organic Carbon;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the *Environmental Protection Act, R.S.O. 1990, c.E.19* , as amended;

"Leachate Contaminated Sewage"means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Orgaworld Canada Ltd., and its successors and assignees;

"OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

"Substantial Completion" has the same meaning as "substantial performance" in the *Construction Lien Act* ; and

"Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these terms and conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with this Approval.

(3) Where there is a conflict between a provision of this environmental compliance approval and any document submitted by the Owner, the conditions in this environmental compliance approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Owner, the Application shall take precedence unless it is clear that the purpose of the document was to amend the Application

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The terms and conditions of this Approval are severable. If any term and condition of this environmental compliance approval, or the application of any requirement of this environmental compliance approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation

to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of address of Owner or operating authority;

(b) change of Owner or operating authority or both, including address of new Owner or operating authority, or both;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* ; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the "Initial Return" or "Notice of Change" filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this environmental compliance approval.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the Substantial Completion of the Works,a set of as-built drawings showing the Works as "constructed" shall be completed and submitted by the Owner to the District Manager.These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works or at operational office of the Owner for the operational life of the Works.

(2) The Owner shall inform in writing to the District Manager when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The Owner shall inform the District Manager of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after **two (2) years** of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

5. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the Owner shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 4.(2). The Owner shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the Owner shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 5.(2) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the Owner shall ensure that the contents of the SWM Pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner.

(8) The Owner shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to.

(9) Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

(10) The Owner shall notify the District Manager orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(13) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or Owner's operational headquarters for inspection by the Ministry.The logbook shall include the following:

(a) the name of the Works;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The Owner shall not store any end-product, including leaves and yard waste outdoors until the Owner prepares a Conditions Assessment and implementation plan approved by the District Manager. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

PART IV - GENERAL

7. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall

include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the Owner.

9. GROUNDWATER MONITORING

Groundwater Monitoring Program

(1) The Owner shall, upon the issuance of this Approval, carry out the following groundwater monitoring program. Samples shall be collected from the specified groundwater monitoring wells at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Groundwater Monitoring

Unconfined Shallow Aquifer

MW1-08*, MW2-08*, MW3-08*, MW4-09*, & MW103-09*.

MW5-09**, MW101-13**, MW102-09**, MW104-13**, MW105-13**, MW106-15** & EW107-15**.

Deep Bedrock Aquifer

TW-4*, TW-7* & TW-8*.

Frequency	*Semi Annual (i.e. two times in a year) ** Tri-Annual (i.e. three time in a year)
Sample Type	Grab
Parameters	Alkalinity, Total Ammonia Nitrogen, Dissolved Organic Carbon, *E-coli* , Iron, Manganese, Nitrate-N, and Total Phosphorous.

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after three (3) years of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall compare analytical monitoring results obtained pursuant to Subsection (1) Table 3 - Groundwater Monitoring with the trigger level concentrations for the trigger parameter listed in Tables 4 and 5.

Table 4
Trigger Level Concentrations
Unconfined Shallow Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	633
Total Ammonia Nitrogen	4.0
Dissolved Organic Carbon	34.6
E-coli	25.6 CFU/100 mL
Iron	48.3
Manganese	17.1
Nitrate-N	1.3
Total Phosphorous	7.2

Table 5
Trigger Parameters
Deep Bedrock Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	996
Total Ammonia Nitrogen	0.2
Dissolved Organic Carbon	18.4
E-coli	5.0 CFU/100 mL
Iron	10.6
Manganese	2.1
Nitrate-N	0.5
Total Phosphorous	0.5

(5) The trigger level program shall be implemented using the following three (3) Tiers to verify the results and direct potential contingency implementation:

Tier I (Routine Monitoring Program)

Tier I Routine Monitoring Program (RMP) involves the sampling of all on-site groundwater monitoring wells at the frequency specified in Table 3. All groundwater monitoring activities completed at the site will be considered Tier I RMP unless two (2) or more trigger parameters exceed there respective trigger levels in a simple sample.

Tier II (Confirmation Monitoring Program)

If during a single monitoring event, two (2) or more trigger parameters exceed the established (see Tables 4 and 5) Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring Program (CMP) shall be implemented.

The Tier II CMP consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next schedule monitoring event in order to confirm the Tier I exceedance of the two (2) or more trigger parameters.

If the concentrations reported in the duplicate sample return to below their respective trigger levels, then Tier I RMP will resume.

If the Tier I exceedance is confirmed, then the next step shall be a re-evaluation of the degree, nature, and potential source(s) of the trigger level impact(s) identified in Tier I including the implication of the exceedance in terms of the potential for impacts to down-gradient off-site water users.

If the Tier II CMP and the subsequent evaluation indicate that the facility operations are having a detrimental effect on water quality migrating off-site, then Tier III Contingency Measures and Compliance Monitoring Program shall be implemented.

Tier III (Contingency Measures and Compliance Monitoring Program)

Tier III Contingency Measures and Compliance Monitoring Program (CMCMP) involves assessment and implementation of contingency measures in the event of imminent off-site groundwater quality impairment.

Contingency measures to be evaluated should include extraction of impacted groundwater and/or surface water for on-site treatment or off-site disposal, or acquisition of groundwater rights and registration of a contaminated attenuation zone (CAZ) on title of adjacent lands.

Tier III CMCMP should also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented.

The Tier III CMCMP details should be determined in conjunction with the development and implementation of preferred contingency measure(s).

The compliance monitoring parameters, locations, and monitoring frequency should be determined at the time of implementation of contingency measures.

Lastly, appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed.

(6) The Owner shall notify the District Manager orally, as soon as possible, and in writing within

seven (7) days in the event a trigger exceedance occurs.

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the District Manager requires from time to time.

SCHEDULE 'A'

1. Environmental Compliance Approval Application for Industrial Sewage Works submitted by Ben Constable, Conestoga-Rovers & Associates (CRA), and signed by Mike Rooke, Compliance Officer, Orgaworld Canada Ltd., dated March 11, 2015, and all supporting documentation and information.

2. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

3. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

4. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

5. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

6. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

7. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

8. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

9. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

10. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

11. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla,

P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

12. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

13. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

14. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

15. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

16. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.(6) is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works"as constructed" are maintained for future references.

4. Conditions 4 and 8 are included to enable the Owner to evaluate and demonstrate the performance of the Works,on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

5. Conditions 5, 6 and 7 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry.

6. Condition 9 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7251-8GKRPD issued on May 30, 2011.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2017

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AA/
c: District Manager, MOECC Ottawa District Office
Ben Constable, Conestoga-Rovers & Associates (CRA)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part 1 Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

CONTENT COPY OF ORIGINAL

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate.*

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner* shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* prepared in accordance with Condition (8) is submitted to the *District Manager* for comments and concurrance;

(2) Upon commencement of operation of the *Works*, the *Owner* shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

(4) The *Owner* shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner*shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner*shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works*to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

CONTENT COPY OF ORIGINAL

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works*, the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,*the *Owner*shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

CONTENT COPY OF ORIGINAL

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit:

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works*, the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works,* on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

CONTENT COPY OF ORIGINAL

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Appendix B
Background Correspondence

Appendix B.1
Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Ministry of the Environment
and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action
en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

January 3, 2017

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

MINISTRY OF THE ENVIRONMENT
JAN 11 2017
OTTAWA

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
2015 Groundwater and Surface Water Monitoring Report
Trigger Level Program
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the above noted report signed by Conestoga Rovers & Associates March 31, 2016 describing groundwater impacts related to the Orgaworld Organics Facility in Ottawa. The report also provides the Trigger Level Program (TLP) to protect groundwater from the impact of this new facility.

The consultant provides an assessment of the physical hydrogeology of the site. A shallow aquifer exists at the bedrock overburden interface. Water level monitoring has confirmed the inferred groundwater flow direction in the upper unconfined aquifer is to the east with some level of limited discharge to ditches located along the north site boundary. The Surface Water Unit should review this report as groundwater that does not meet Provincial Water Quality Objectives for ammonia may at times discharge to these ditches.

A deep aquifer exists in sandstone. Based on in-situ hydraulic testing the consultant has deemed there is no hydraulic connection between the deep aquifer and the unconfined shallow aquifer. Inferred groundwater flow in the deep aquifer is to the west. Contaminants of concerns identified are ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater quality mapping of ammonia, DOC, iron and manganese confirm that a plume extends in the shallow aquifer northeastward, originating in and around the northeast corner of the Organic Composting Facility. Some impacts have been detected in the deep aquifer.

A TLP has been proposed recognizing that past site activities and up gradient water quality issues exist and that an alternative method has been developed to assess the net impact of this new facility, bearing in mind that groundwater impairment must not occur. I have reviewed the proposed TLP and find it is acceptable to me.

I find the monitoring program rationalization acceptable to me.

In general, I agree with the conclusion and recommendations made by the consultant. Current remediation efforts must continue to improve groundwater quality at all down gradient monitoring wells relative to facility start up and any additional work as per the TLP. If a Tier III trigger is reached I should be consulted.

Robert W. Holland, P.Geo.
RWH/dv

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

Appendix B.2
Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

ISO 9001

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

Location	Field Test Parameters			Laboratory Test Parameters							Collection Method
	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3,4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4[8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

002722

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3/4]	*Bacteriological Components* [5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix B.3
Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

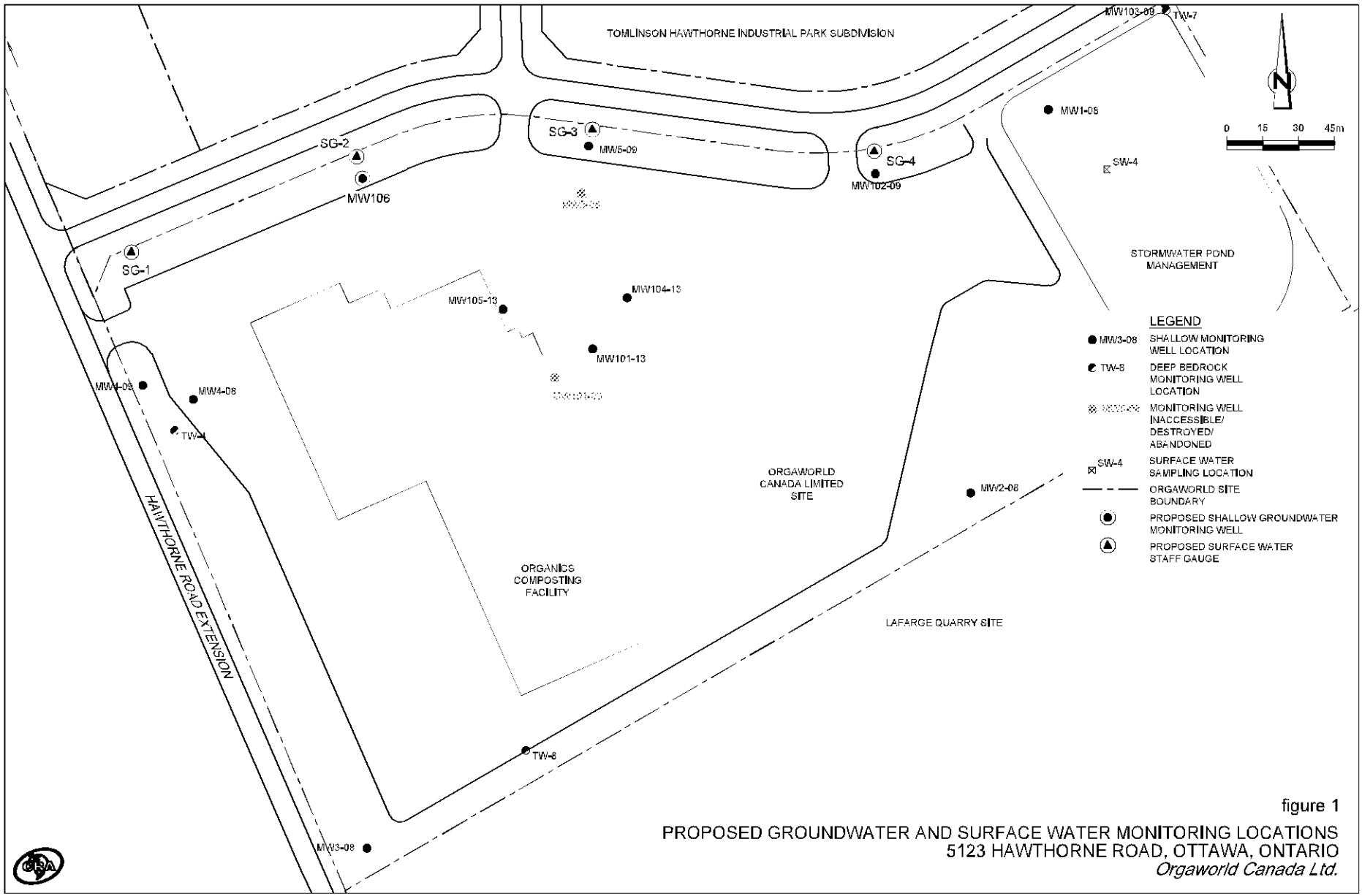


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

002730

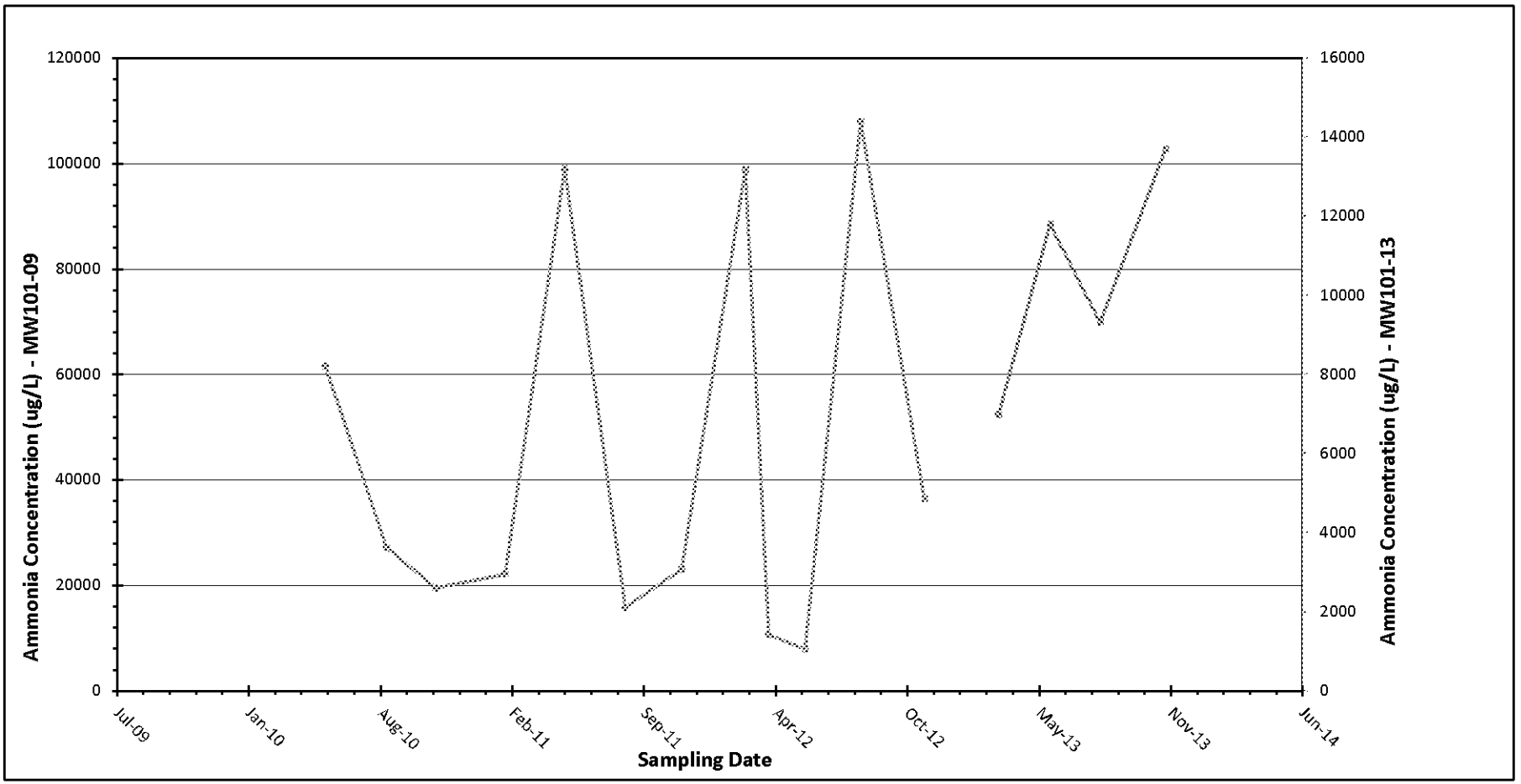


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

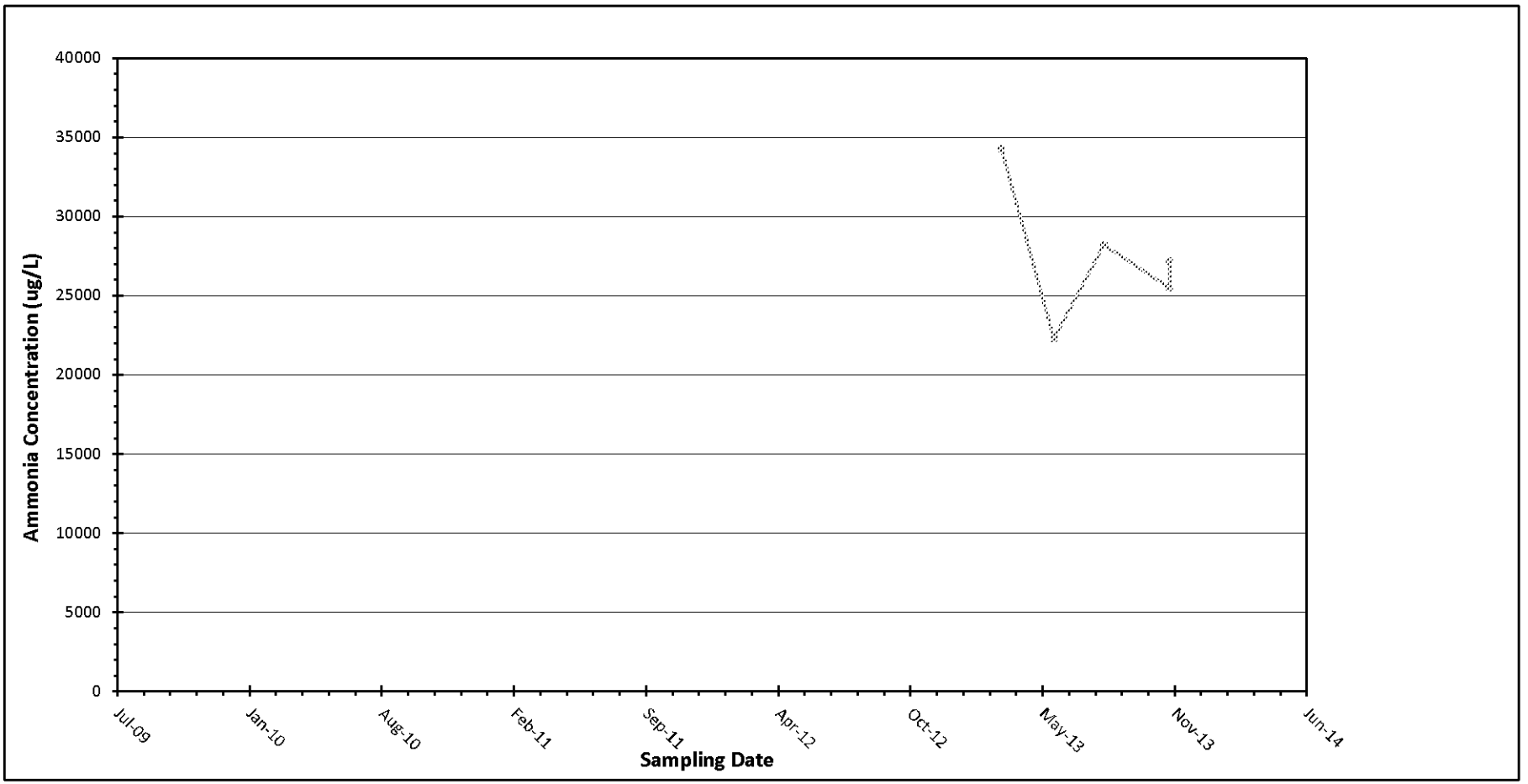


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

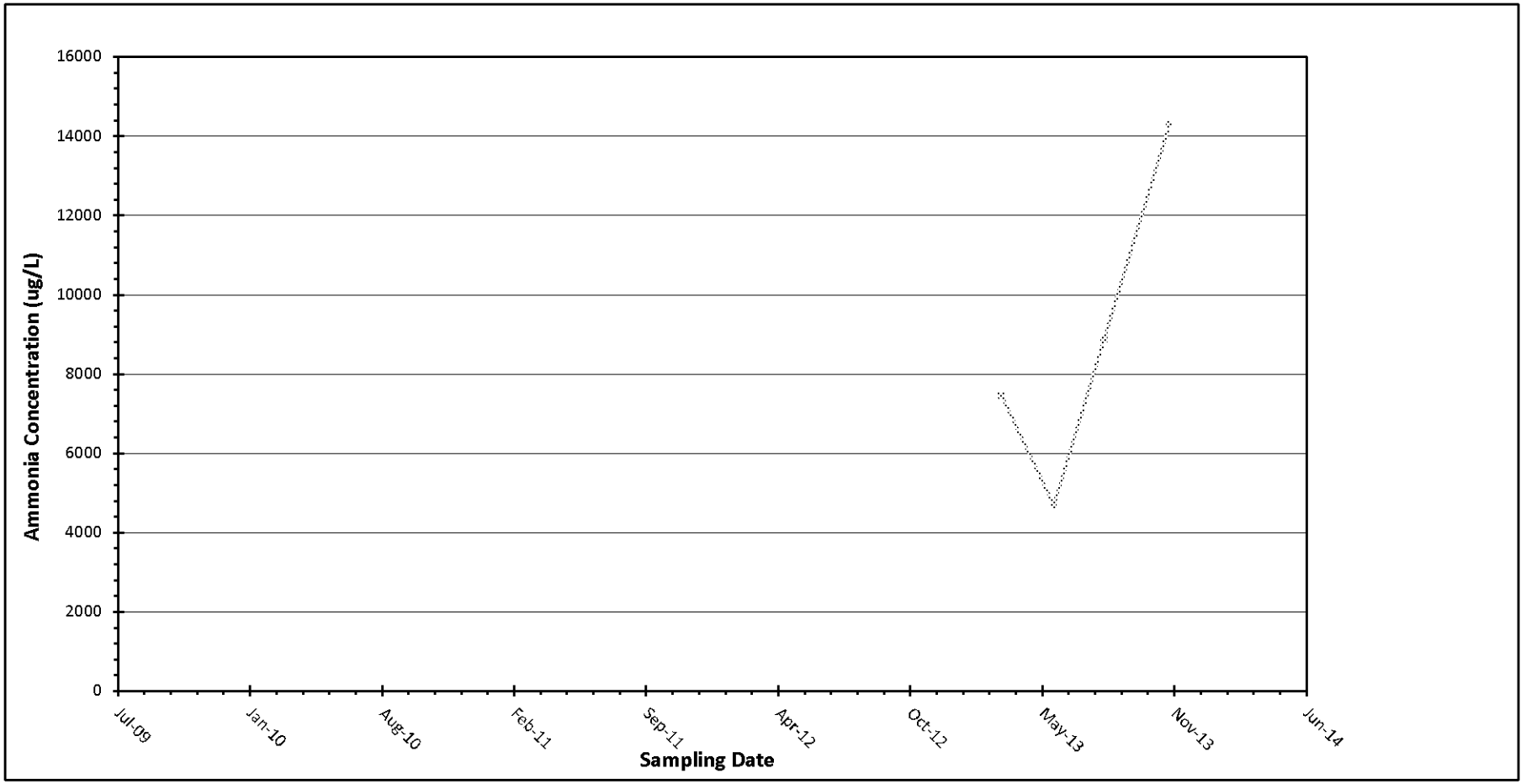


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

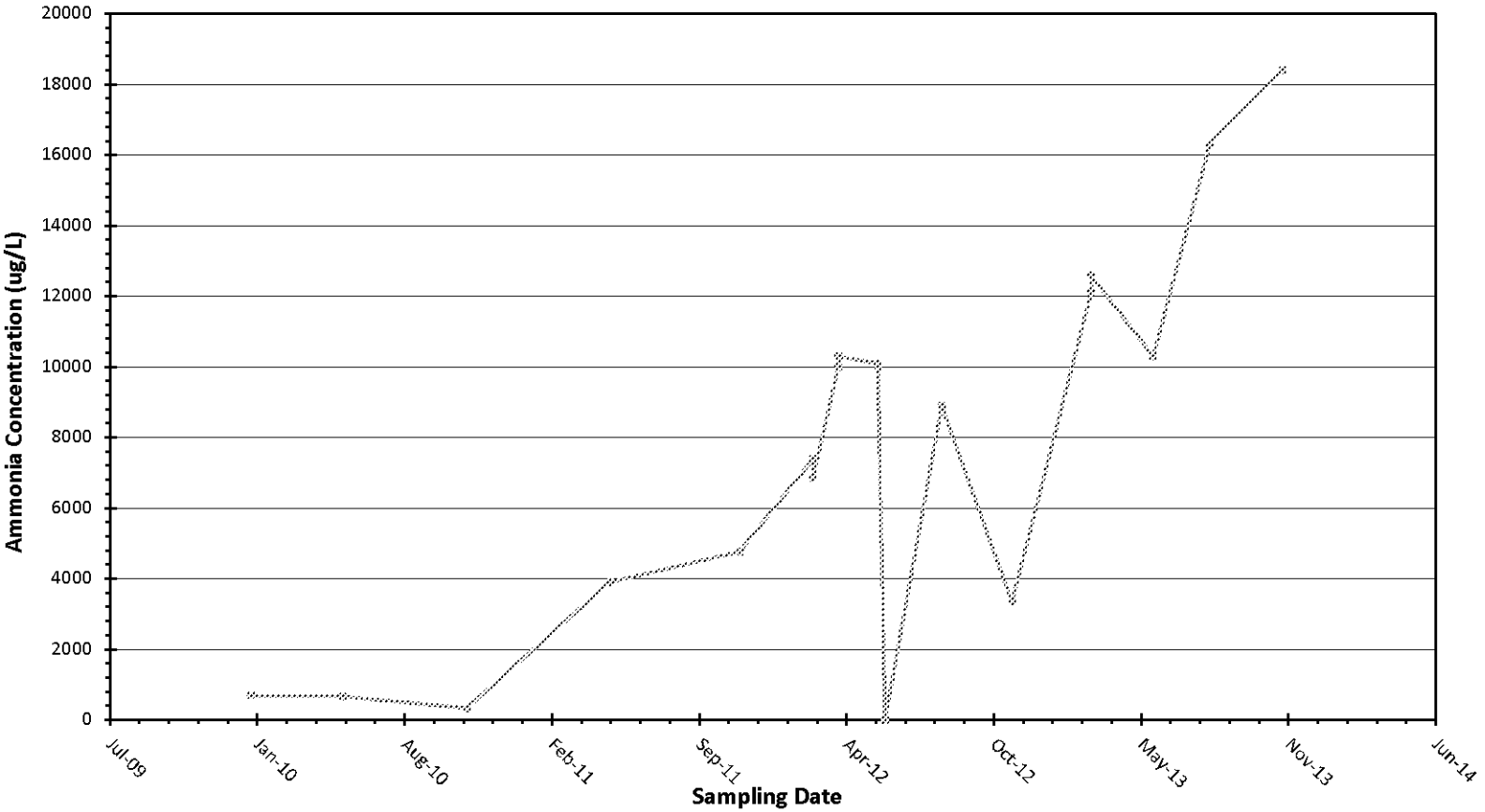


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

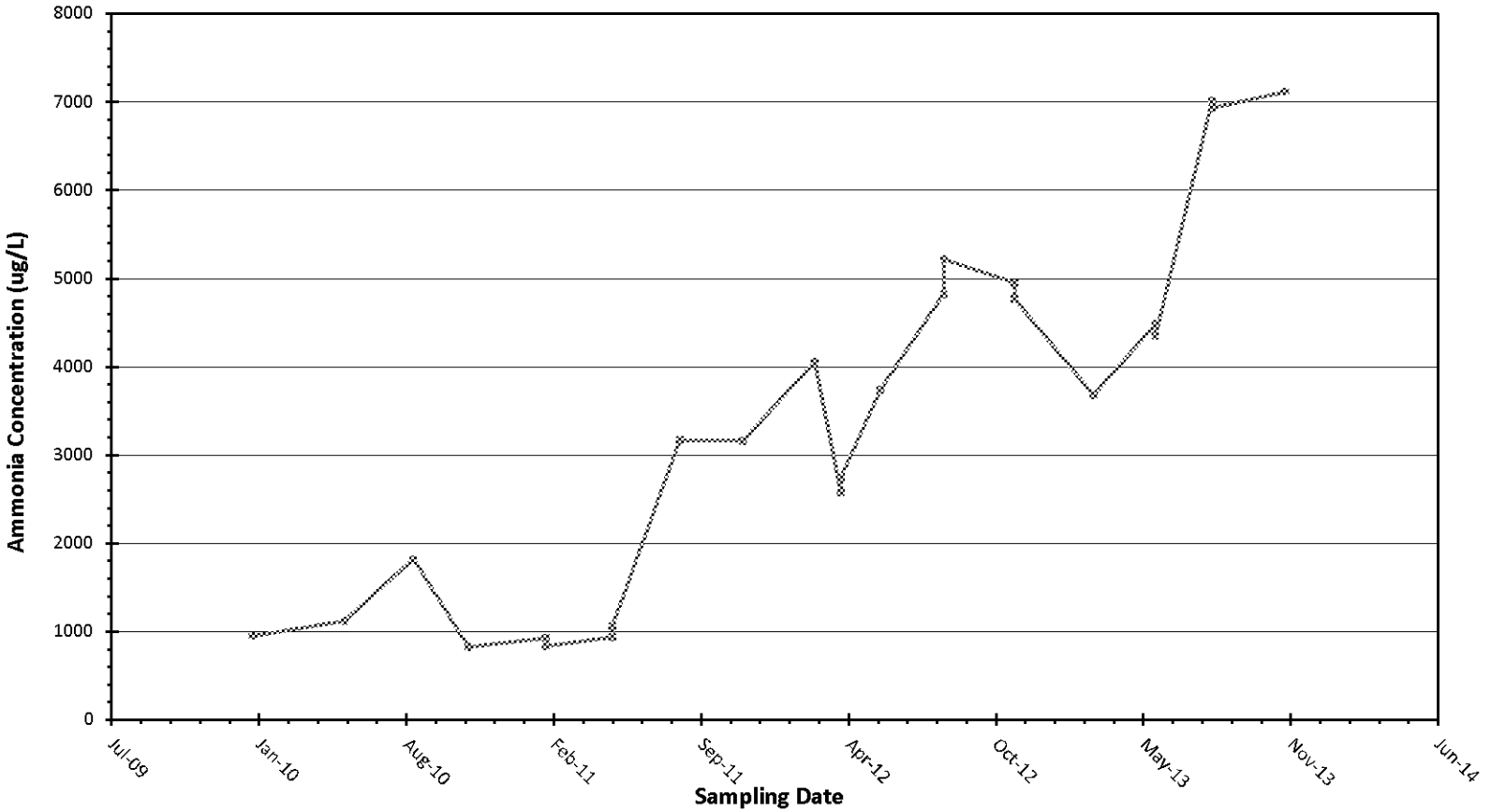


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

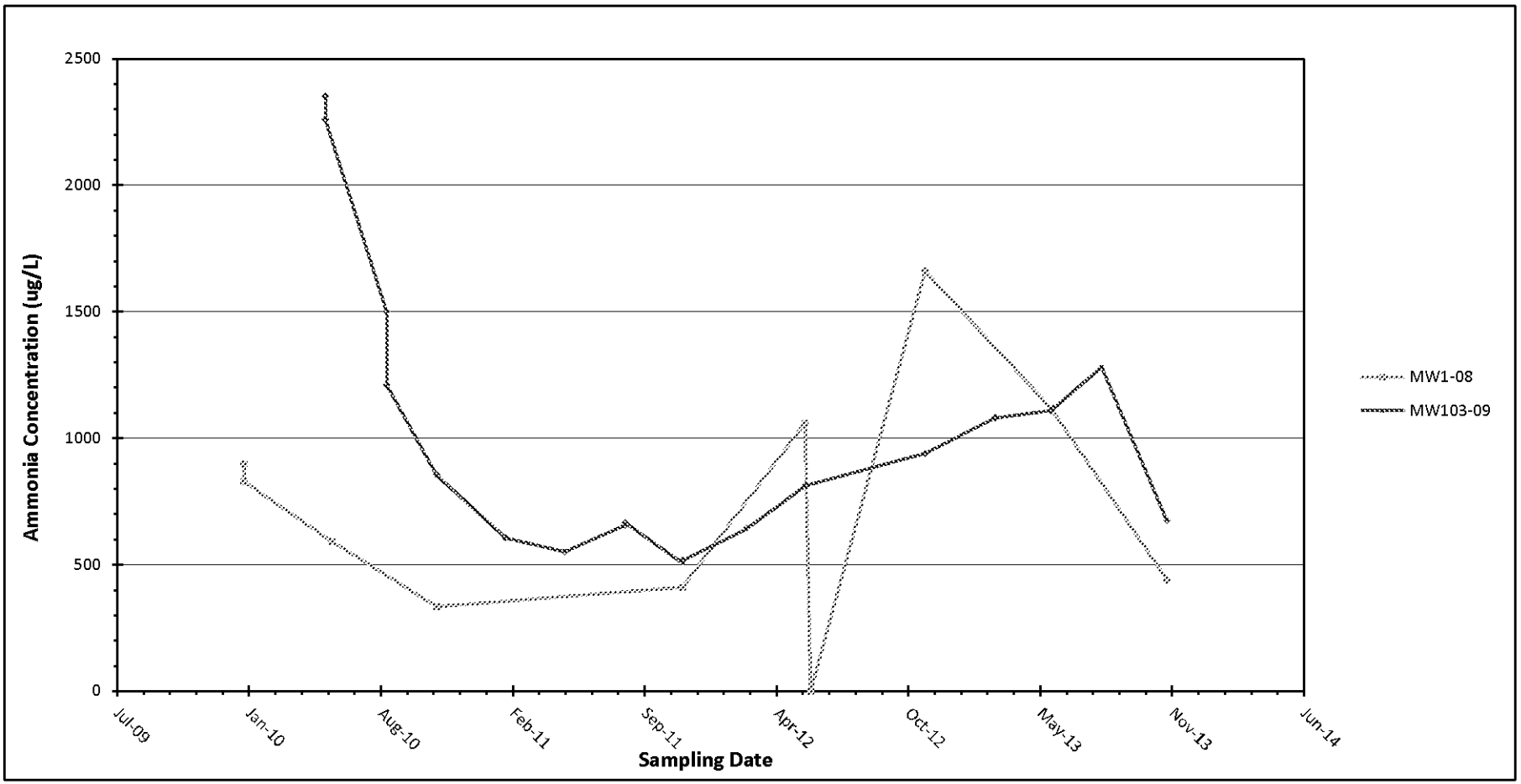


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

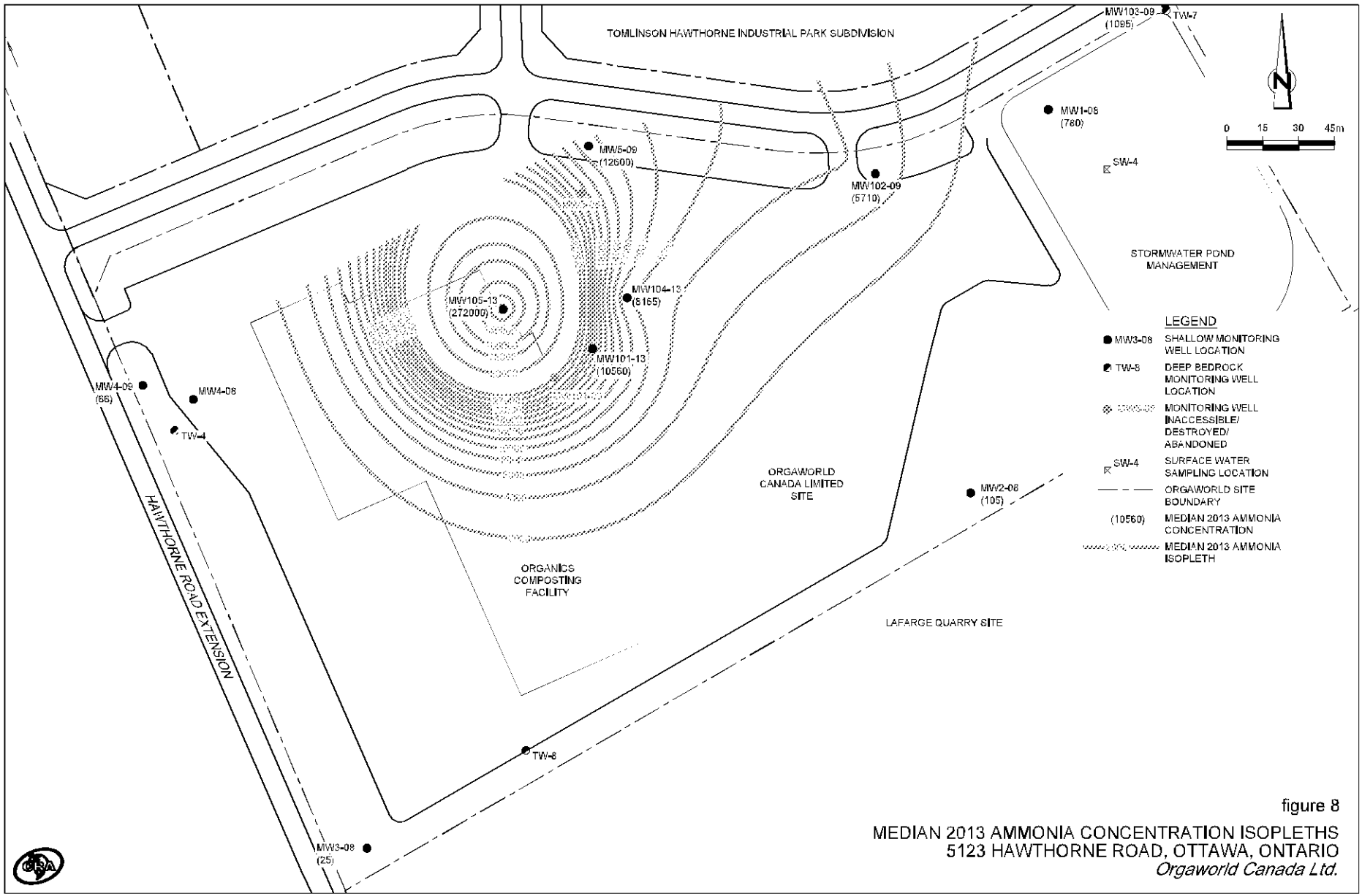


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

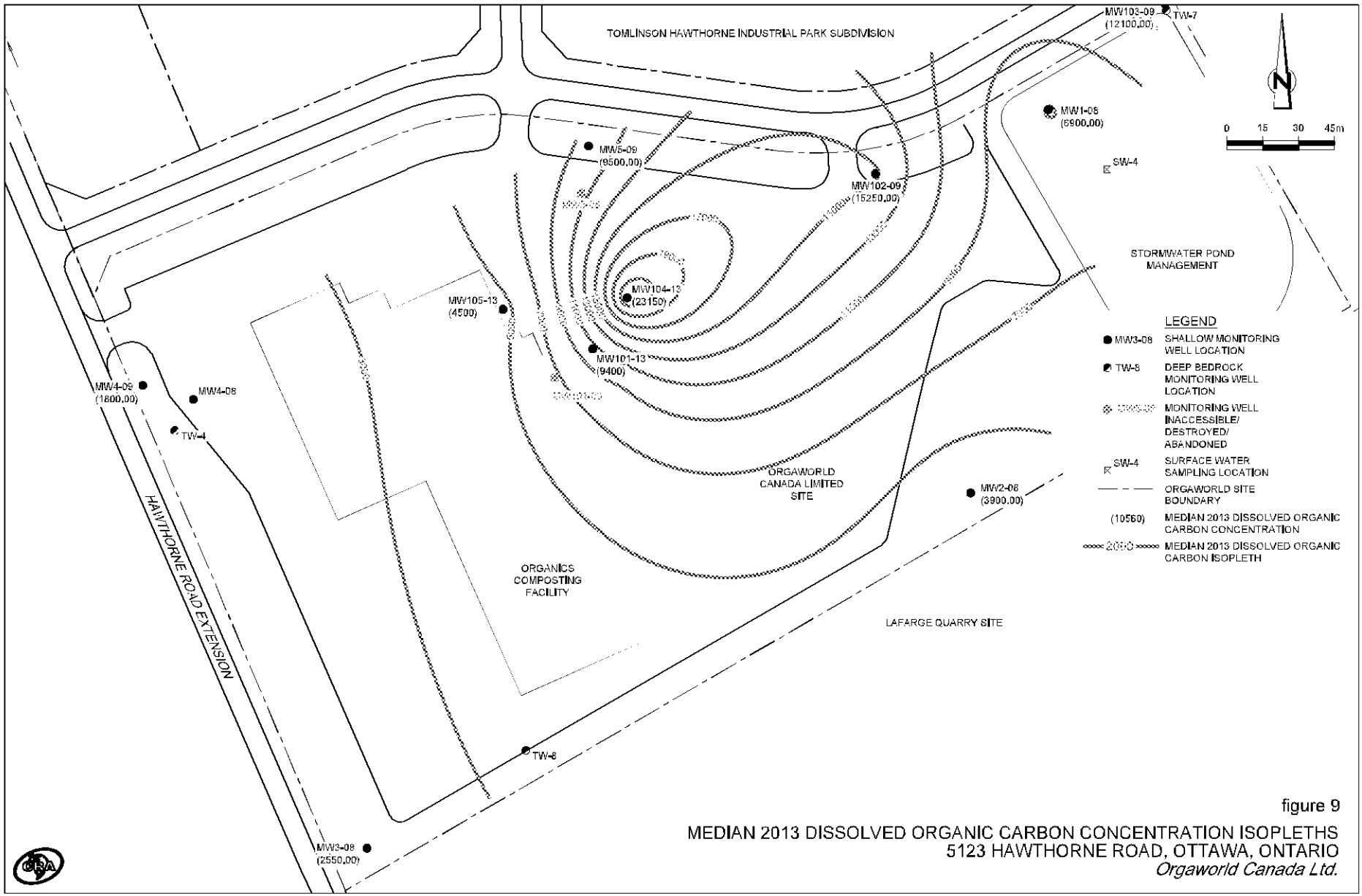


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

002738

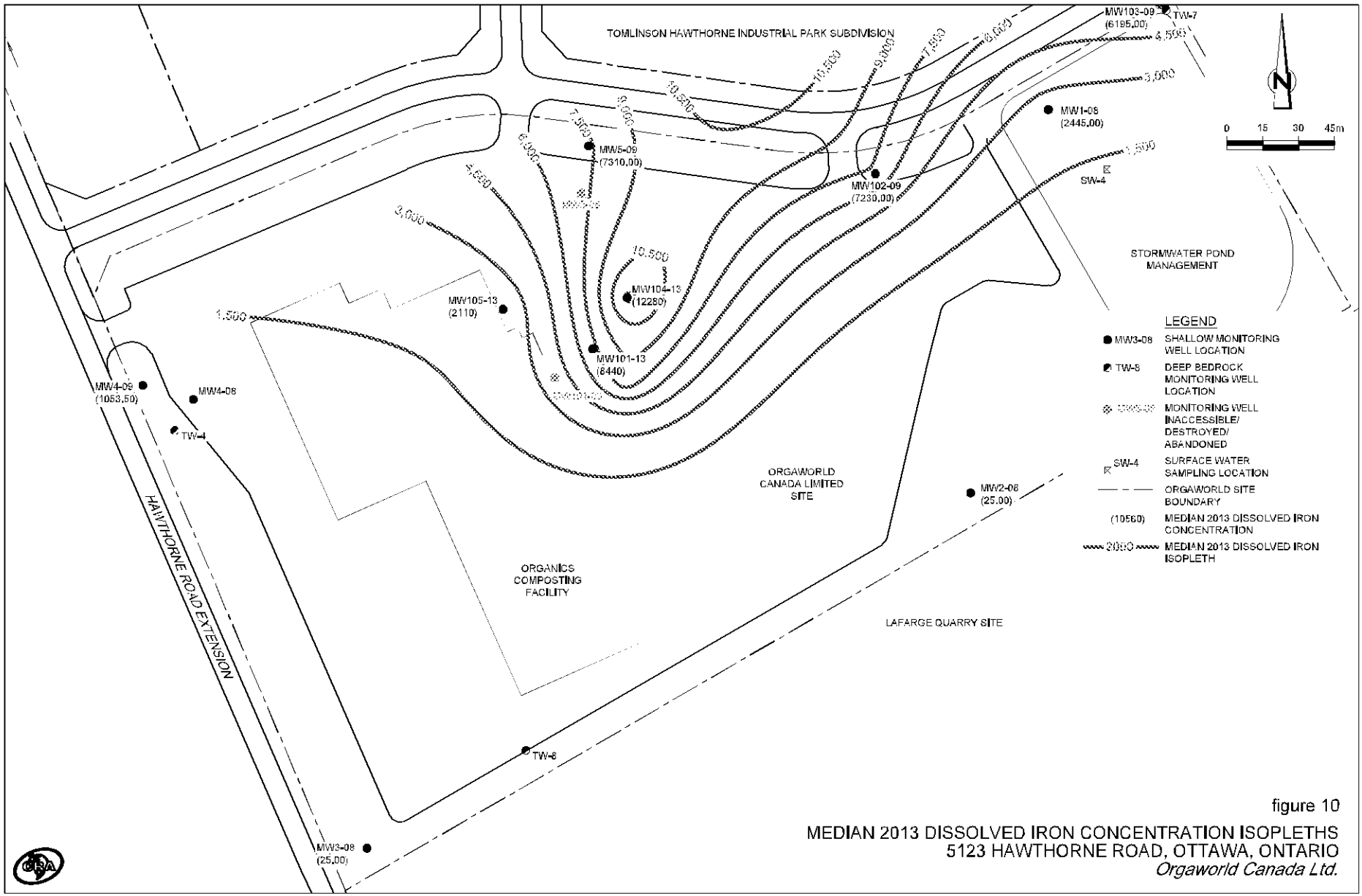


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

002739

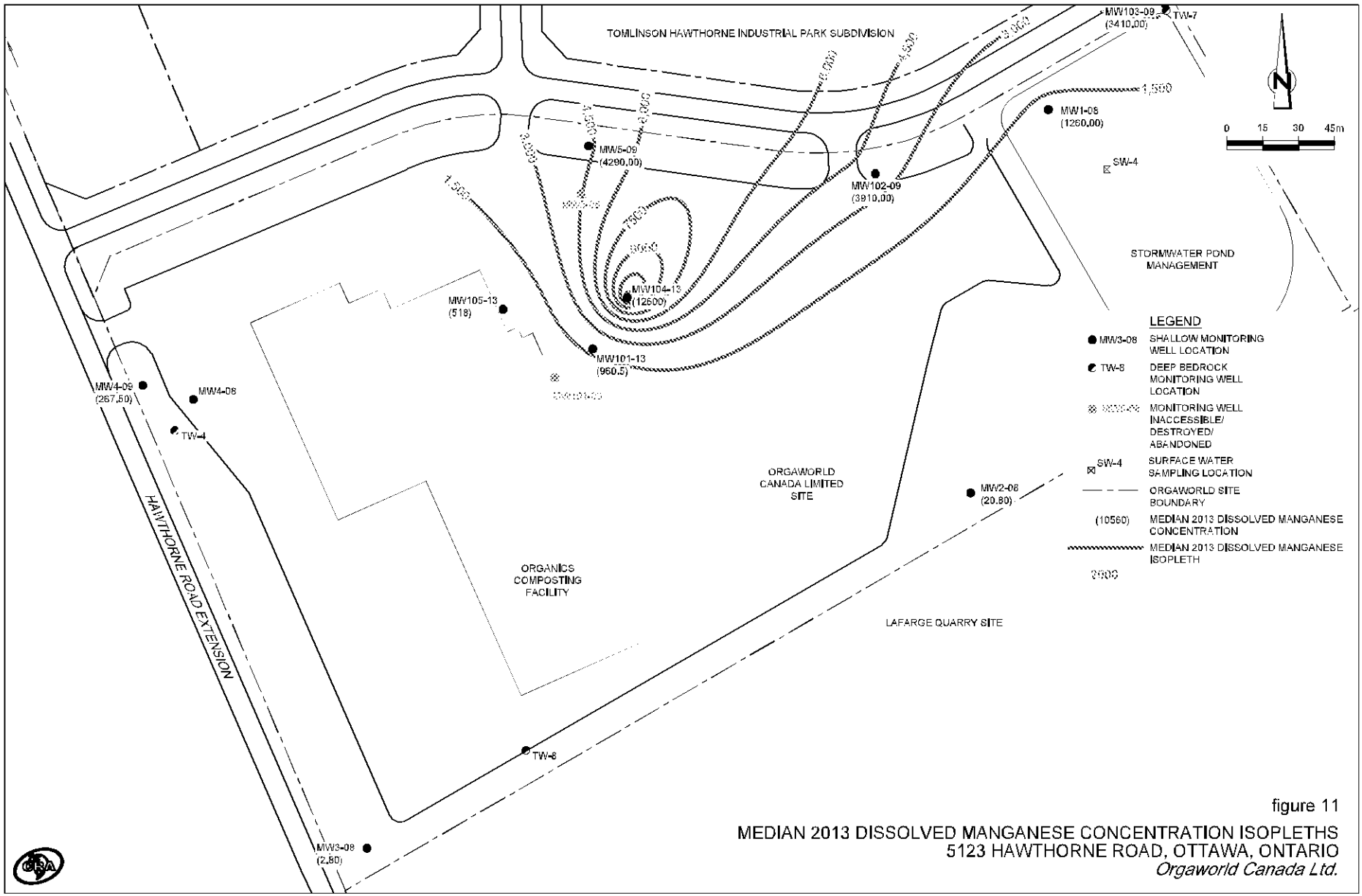


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

Appendix C
Stratigraphic and Instrumentation Logs

Appendix C.1
Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 93.06 TOP OF RISER 93.00 GROUND SURFACE 91.89							
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug					
	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS1		35		0.0
1				SS2		27		0.0
2			Well Screen					
3	END OF BOREHOLE @ 2.97m BGS	88.92						
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

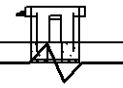
OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002743

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17					
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40	WELL DETAILS Screened interval: 92.54 to 90.40m 0.63 to 2.77m BGS Length: 2.13m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.02 to 92.71m 0.15 to 0.46m BGS Material: Bentonite Sand Pack: 92.71 to 90.40m 0.46 to 2.77m BGS Material: Silica Sand			
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

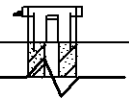
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1
2
3
4
5
6
7
8
9
10
11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug				
	BEDROCK - fractured limestone						
1							
2							
3							
4							
5							
6							
7							
8							
9			Filter Sand				
10			Well Screen				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
12							
13							
14							
15							
16							
17							
	END OF BOREHOLE @ 17.37m BGS	86.18					
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand				
19							
20							
21							
22							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002749

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
2	- becoming very dense at 1.68m BGS	93.28	Filter Sand Well Screen	RC1	93	63
	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth					
3	END OF BOREHOLE @ 2.84m BGS	92.22				
4						
5						
6						
7						
8						
9						
10						
11						
12						

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	97.54 97.45 96.58						
0.5	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist		BENTONITE SAND	1SS		33		0.
1.0			5.08cm PVC WELL CASING					
1.5	- coarse sand, wood pieces, roots at 1.12m BGS			2SS		33	11	10.0
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS		15.24cm BOREHOLE	3SS		54	86	0.1
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29	BENTONITE	4SS		67	55	0.2
3.0								
3.5	- REFUSAL at 3.50m BGS BEDROCK	93.07	5.08cm PVC WELL SCREEN	5SS		8		0.1
4.0			SAND PACK					
4.5	END OF BOREHOLE @ 4.11m BGS	92.46						
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.99 to 92.45m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack:
94.29 to 92.45m
2.29 to 4.11m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug	SS1		54	13
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS2		83	74
2			Filter Sand Well Screen	SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4			WELL DETAILS Screened interval: 93.12 to 91.59m 1.24 to 2.77m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 94.06 to 93.42m 0.30 to 0.94m BGS Material: Bentonite Sand Pack: 93.42 to 91.59m 0.94 to 2.77m BGS Material: Silica Sand				
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 94.57 TOP OF RISER 94.50 GROUND SURFACE 93.36							
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay		BENTONITE SAND 5.08cm PVC WELL CASING 15.24cm BOREHOLE	1SS		54	14	0.0
0.5								
1.0				2SS		54	12	0.1
1.5	- red silty sand (or covered brick) at 1.68m BGS - spoon wet at 1.83m BGS			3SS		29	13	0.0
2.0								
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92	BENTONITE	4SS		71	25	0.1
3.0								
3.5	- increasing clay, becoming wet at 3.51m BGS		5.08cm PVC WELL SCREEN	5SS		25	8	0.0
4.0								
4.5	- cobble, rootmat, black at 4.24m BGS END OF BOREHOLE @ 4.42m BGS	88.94	SAND PACK	6SS		29	6	0.0
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.98 93.83						
0	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist							
1	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07	Bentonite Hole Plug	SS1		83	43	13.1
2				SS2		86		17.1
3				SS3		75	29	21.3
4			Filter Sand	SS4		33	16	23.9
5	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	89.26	Well Screen	SS5		17	7	2.3
6	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.89		SS6		100	20	0.0
7				SS7		83	26	0.0
8	END OF BOREHOLE @ 7.62m BGS	86.21		SS8		57		0.0
9								
10								
11								

WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002754

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.82 93.81						
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist			SS1		50	38	0.0
1			Bentonite Hole Plug	SS2		35		4.6
2				SS3		50	13	0.0
3				SS4		25	15	4.3
4	- becoming wet at 3.65m BGS			SS5		100		
5			Filter Sand Well Screen	SS6		42	54	0.0
6	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32		SS7		50	15	0.0
7	END OF BOREHOLE @ 6.98m BGS	86.83		SS8		100		1.5
8				SS9		100		0.0
9								
10								
11								

WELL DETAILS
Screened interval:
90.76 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
5	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

002756

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.96						
	GROUND SURFACE	82.94						
	TOPSOIL	82.79						
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft		Bentonite Hole Plug	SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand	SS2		100	3	0.0
2			Well Screen					
3				SS3		100		0.0
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	84.00 83.10						
0	TOPSOIL	82.95						
	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS		Bentonite Hole Plug	SS1		83	15	0.0
1								
	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS	81.42	Filter Sand Well Screen	SS2		50	25	0.0
2								
				SS3		100	27	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20						
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS3)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.23 96.15 95.67						
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE	1SS		58	7	0.1
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND					
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE					
2.0			BENTONITE	3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0			WELL DETAILS Screened interval: 93.54 to 92.01m 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 0.010 Material: PVC Seal: 94.15 to 93.84m 1.52 to 1.83m BGS Material: BENTONITE Sand Pack: 93.84 to 92.01m 1.83 to 3.66m BGS Material: #2 SAND					
4.5								
5.0								
5.5								
6.0								
6.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	94.96 94.88					
	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.90 93.79 92.99						
0.5	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick)		BENTONITE SAND	1SS		25		0.0
1.0	- increasing sand at 0.66m BGS		5.08cm PVC WELL CASING	2SS		75	24	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0	- 0.43m coarse beige sand at 1.98m BGS			3SS		67	19	0.1
2.5	- wet at 2.29m BGS			4SS		83	24	0.1
3.0	- ~2.54cm root mat at 2.74m BGS		5.08cm PVC WELL SCREEN					
3.5	CL/ML-SILTY CLAY, soft, grey, wet	90.09	SAND PACK	5SS		63	4	0.2
4.0	END OF BOREHOLE @ 3.66m BGS	89.33						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.45m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.15 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.42 93.33 92.38						
0.5	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist		BENTONITE 5.08cm PVC WELL CASING SAND	1SS		29	6	0.1
1.0			BENTONITE	2SS		38	16	0.1
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29						
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01	15.24cm BOREHOLE	3SS		83	26	0.0
2.0			5.08cm PVC WELL SCREEN					
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS			4SS		50		0.2
3.0	- REFUSAL at 3.05m BGS	89.33	SAND PACK					
	END OF BOREHOLE @ 3.05m BGS			5SS		4		0.1
3.5								
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

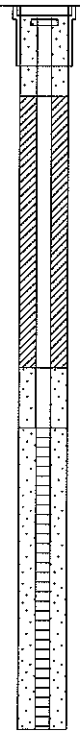
OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.63					
	TOP OF RISER	94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0							
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							



WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

002763

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0			WELL DETAILS Screened interval: 92.92 to 91.40m m AMSL 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.23 to 94.60m m AMSL 1.83 to 0.46m BGS Material: Bentonite Sand Pack: 93.23 to 91.40m m AMSL 1.83 to 3.66m BGS Material: No. 3 Silica Sand				
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOP OF RISER	-0.46
	TOP OF CASING	-0.61
0	GRASS AND TOPSOIL	0.05
	FILL - concrete, red brick, ashphalt, sand, gravel, moist	
1		
2		
3		
4	- wet at 4.27m BGS	
5	- concrete at 4.95m BGS	
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18
6		
	END OF BOREHOLE @ 6.38m BGS	6.38
7		
8		
9		
10		
11		

MONITOR INSTALLATION

WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		12	
2		10	64
3		15	13
4		4	
5		13	38
6		13	59
7		12	
8		14	26
9		6	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-GT006.GPJ CRA_CORP.GDT 3/10/15

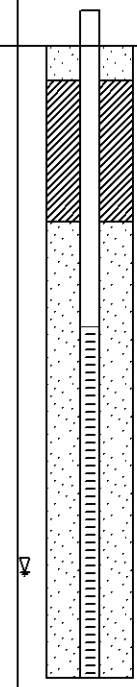
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOPSOIL - sandy, medium brown, dry	
	rock fragments	1.07
	SILTY SAND - medium brown	1.22
	CLEARSTONE - dry	1.37
	rock fragments	1.68
	LIMESTONE - grey	2.13
	- highly fractured at 5.18m BGS	
	END OF BOREHOLE @ 5.49m BGS	5.49

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

SAMPLE				
NUMBER	INTERVAL	REC (%)	'N' VALUE	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-OT006.GPJ CRA_CORP.GDT 2/23/16

Appendix C.2
Deep Bedrock Water Well and Stratigraphic Logs

OCT 07 '93 08:09 BEAVER ROAD BUILDERS

#1

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

1. PRINT ONLY (in ink) IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

SURVEY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
Ottawa Carleton	Gloucester	6		26

OWNER'S SURNAME FIRST	ADDRESS	DATE COMPLETED
ver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DAY 19 MO. 4 YR. 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
y	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	DEPTH - FEET FROM	TO
☐ FRESH ☐ SULPHUR ☐ MINERAL GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL GAS ☐ SALTY		
☐ FRESH ☐ SULPHUR ☐ MINERAL GAS ☐ SALTY		

CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	TO
6 1/4	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC	.188	0	31
6 1/8	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		31	75
6	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		75	135

SCREEN

TYPE OF WELLING (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN	FEET

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT CLAY PACKER, ETC.)
31	0	Grouted - Cement (18)

METHOD OF CONSTRUCTION	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	15-20 GPM	1 HOURS MINUTES

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	10 MINUTES	20 MINUTES	30 MINUTES
31 FEET	130 FEET	☐ PUMPING ☒ RECOVERY	40 FEET	33 FEET	31 FEET

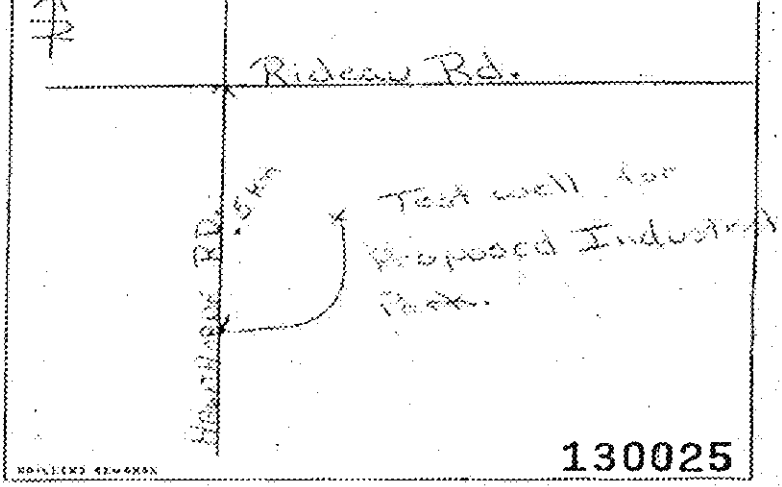
IF FLOWING GIVE RATE	WATER AT END OF TEST
GPM	☐ CLEAR ☐ CLOUDY

DURATION OF FLOW	ALLOWABLE DRAWDOWN	RECOMMENDED PUMPING RATE
SHALLOW ☒ DEEP	125 FEET	5 GPM

FINAL STATUS OF WELL	☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL	☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED ☐ DEWATERING
WATER USE	☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER	☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED
METHOD OF CONSTRUCTION	☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☒ AIR PERCUSSION	☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1556
P.O. Box 450 Stittsville, Ontario K2S 1A5	
NAME OF WELL TECHNICIAN (PLEASE PRINT) S. Miller	WELL TECHNICIAN'S LICENCE NUMBER 10097
SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE DAY 20 MO. 7 YR. 93

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/86) FORM 9

002768

OCT 07 '93 08:12 BEAVER ROAD BUILDERS P.3/4

Ministry of the Environment Ontario

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-2

Ottawa Carleton — Gloucester — 6 — 26

Beaver Road Builders — P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2 — 16 — 8 — 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General Colour	Most Common Material	Other Materials	General Description	From	To
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

Kind of Water: NOT TESTED

CASING & OPEN HOLE RECORD

Inside Diameter	Material	Weight	Depth From	Depth To
6 1/4	Steel	.188	0	39
5 15/16	Steel		39	100

SCREEN

PLUGGING & SEALING RECORD

Depth Set at From	To	Material and Type
37.5	0	Cement - Grouted

Pump: Yes — Capacity: 20 — Duration of Pumping: 1

Static Level	Water Level End of Pumping	Pumping Rate		Kind of Pumping	
		US gpm	Imp gpm		
7'6"	14'6"	13'11"	14	14'4"	14'6"

Pump Intake Set at: 50

Kind of Sealing Block: Cement

Clear and Sand Free: Yes — Time: 5 hrs

Final Status of Well: Water Supply

Water Use: Domestic, Irrigation

Method of Construction: Air Percussion

LOCATION OF WELL

Overburden and Bedrock

Beaver Rd — 390 feet — 150 feet — Test Well #1

135946

Well Contractor: Capital Water Supply Ltd. — 1558

490 Bristaville, Ontario K2S 1A6

Well Technician: Miller/T. Harrison — Technician's Licence No.: T0097/T2251

Submitted: Oct 22 1993

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/87) FORM 6

002769

Ontario Ministry of the Environment

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton	Gloucester	6	26
Beaver Road Builders	P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2	DATE COMPLETED: 16 / 8 / 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Gray & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: FRESH / SALTY / UNKNOWN / MINERAL / GAS

NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	STEEL	.188	0	22
6 1/16	OPEN HOLE		22	100

SCREEN

PLUGGING & SEALING RECORD

DIAMETER	DEPTH FROM	MATERIAL AND TYPE
20'8"	0	Grouted cement (3)

PUMPING TEST METHOD: PUMP / BAILER

PUMPING RATE	WATER LEVEL END OF PUMPING	WATER LEVEL AFTER PUMPING		TIME	
		1 MINUTE	2 MINUTES	3 MINUTES	4 MINUTES
21'6"	24'4"	23'6"	24	24'4"	24'4"

PUMPING RATE	DURATION OF PUMPING	RECOMMENDED PUMP DEPTH	RECOMMENDED PUMP SETTING	RECOMMENDED PUMP RATE
	15-20	40	50	5

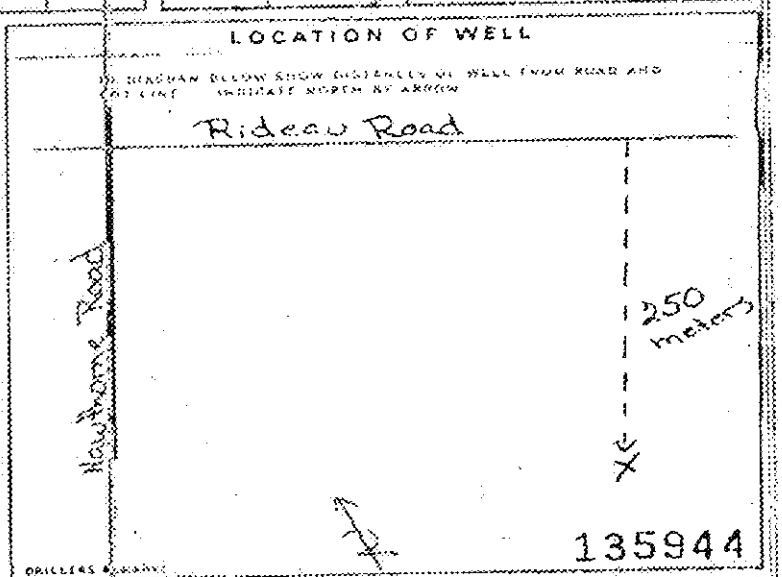
FINAL STATUS OF WELL: WATER SUPPLY / OBSERVATION WELL / TEST HOLE / RECHARGE WELL / ABANDONED, INSUFFICIENT SUPPLY / ABANDONED, POOR QUALITY / DEWATERING

WATER USE: DOMESTIC / STOCK / IRRIGATION / INDUSTRIAL / COMMERCIAL / MUNICIPAL / PUBLIC SUPPLY / COOLING OR AIR CONDITIONING / NOT USED

METHOD OF CONSTRUCTION: CABLE TOOL / ROTARY (CONVENTIONAL) / ROTARY (REVERSE) / ROTARY (AIR) / AIR PERCUSSION / BORING / DIAMOND / JETTING / DRIVING / DIGGING / OTHER

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1550
ADDRESS: Box 490 Stittsville, Ontario K2S 1A6	
NAME OF WELL TECHNICIAN: S. Miller/T. Harrison	WELL TECHNICIAN'S LICENCE NUMBER: 0097/T2251
SIGNATURE OF TECHNICIAN/CONTRACTOR	DATE SUBMITTED: 18 / 8 / 93

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO. 0506 (3) '90

002770

Ontario Ministry of the Environment

Well Record
Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: A068332

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/0 651 Colby Drive	Waterloo	Ontario	N2V1C2	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☒ Rotary (Reverse Air) ☐ Driving ☐ Boring ☐ Digging ☒ Air percussion ☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Industrial ☐ Other, specify: Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	13.10

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	
26.51	☐ Fresh ☐ Untested ☐ Gas	☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas	☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas	☐ Other, specify

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

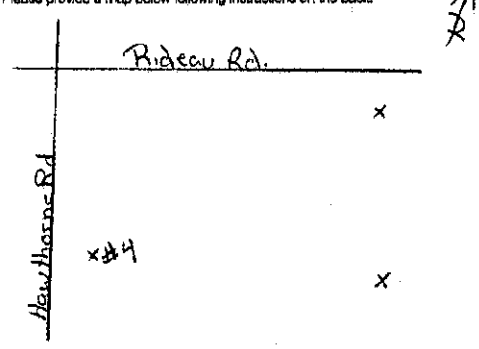
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15			
1	15.97	1	16.76	
2	16.98	2	15.74	
3	17.30	3	15.20	
4	17.43	4	15.	
5	17.50	5	14.91	
10	17.88	10	14.71	
15		15		
20	18.16	20	14.54	
25	18.23	25	14.51	
30	18.26	30	14.47	
40	18.34	40	14.41	
50	18.39	50	14.38	
60	18.41	60	14.35	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2008 09 08

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only
Audit No: 8041 11
Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002771

Ontario Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below) A068335 **A 068336**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K 2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457043	5016848		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
27.12 (m/ft) [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify			
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	0	12.80	15.7
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

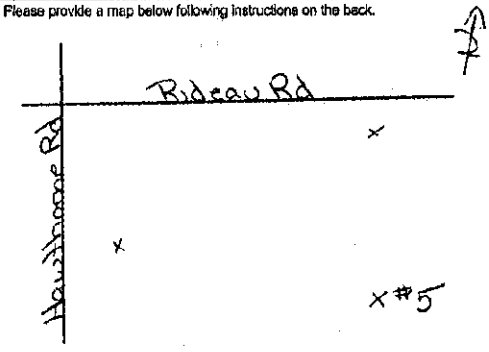
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

	Drew Down Time (min)	Drew Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		6.85		
1		8.03	1	8.97
2		8.35	2	8.69
3		8.60	3	8.55
4		8.76	4	8.46
5		8.88	5	8.40
10		9.20	10	8.23
15			15	
20		9.49	20	8.04
25		9.62	25	7.99
30		9.68	30	7.93
40		9.82	40	7.84
50		9.91	50	7.77
60		9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361766	Miller, Stephon

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008 10 06

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [X] No	2008 10 06	Audit No. Z 844140
	Date Work Completed: 2008 09 26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002772

Ontario | Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 8600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	83	18457102	5017600		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond [ ] Rotary (Conventional) [ ] Jetting [X] Rotary (Reverse) Air [ ] Driving [ ] Boring [ ] Digging [X] Air percussion [ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used [X] Domestic [ ] Municipal [ ] Dewatering [ ] Livestock [ ] Test Hole [ ] Monitoring [ ] Irrigation [ ] Cooling & Air Conditioning [X] Industrial [ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Status of Well

[ ] Water Supply [ ] Replacement Well [ ] Test Hole [ ] Recharge Well [ ] Dewatering Well [ ] Observation and/or Monitoring Hole [ ] Alteration (Construction) [ ] Abandoned, Insufficient Supply [ ] Abandoned, Poor Water Quality [ ] Abandoned, other, specify [ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water: [ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify
Water found at Depth (m/ft)	Kind of Water: [ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify
Water found at Depth (m/ft)	Kind of Water: [ ] Fresh [ ] Untested [ ] Gas [ ] Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was: [ ] Clear and sand free [ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

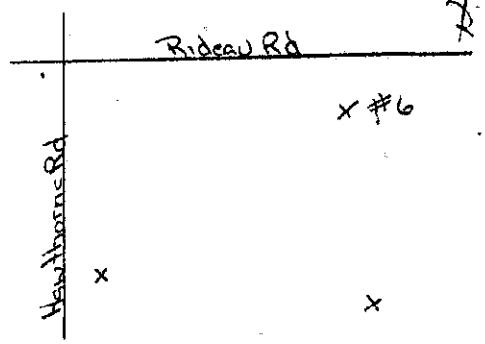
Well production (l/min / GPM):

Disinfected? [ ] Yes [X] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	3.18		
1	3.24	1	
2	4.23	2	
3	5.19	3	
4		4	
5	6.53	5	
10	8.06	10	
15	9.99	15	22.80
20	11.53	20	19.40
25	12.92	25	17.12
30	14.08	30	15.13
40		40	11.82
50		50	9.47
60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361765	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008/09/26

Well owner's information package delivered	Date Package Delivered	Minister's Work
[ ] Yes [X] No	2008/09/26	Audit No. Z 084410
	Date Work Completed: 2008/09/26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

002773

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
0	FILL, sand and gravel, packed, brown		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
1.52	SANDSTONE, very hard, grey and white	90.94					
29.87	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
0	LIMESTONE, grey, broken rock						
1.52	SANDSTONE, very hard, grey and white	92.94	18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
29.87	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix D
QA/QC Assessment Memorandum and Laboratory Analytical Reports

Memorandum

December 14, 2018

To:	Ben Kempel, Trevor Saunders	Ref. No.:	045804-58
From:	Pascal Renella/al/10		450-902-4349

Subject: Data Quality Assessment and Validation

Laboratory: ALS Canada Ltd

Date(s) Sampled: May 15 – November 8, 2018

Lab Job No.: L2095276, L2096016, L2147743, L2195034

Sampled By: Trevor Saunders

Media Sampled: Groundwater & Surface Water

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☐	☒	☐	☐
Lab QA/QC	Within standard recoveries	☒	☐	☐	☐

Data OK for Use Yes ☐ With Qualifiers ☒ No ☐ Initial: PR

The following results are qualified due high temperature (14.5°C) upon arrival at the laboratory the day after sampling:

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L2096016	GW-45804-051518-TS-001	Iron (dissolved)	3.62	J	mg/L
L2096016	GW-45804-051518-TS-002	Iron (dissolved)	3.62	J	mg/L
L2096016	GW-45804-051518-TS-003	Iron (dissolved)	0.10	UJ	mg/L
L2096016	GW-45804-051518-TS-001	Manganese (dissolved)	0.254	J	mg/L
L2096016	GW-45804-051518-TS-002	Manganese (dissolved)	0.253	J	mg/L
L2096016	GW-45804-051518-TS-003	Manganese (dissolved)	0.154	J	mg/L
L2096016	GW-45804-051518-TS-001	Alkalinity, total (as CaCO3)	642	J	mg/L
L2096016	GW-45804-051518-TS-002	Alkalinity, total (as CaCO3)	672	J	mg/L
L2096016	GW-45804-051518-TS-003	Alkalinity, total (as CaCO3)	318	J	mg/L
L2096016	GW-45804-051518-TS-001	Ammonia-N	33.0	J	mg/L

ghd
4600, boul. de la Côte-Vertu, Montréal, Québec, H4S 1C7, Canada
T 514 333 5151 F 514 333 46744 W www.ghd.com
SMQ ISO 9001:2008

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L2096016	GW-45804-051518-TS-002	Ammonia-N	33.2	J	mg/L
L2096016	GW-45804-051518-TS-003	Ammonia-N	0.554	UJ	mg/L
L2096016	GW-45804-051518-TS-001	Dissolved organic carbon (DOC)	10.1	J	mg/L
L2096016	GW-45804-051518-TS-002	Dissolved organic carbon (DOC)	10.7	J	mg/L
L2096016	GW-45804-051518-TS-003	Dissolved organic carbon (DOC)	2.0	J	mg/L
L2096016	GW-45804-051518-TS-001	Escherichia coli	0	UJ	cfu/100mL
L2096016	GW-45804-051518-TS-002	Escherichia coli	0	UJ	cfu/100mL
L2096016	GW-45804-051518-TS-003	Escherichia coli	0	UJ	cfu/100mL
L2096016	GW-45804-051518-TS-001	Nitrate (as N)	0.020	UJ	mg/L
L2096016	GW-45804-051518-TS-002	Nitrate (as N)	0.020	UJ	mg/L
L2096016	GW-45804-051518-TS-003	Nitrate (as N)	0.020	UJ	mg/L
L2096016	GW-45804-051518-TS-001	Phosphorus	0.144	J	mg/L
L2096016	GW-45804-051518-TS-002	Phosphorus	0.145	J	mg/L
L2096016	GW-45804-051518-TS-003	Phosphorus	0.0034	J	mg/L

The following results are qualified due to holding time exceedance:

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L2195034	GW-45804-110718-TS-001	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110718-TS-002	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110718-TS-003	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-004	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-005	Escherichia coli	78	J	cfu/100mL
L2195034	GW-45804-110818-TS-006	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-007	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-008	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-009	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-010	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-011	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-012	Escherichia coli	0	UJ	cfu/100mL
L2195034	GW-45804-110818-TS-013	Escherichia coli	0	UJ	cfu/100mL
L2195034	SW-45804-110718-TS-001	Escherichia coli	95	J	cfu/100mL
L2195034	SW-45804-110718-TS-002	Escherichia coli	15	J	cfu/100mL
L2195034	SW-45804-110718-TS-003	Escherichia coli	2	J	cfu/100mL
L2195034	SW-45804-110718-TS-004	Escherichia coli	18	J	cfu/100mL
L2195034	SW-45804-110718-TS-005	Escherichia coli	9	J	cfu/100mL

The following results are qualified based on field blank detections:

Lab Sample ID	Field Sample ID	Analyte	Result	Qualifier	Units
L2096016	GW-45804-051518-TS-003	Ammonia-N	0.554	U	mg/L
L2096016	GW-45804-051618-TS-009	Ammonia-N	0.282	U	mg/L
L2096016	GW-45804-051618-TS-015	Ammonia-N	0.182	U	mg/L
L2096016	GW-45804-051618-TS-016	Ammonia-N	0.224	U	mg/L
L2096016	GW-45804-051618-TS-017	Ammonia-N	0.395	U	mg/L
L2096016	GW-45804-051618-TS-018	Ammonia-N	0.385	U	mg/L
L2096016	GW-45804-051618-TS-019	Ammonia-N	0.812	U	mg/L
L2096016	GW-45804-051618-TS-020	Ammonia-N	0.871	U	mg/L
L2147743	GW-45804-081518-TS-006	Phosphorus	0.0123	U	mg/L
L2195034	GW-45804-110718-TS-002	Ammonia-N	0.255	U	mg/L
L2195034	GW-45804-110718-TS-003	Ammonia-N	0.128	U	mg/L
L2195034	GW-45804-110818-TS-007	Ammonia-N	0.171	U	mg/L
L2195034	GW-45804-110818-TS-008	Ammonia-N	0.063	U	mg/L
L2195034	GW-45804-110818-TS-010	Ammonia-N	0.063	U	mg/L
L2195034	GW-45804-110818-TS-015	Ammonia-N	0.218	U	mg/L
L2195034	GW-45804-110818-TS-006	Dissolved organic carbon (DOC)	5.64	U	mg/L
L2195034	GW-45804-110818-TS-008	Dissolved organic carbon (DOC)	2.95	U	mg/L
L2195034	GW-45804-110818-TS-010	Dissolved organic carbon (DOC)	2.36	U	mg/L
L2195034	GW-45804-110818-TS-015	Dissolved organic carbon (DOC)	5.09	U	mg/L

The following results are qualified based on field duplicate variability:

Lab Sample ID	Field Sample ID	Analyte	Result	Qualifier	Units
L2096016	GW-45804-051618-TS-017	Iron (dissolved)	0.34	J	mg/L
L2096016	GW-45804-051618-TS-018	Iron (dissolved)	0.50	J	mg/L
L2096016	GW-45804-051618-TS-017	Dissolved organic carbon (DOC)	3.7	J	mg/L
L2096016	GW-45804-051618-TS-018	Dissolved organic carbon (DOC)	2.1	J	mg/L
L2195034	SW-45804-110718-TS-004	Ammonia-N	0.351	J	mg/L
L2195034	SW-45804-110718-TS-005	Ammonia-N	0.205	J	mg/L
L2195034	SW-45804-110718-TS-004	Escherichia coli	18	J	cfu/100mL
L2195034	SW-45804-110718-TS-005	Escherichia coli	9	J	cfu/100mL
L2195034	GW-45804-110718-TS-001	Phosphorus	0.0149	J	mg/L
L2195034	GW-45804-110718-TS-002	Phosphorus	0.0113	J	mg/L

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L2195034	SW-45804-110718-TS-004	Phosphorus	0.0192	J	mg/L
L2195034	SW-45804-110718-TS-005	Phosphorus	0.0120	J	mg/L

Notes:

J - Estimated concentration
U - Not Detected
UJ - Non-detect with an Estimated Report Limit
N - Nitrogen
CFU – Colony Forming Units

Appendix E
2010 – 2017 Analytical Data

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010
			Original	Duplicate	Original	Original
Parameters:	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	-	0.0056
Boron (dissolved)	mg/L	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	16.6	17.2	3.56	1.50
Lead (dissolved)	mg/L	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	82.9	79.6	-	-
Manganese (dissolved)	mg/L	17.1	11.0	10.9	1.14	0.640
Mercury (dissolved)	mg/L	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.0124	0.0118	0.0530	0.0344
Nickel (dissolved)	mg/L	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-
Zinc (dissolved)	mg/L	-	ND(0.030)	0.148	0.0052	ND(0.0030)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	490	490	207	187
Ammonia-N	mg/L	4.0	0.899	0.828	0.593	0.335
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-
Chloride	mg/L	-	66.1	66.6	109	47.5
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	-	220	249	69.2	151
Conductivity	umhos/cm	-	1750	1760	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	9.9	6.4	7.0
Escherichia coli	cfu/100mL	25.6	0	0	3	9
Fecal coliform bacteria	cfu/100mL	-	0	0	11	14
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.65	7.59	-	-
Phenol	mg/L	-	-	-	-	-
Phosphorus	mg/L	7.2	0.127	0.067	1.60	5.46
Sulfate	mg/L	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	700	50
Total dissolved solids (TDS)	mg/L	-	1310	1320	1010	896
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-
Turbidity	NTU	-	63.0	64.0	-	-
Un-ionized ammonia	mg/L	-	0.000415	0.000382	0.00645	0.000111

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010
			Original	Duplicate	Original	Original
Field Parameters						
Conductivity, field	mS/cm	-	1.09	1.09	0.5	1.62
Dissolved oxygen (DO), field	mg/L	-	2.29	2.29	-	6.87
Oxidation reduction potential (ORP), field	millivolts	-	-85	-85	-	-143
pH, field	s.u.	-	6.53	6.53	7.47	6.13
Temperature, field	Deg C	-	3.7	3.7	16.5	11.1
Turbidity, field	NTU	-	207	207	-	-
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	690	440
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	690	440
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	2640	1520
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	8000	4100
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010
			Original	Duplicate	Original	Original
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0180	0.0397
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001	GW-45804-111212-MB-003	GW-45804-052213-TS-004
Sample Date:		11/10/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.0061	0.0052	-	0.0054	0.0048
Boron (dissolved)	mg/L	-	ND(0.050)	-	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00146	-	0.00228	0.00077
Copper (dissolved)	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.897	1.92	-	6.78	3.03
Lead (dissolved)	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-
Manganese (dissolved)	mg/L	0.539	0.956	-	2.17	1.43
Mercury (dissolved)	mg/L	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0056	0.0037	-	0.0058	0.0109
Nickel (dissolved)	mg/L	-	ND(0.0020)	-	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	ND(0.0030)	ND(0.0030)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	177	254	-	396	206
Ammonia-N	mg/L	0.410	1.06	-	1.66	1.12
Biochemical oxygen demand (carbonaceous)	mg/L	2.5	3.8	-	7.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	51	-	55	49
Chloride	mg/L	37.9	99.8	-	70.7	90
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	29.5	-	107	43.1 J	27.8
Conductivity	umhos/cm	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.5	9.5	-	9.2	6.2
Escherichia coli	cfu/100mL	ND(2)	-	13	6	20
Fecal coliform bacteria	cfu/100mL	2	-	6	10	40
Nitrate (as N)	mg/L	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)
pH, lab	s.u.	-	7.78	-	7.78	7.74
Phenol	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	3.13	2.88	-	1.67	3.27
Sulfate	mg/L	-	-	-	397	337
Total coliform bacteria	cfu/100mL	70	-	470	100	20
Total dissolved solids (TDS)	mg/L	482	700	-	1110	612
Total kjeldahl nitrogen (TKN)	mg/L	-	2.29	-	2.95	2.53
Total suspended solids (TSS)	mg/L	-	3970	-	4820	2690
Turbidity	NTU	-	-	24.0	7.50 J	58.0
Un-ionized ammonia	mg/L	0.00367	-	-	0.194	0.000445

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001	GW-45804-111212-MB-003	GW-45804-052213-TS-004
Sample Date:		11/10/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original
Field Parameters						
Conductivity, field	mS/cm	0.701	1.16	1.24	1.32	1.3
Dissolved oxygen (DO), field	mg/L	-	-	-	3.01	4.46
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-113	-
pH, field	s.u.	7.82	6.65	6.24	6.68	6.05
Temperature, field	Deg C	9.5	12.98	12.73	12.3	15.9
Turbidity, field	NTU	-5	-	-	-5	-5
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	930	700	-	460	530
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	930	700	-	460	530
Petroleum hydrocarbons F4 (C34-C50)	µg/L	3410	2650	-	1710	1920
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	10900	9000	-	8300	13600
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001	GW-45804-111212-MB-003	GW-45804-052213-TS-004
Sample Date:		11/10/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	0.034	0.040
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	0.068	-
2-Methylnaphthalene	µg/L	-	-	-	0.034	0.028
Acenaphthene	µg/L	-	-	-	0.024	ND(0.020)
Acenaphthylene	µg/L	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	0.029	ND(0.020)
Benzo(a)pyrene	µg/L	0.0276	0.0086	-	0.034	0.0149
Benzo(b)fluoranthene	µg/L	-	-	-	0.041	0.033
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	0.056	0.027
Benzo(k)fluoranthene	µg/L	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	0.113	0.070
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	0.034	0.030
Fluorene	µg/L	-	-	-	0.040	ND(0.30)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	0.047	0.049
Phenanthrene	µg/L	-	-	-	0.056	0.061
Pyrene	µg/L	-	-	-	0.056	0.040

002787

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007
Sample Date:		11/14/2013	5/30/2014	11/25/2014
		Original	Original	Original
Parameters:	**Units**			
Metals				
Arsenic (dissolved)	mg/L	0.0031	0.0041	0.0016
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00070	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	1.86	2.78	2.54
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-
Manganese (dissolved)	mg/L	1.09	1.23	0.916
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0042	0.0045	0.0026
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-
Zinc (dissolved)	mg/L	0.0036	0.0045	ND(0.0030)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	185	234 J	234
Ammonia-N	mg/L	0.440	2.08 J	1.22
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	53	45 J	24
Chloride	mg/L	50.2	85.2 J	50
Color (apparent)	color unit	-	146 J	146
Color (apparent)	TCU	34.9	-	-
Conductivity	umhos/cm	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.6	6.4 J	7.4
Escherichia coli	cfu/100mL	11	0 J	0
Fecal coliform bacteria	cfu/100mL	15	0 J	0 J
Nitrate (as N)	mg/L	0.10	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10) J	ND(0.50)
pH, lab	s.u.	7.31	7.77 J	7.90
Phenol	mg/L	0.0017	ND(0.0010) J	ND(0.0010)
Phosphorus	mg/L	3.32	0.174 J	0.206
Sulfate	mg/L	231	184 J	141
Total coliform bacteria	cfu/100mL	900	5 J	290
Total dissolved solids (TDS)	mg/L	537	644 J	513
Total kjeldahl nitrogen (TKN)	mg/L	1.37	2.88 J	1.44
Total suspended solids (TSS)	mg/L	3220	5.6 J	7.6
Turbidity	NTU	46.8	15.7 J	29.4
Un-ionized ammonia	mg/L	0.000151	0.0173 J	0.00696

002788

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007
Sample Date:		11/14/2013	5/30/2014	11/25/2014
		Original	Original	Original
Field Parameters				
Conductivity, field	mS/cm	0.857	1.17	0.307
Dissolved oxygen (DO), field	mg/L	7.02	0	3.32
Oxidation reduction potential (ORP), field	millivolts	-	-175	-53
pH, field	s.u.	6.18	7.38	7.47
Temperature, field	Deg C	10.0	15.85	6.11
Turbidity, field	NTU	857	3.1	-
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	780	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	780	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	3160	ND(250) J	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	20000	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007
Sample Date:		11/14/2013	5/30/2014	11/25/2014
		Original	Original	Original
Semi-Volatiles				
1-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acridine	µg/L	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	0.0117 J	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016	GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008
Sample Date:		11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/1/2017
		Duplicate	Original	Original	Original	Original	
Parameters:	**Units**						
Metals							
Arsenic (dissolved)	mg/L	0.0015	0.0034	0.00149	0.00186	0.00161	-
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	0.017	0.032	0.026	-
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00061	0.00086	ND(0.00050)	-
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00010)	0.00011	ND(0.00010)	-
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00020)	ND(0.00020)	0.00058	-
Iron (dissolved)	mg/L	2.54	3.42	3.00	6.28	8.11	6.21
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.000050)	ND(0.000050)	-
Magnesium (dissolved)	mg/L	-	--	--	--	--	-
Manganese (dissolved)	mg/L	0.901	1.07	0.988	1.26	2.09	1.19
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Molybdenum (dissolved)	mg/L	0.0027	0.0017	0.00160	0.00113	0.00180	-
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.00050)	0.00084	0.00065	-
Silver (dissolved)	mg/L	-	--	--	--	--	-
Zinc (dissolved)	mg/L	0.0058	ND(0.0030)	0.0024	0.0010	ND(0.0010)	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	238	299	222	322	273	410
Ammonia-N	mg/L	1.32	0.844	0.492	0.803	0.917	1.14
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	15	36	21	35	33	-
Chloride	mg/L	50	75.5	52.2	97.1	101	-
Color (apparent)	color unit	136	--	--	260	448	-
Color (apparent)	TCU	-	49.5	103	--	--	-
Conductivity	umhos/cm	-	--	--	--	--	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.3	10.7	7.6	9.7	7.3	7.9
Escherichia coli	cfu/100mL	2	1	0	0	0	0
Fecal coliform bacteria	cfu/100mL	4 J	1	0	0	0	-
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.020)	ND(0.020)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.050)	-
pH, lab	s.u.	7.88	7.74	7.72	7.85	6.96	-
Phenol	mg/L	ND(0.0010)	0.0101	0.0022	0.0022	0.0024	-
Phosphorus	mg/L	0.208	1.67	0.162	0.118	0.147	0.167
Sulfate	mg/L	137	88.7	80.8	149	589	-
Total coliform bacteria	cfu/100mL	320	800	150	1	100	-
Total dissolved solids (TDS)	mg/L	511	468	441	727	1360	-
Total kjeldahl nitrogen (TKN)	mg/L	1.54	1.95	0.99	1.62	0.79	-
Total suspended solids (TSS)	mg/L	6.4	2800	23.1	11.3	12.1	-
Turbidity	NTU	28.2	40.0	40.4	78.1	107	-
Un-ionized ammonia	mg/L	0.00753	0.00483	0.0287	0.00945	0.00227	0.0036

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016	GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008
Sample Date:		11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/1/2017
		Duplicate	Original	Original	Original	Original	
Field Parameters							
Conductivity, field	mS/cm	0.307	0.607	0.594	0.795	1.59	0.911
Dissolved oxygen (DO), field	mg/L	3.32	8.32	0	0	6.35	5.49
Oxidation reduction potential (ORP), field	millivolts	-53	-92	-119	-102	-95	-122
pH, field	s.u.	7.47	7.24	8.39	7.87	7	7.11
Temperature, field	Deg C	8.11	14.97	11.3	11.51	11.23	13.83
Turbidity, field	NTU	-	0	33.8	0.6	0	0
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	530	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	--	--	--	--	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	2470	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	--	--	--	--	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	ND(100)	--	--	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	--	--	--	--	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	ND(250)	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	ND(250)	--	--	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	3000	ND(380)	ND(380)	ND(380)	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016	GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008
Sample Date:		11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/1/2017
		Duplicate	Original	Original	Original	Original	
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	--	--	--	--	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	--	--	--	--	-
2-Methylnaphthalene	µg/L	-	--	--	--	--	-
Acenaphthene	µg/L	-	--	--	--	--	-
Acenaphthylene	µg/L	-	--	--	--	--	-
Acridine	µg/L	-	--	--	--	--	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	--	--	--	--	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	-	--	--	--	--	-
Benzo(b)pyridine (Quinoline)	µg/L	-	--	--	--	--	-
Benzo(g,h,i)perylene	µg/L	-	--	--	--	--	-
Benzo(k)fluoranthene	µg/L	-	--	--	--	--	-
Carcinogenic potency equivalent	µg/L	-	--	--	--	--	-
Chrysene	µg/L	-	--	--	--	--	-
Dibenz(a,h)anthracene	µg/L	-	--	--	--	--	-
Fluoranthene	µg/L	-	--	--	--	--	-
Fluorene	µg/L	-	--	--	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	-	--	--	--	--	-
Naphthalene	µg/L	-	--	--	--	--	-
Phenanthrene	µg/L	-	--	--	--	--	-
Pyrene	µg/L	-	--	--	--	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011
			Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-
Iron (dissolved)	mg/L	46.3	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	26.5	-	-	-
Manganese (dissolved)	mg/L	17.1	0.0070	0.0691	0.0077	0.0110
Mercury (dissolved)	mg/L	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.0064	0.0120	0.0077	0.0104
Nickel (dissolved)	mg/L	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.103	0.0253	0.0127	0.0414
		-				
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	209	261	314	281
Ammonia-N	mg/L	4.0	ND(0.050)	0.071	0.090	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-
Chloride	mg/L	-	ND(2.0)	3.0	ND(2.0)	ND(2.0)
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	-	32.7	66.3	15.1	25.2
Conductivity	umhos/cm	-	465	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.5	1.5	3.2	4.8
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0
Nitrate (as N)	mg/L	1.3	0.12	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	8.00	-	-	-
Phenol	mg/L	-	-	-	-	-
Phosphorus	mg/L	7.2	0.110	0.039	0.033	0.033
Sulfate	mg/L	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	1	2	30	210
Total dissolved solids (TDS)	mg/L	-	258	456	576	518
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**MW2-08**	**MW2-08**	**MW2-08**	**MW2-08**
Sample ID:			**GW-45804-011310-TS-004**	**GW-45804-051910-MB-007**	**GW-45804-110210-TS-006**	**GW-45804-051811-MMD-012**
Sample Date:			**1/13/2010**	**5/19/2010**	**11/2/2010**	**5/18/2011**
			Original	**Original**	**Original**	**Original**
Parameters:	***Units***	***TLP*** [1]				
Turbidity	NTU	-	6.10	-	-	-
Un-ionized ammonia	mg/L	-	ND(0.000057)	0.00045	0.0096	ND(0.000076)

002795

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**MW2-08**	**MW2-08**	**MW2-08**	**MW2-08**
Sample ID:			**GW-45804-011310-TS-004**	**GW-45804-051910-MB-007**	**GW-45804-110210-TS-006**	**GW-45804-051811-MMD-012**
Sample Date:			**1/13/2010**	**5/19/2010**	**11/2/2010**	**5/18/2011**
			Original	**Original**	**Original**	**Original**
Parameters:	***Units***	***TLP*** [1]				
Field Parameters						
Conductivity, field	mS/cm	-	0.801	0.678	0.971	0.95
Dissolved oxygen (DO), field	mg/L	-	-	5.69	4.3	9.19
Oxidation reduction potential (ORP), field	millivolts	-	-	14	-77	213
pH, field	s.u.	-	6.78	7.38	8.68	6.96
Temperature, field	Deg C	-	7.5	12.12	10.9	6.14
Turbidity, field	NTU	-	255	-	-	3.5
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	390	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	390	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	390	ND(250)	ND(250)	ND(250)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-

002796

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011
			Original	Original	Original	Original
Parameters:	*Units*	*TLP*[1]				
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

002797

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**	**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-110911-TS-007**	**GW-45804-111011-TS-007-1**	**GW-45804-051512-MB-007**	**GW-45804-111212-MB-009**
Sample Date:		**11/9/2011**	**11/10/2011**	**5/15/2012**	**11/12/2012**
		Original	**Original**	**Original**	**Original**
Parameters:	***Units***				
Metals					
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	-	0.00012	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	0.00122	0.00058
Copper (dissolved)	mg/L	-	-	0.0028	0.0036
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	-	0.177	0.0352	0.0074
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0122	0.0098	0.0085
Nickel (dissolved)	mg/L	-	-	0.0052	0.0050
Zinc (dissolved)	mg/L	-	0.0126	0.0090	0.0100
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	294	-	273	329
Ammonia-N	mg/L	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	-	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	ND(10)	19
Chloride	mg/L	ND(6.0)	-	ND(2.0)	2.8
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	9.9	-	11.5	-
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.0	-	3.9	5.0
Escherichia coli	cfu/100mL	ND(2)	-	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	ND(2)	-	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.30)	-	ND(0.10)	0.31
Nitrite (as N)	mg/L	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	-	8.00	7.83
Phenol	mg/L	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.038	-	ND(0.030)	0.054
Sulfate	mg/L	-	-	-	216
Total coliform bacteria	cfu/100mL	2	-	ND(2)	10
Total dissolved solids (TDS)	mg/L	554	-	518	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.43	0.43
Total suspended solids (TSS)	mg/L	-	-	24.4	-

002798

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**	**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-110911-TS-007**	**GW-45804-111011-TS-007-1**	**GW-45804-051512-MB-007**	**GW-45804-111212-MB-009**
Sample Date:		**11/9/2011**	**11/10/2011**	**5/15/2012**	**11/12/2012**
		Original	**Original**	**Original**	**Original**
Parameters:	***Units***				
Turbidity	NTU	-	-	4.80	-
Un-ionized ammonia	mg/L	ND(0.00058)	-	-	ND(0.000040)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:		11/9/2011	11/10/2011	5/15/2012	11/12/2012
		Original	Original	Original	Original
Parameters:	***Units***				
Field Parameters					
Conductivity, field	mS/cm	0.77	-	-	1.21
Dissolved oxygen (DO), field	mg/L	-	-	-	6.66
Oxidation reduction potential (ORP), field	millivolts	-	-	-	248
pH, field	s.u.	7.68	-	-	6.50
Temperature, field	Deg C	10.9	-	-	11.6
Turbidity, field	NTU	94.4	-	-	953
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	-
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	ND(0.020)
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	ND(0.020)
Benzo(g,h,i)perylene	µg/L	-	-	-	0.027
Benzo(k)fluoranthene	µg/L	-	-	-	ND(0.020)
Chrysene	µg/L	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	ND(0.020)

002800

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:		11/9/2011	11/10/2011	5/15/2012	11/12/2012
		Original	Original	Original	Original
Parameters:	*Units*				
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	ND(0.020)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	***Units***				
Metals					
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	-	0.00022	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00295	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	0.0031	0.0038	0.0039
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	-	0.0361	0.0035	0.0019
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0173	0.0067	0.0123
Nickel (dissolved)	mg/L	-	0.0064	0.0046	0.0048
Zinc (dissolved)	mg/L	-	0.0153	0.0071	0.0105
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	263	310	282
Ammonia-N	mg/L	-	ND(0.050)	0.105	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	34	10
Chloride	mg/L	-	2.7	ND(2.0)	ND(2.0)
Color (apparent)	color unit	-	-	-	9.9
Color (apparent)	TCU	17.1	24.3 J	14.5	-
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	ND(3.8)	5.9	2.2
Escherichia coli	cfu/100mL	-	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	ND(2)	0	0
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.98	7.79	7.71
Phenol	mg/L	-	ND(0.0010)	0.0019	0.0016
Phosphorus	mg/L	-	0.073	ND(0.030)	0.052
Sulfate	mg/L	-	147	119	108
Total coliform bacteria	cfu/100mL	-	ND(100)	1	5
Total dissolved solids (TDS)	mg/L	588	448	446	402
Total kjeldahl nitrogen (TKN)	mg/L	-	0.18	0.41	ND(0.43)
Total suspended solids (TSS)	mg/L	59.2	194	65.2	17.2

002802

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	*Units*				
Turbidity	NTU	19.1	8.88	0.58	2.22
Un-ionized ammonia	mg/L	-	ND(0.0000028)	0.000034	ND(0.00048)

002803

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	***Units***				
Field Parameters					
Conductivity, field	mS/cm	-	1.96	0.832	0.886
Dissolved oxygen (DO), field	mg/L	-	6.41	8.16	6.91
Oxidation reduction potential (ORP), field	millivolts	-	-	-	94
pH, field	s.u.	-	5.30	6.16	7.53
Temperature, field	Deg C	-	13.0	10.1	13.12
Turbidity, field	NTU	-	325	230	35.6
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-

002804

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	*Units*				
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002805

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010	GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:		5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.00025	0.00024	0.00050
Boron (dissolved)	mg/L	-	ND(0.050)	0.018	0.011	ND(0.010)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.000035	0.000035	0.000019
Chromium (dissolved)	mg/L	-	ND(0.0010)	0.00102	0.00063	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00010)	ND(0.00010)	0.00023
Copper (dissolved)	mg/L	-	0.0027	0.00376	0.00369	0.0705
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.000050)	0.000129	0.000149
Magnesium (dissolved)	mg/L	-	-	--	--	--
Manganese (dissolved)	mg/L	-	0.0047	0.00072	0.00171	0.00270
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0061	0.00905	0.00905	0.0218
Nickel (dissolved)	mg/L	-	0.0038	0.00453	0.00434	0.00526
Zinc (dissolved)	mg/L	-	0.0047	0.0094	0.0139	0.0034
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	-	325	324	284	188
Ammonia-N	mg/L	-	ND(0.050)	ND(0.050)	0.054	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	13	ND(10)	18	36
Chloride	mg/L	-	ND(10)	ND(2.5)	0.88	2.81
Color (apparent)	color unit	-	7.0		86.6	143
Color (apparent)	TCU	-	-	58.5	--	--
Conductivity	umhos/cm	-	-	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	5.6	5.2	5.1	10.0
Escherichia coli	cfu/100mL	-	0	0	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	ND(2)
Nitrate (as N)	mg/L	-	ND(0.50)	ND(0.10)	ND(0.020)	0.226
Nitrite (as N)	mg/L	-	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	7.90	7.79	7.89	7.66
Phenol	mg/L	-	ND(0.0010)	0.0027	0.0024	ND(0.0013)
Phosphorus	mg/L	-	0.031	0.041	0.0991	0.0517
Sulfate	mg/L	-	106	228	118	135
Total coliform bacteria	cfu/100mL	-	270	30	20	300
Total dissolved solids (TDS)	mg/L	-	437	589	502	413
Total kjeldahl nitrogen (TKN)	mg/L	-	0.20	0.53	0.27	1.00
Total suspended solids (TSS)	mg/L	-	ND(2.0)	74.2	567	81.7

002806

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010	GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:		5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Turbidity	NTU	-	0.62	31.9	64.5	26.6
Un-ionized ammonia	mg/L	-	-	ND(0.0070)	0.0054	ND(0.000080)

002807

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010	GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:		5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Field Parameters						
Conductivity, field	mS/cm	0.686	0.681	0.678	0.527	--
Dissolved oxygen (DO), field	mg/L	6.91	6.02	3.1	4.96	--
Oxidation reduction potential (ORP), field	millivolts	94	67	55	110	--
pH, field	s.u.	7.53	7.51	8.74	8.74	--
Temperature, field	Deg C	13.12	9.16	13.08	10.58	--
Turbidity, field	NTU	35.6	-	44.1	177	--
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--
Acenaphthene	µg/L	-	-	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--
Chrysene	µg/L	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--
Fluoranthene	µg/L	-	-	--	--	--
Fluorene	µg/L	-	-	--	--	--

002808

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010	GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:		5/30/2014	11/25/2014	11/10/2015	5/17/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	*Units*					
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--
Naphthalene	µg/L	-	-	--	--	--
Phenanthrene	µg/L	-	-	--	--	--
Pyrene	µg/L	-	-	--	--	--

002809

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-060217-TS-010**	**GW-45804-113017-TS-010**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	***Units***		
Metals			
Arsenic (dissolved)	mg/L	-	-
Boron (dissolved)	mg/L	-	-
Cadmium (dissolved)	mg/L	-	-
Chromium (dissolved)	mg/L	-	-
Cobalt (dissolved)	mg/L	-	-
Copper (dissolved)	mg/L	-	-
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	-	-
Magnesium (dissolved)	mg/L	-	-
Manganese (dissolved)	mg/L	0.207	0.00058
Mercury (dissolved)	mg/L	-	-
Molybdenum (dissolved)	mg/L	-	-
Nickel (dissolved)	mg/L	-	-
Zinc (dissolved)	mg/L	-	-
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	242	219
Ammonia-N	mg/L	ND(0.038)	ND(0.161)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-
Chemical oxygen demand (COD)	mg/L	-	-
Chloride	mg/L	-	-
Color (apparent)	color unit	-	-
Color (apparent)	TCU	-	-
Conductivity	umhos/cm	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.4	ND(6.4)
Escherichia coli	cfu/100mL	0	0
Fecal coliform bacteria	cfu/100mL	-	-
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	-	-
pH, lab	s.u.	-	-
Phenol	mg/L	-	-
Phosphorus	mg/L	0.0276	0.0388
Sulfate	mg/L	-	-
Total coliform bacteria	cfu/100mL	-	-
Total dissolved solids (TDS)	mg/L	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	-

002810

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-060217-TS-010**	**GW-45804-113017-TS-010**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	***Units***		
Turbidity	NTU	-	-
Un-ionized ammonia	mg/L	ND(0.0002)	ND(0.0016)

002811

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-060217-TS-010**	**GW-45804-113017-TS-010**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	***Units***		
Field Parameters			
Conductivity, field	mS/cm	0.528	0.247
Dissolved oxygen (DO), field	mg/L	1.57	2.15
Oxidation reduction potential (ORP), field	millivolts	125	107
pH, field	s.u.	7.45	7.79
Temperature, field	Deg C	11.2	8.08
Turbidity, field	NTU	90.4	37.3
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-
Semi-Volatiles			
1-Methylnaphthalene	µg/L	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-
2-Methylnaphthalene	µg/L	-	-
Acenaphthene	µg/L	-	-
Acenaphthylene	µg/L	-	-
Anthracene	µg/L	-	-
Benzo(a)anthracene	µg/L	-	-
Benzo(a)pyrene	µg/L	-	-
Benzo(b)fluoranthene	µg/L	-	-
Benzo(g,h,i)perylene	µg/L	-	-
Benzo(k)fluoranthene	µg/L	-	-
Chrysene	µg/L	-	-
Dibenz(a,h)anthracene	µg/L	-	-
Fluoranthene	µg/L	-	-
Fluorene	µg/L	-	-

002812

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW2-08**	**MW2-08**
Sample ID:		**GW-45804-060217-TS-010**	**GW-45804-113017-TS-010**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	***Units***		
Indeno(1,2,3-cd)pyrene	µg/L	-	-
Naphthalene	µg/L	-	-
Phenanthrene	µg/L	-	-
Pyrene	µg/L	-	-

002813

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010
		Original	Original	Duplicate	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.0049	0.0013	0.0013	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-
Magnesium (dissolved)	mg/L	62.4	-	-	-
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0053
Mercury (dissolved)	mg/L	-	-	-	-
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135
Nickel (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	0.0199	0.0482	0.0052	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	300	279	276	316
Ammonia-N	mg/L	0.123	0.077	0.078	0.073
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-
Chloride	mg/L	25.1	28.4	31.6	27.5
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	10.2	16.9	19.7	38.3
Conductivity	umhos/cm	1080	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.8	1.7	3.5
Escherichia coli	cfu/100mL	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	1
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	7.97	-	-	-
Phenol	mg/L	-	-	-	-
Phosphorus	mg/L	0.378	0.105	0.090	0.093
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	3	1	10	120
Total dissolved solids (TDS)	mg/L	736	618	690	766
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-

002814

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010
		Original	Original	Duplicate	Original
Parameters:	**Units**				
Turbidity	NTU	2.70	-	-	-
Un-ionized ammonia	mg/L	0.0000030	0.00118	0.00119	0.000095
Field Parameters					
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02
Dissolved oxygen (DO), field	mg/L	4.42	-	-	1.47
Oxidation reduction potential (ORP), field	millivolts	-	38	38	394
pH, field	s.u.	5.05	7.75	7.75	6.82
Temperature, field	Deg C	9.6	12.5	12.5	8.4
Turbidity, field	NTU	424	-	-	-

002815

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010
		Original	Original	Duplicate	Original
Parameters:	**Units**				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	380	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002816

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**	**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-110210-TS-002**	**GW-45804-051711-MMD-009**	**GW-45804-110911-TS-001**	**GW-45804-051512-MB-011**
Sample Date:		**11/2/2010**	**5/17/2011**	**11/9/2011**	**5/15/2012**
		Duplicate	**Original**	**Original**	**Original**
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	0.0071	0.0016	0.0036	0.0066
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0147	0.0132	0.0152	0.0328
Nickel (dissolved)	mg/L	-	-	-	0.0021
Zinc (dissolved)	mg/L	ND(0.0030)	0.0043	0.0147	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	322	278	276	250
Ammonia-N	mg/L	0.058	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	15
Chloride	mg/L	27.4	21.8	55.7	43.9
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	42.9	34.4	16.3	52.4
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.0	3.1	2.5	ND(5.0)
Escherichia coli	cfu/100mL	0	0	2	0
Fecal coliform bacteria	cfu/100mL	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	-	-	-	7.96
Phenol	mg/L	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.079	0.075	ND(0.030)	0.240
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	430	1	60	0
Total dissolved solids (TDS)	mg/L	778	482	1040	790
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.20
Total suspended solids (TSS)	mg/L	-	-	-	303

002817

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**	**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-110210-TS-002**	**GW-45804-051711-MMD-009**	**GW-45804-110911-TS-001**	**GW-45804-051512-MB-011**
Sample Date:		**11/2/2010**	**5/17/2011**	**11/9/2011**	**5/15/2012**
		Duplicate	**Original**	**Original**	**Original**
Parameters:	**Units**				
Turbidity	NTU	-	-	-	149
Un-ionized ammonia	mg/L	0.000076	ND(0.00012)	ND(0.000049)	-
Field Parameters					
Conductivity, field	mS/cm	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	1.47	-	1.47	2.87
Oxidation reduction potential (ORP), field	millivolts	394	-	120	51
pH, field	s.u.	6.82	7.08	6.68	6.67
Temperature, field	Deg C	8.4	8.61	8.7	9.81
Turbidity, field	NTU	-	150	99	504

002818

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-110210-TS-002	GW-45804-051711-MMD-009	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Duplicate	Original	Original	Original
Parameters:	**Units**				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-016
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	0.0019	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	0.0273	0.0014	0.0042	0.0055
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0203	0.0148	0.0165	0.0459
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0075	ND(0.0030)	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	309	275	295	262
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	11	30	12
Chloride	mg/L	65.4	46	43.1	46.8
Color (apparent)	color unit	-	-	-	10.4
Color (apparent)	TCU	45.5	34.0	50.7	-
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	2.2	2.9	2.7
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)
pH, lab	s.u.	7.76	7.67	7.62	7.62
Phenol	mg/L	ND(0.0010)	0.0030	0.0012	0.0045
Phosphorus	mg/L	0.301	0.038	0.166	0.074
Sulfate	mg/L	495	292	445	222
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5
Total dissolved solids (TDS)	mg/L	1130	714	1020	613
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	1.34	ND(0.52)
Total suspended solids (TSS)	mg/L	642	99.0	209	106

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**	**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-111312-MB-013**	**GW-45804-052213-TS-008**	**GW-45804-111413-TS-014**	**GW-45804-052914-MB-016**
Sample Date:		**11/13/2012**	**5/22/2013**	**11/14/2013**	**5/29/2014**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Turbidity	NTU	11.8	13.5	6.82	4.84
Un-ionized ammonia	mg/L	ND(0.00042)	ND(0.0000015)	ND(0.000017)	ND(0.00017)
Field Parameters					
Conductivity, field	mS/cm	1.21	1.16	1.46	0.946
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73
Oxidation reduction potential (ORP), field	millivolts	16	-	-	105
pH, field	s.u.	7.58	5.09	6.16	7.24
Temperature, field	Deg C	9.8	11.3	10.4	8.09
Turbidity, field	NTU	473	393	25	194

002821

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-016
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014
		Original	Original	Original	Original
Parameters:	**Units**				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(380)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	0.094	-	-
2-Methylnaphthalene	µg/L	-	0.212	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-
Acridine	µg/L	-	ND(4.0)	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	-	-
Chrysene	µg/L	-	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-
Fluoranthene	µg/L	-	ND(0.020)	-	-
Fluorene	µg/L	-	ND(0.020)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-
Naphthalene	µg/L	-	0.113	-	-
Phenanthrene	µg/L	-	ND(0.020)	-	-
Pyrene	µg/L	-	ND(0.020)	-	-

002822

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017	GW-45804-111616-TS-014
Sample Date:		11/26/2014	5/28/2015	11/10/2015	5/18/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00025	ND(0.0010)	0.00026
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	0.024	ND(0.10)	0.022
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	0.000015	ND(0.00010)	0.000013
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00065	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00048	ND(0.0020)	ND(0.00065)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.10)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.000080	ND(0.00050)	0.000067
Magnesium (dissolved)	mg/L	-	--	--	--	--
Manganese (dissolved)	mg/L	ND(0.0010)	0.0012	ND(0.00050)	0.0386	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0300	0.121	0.0182	0.191	0.0162
Nickel (dissolved)	mg/L	0.0028	0.0043	0.00233	0.0083	0.00226
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0013	ND(0.010)	0.0089
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	283	250	279	239	277
Ammonia-N	mg/L	0.051	ND(0.113)	ND(0.050)	ND(0.036)	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	14	13
Chloride	mg/L	52.5	59.6	44.1	64.3	56.9
Color (apparent)	color unit	13.3			17.1	4.2
Color (apparent)	TCU	-	11.2	17.2	--	--
Conductivity	umhos/cm	-	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.5	1.7	3.4	2.9	2.4
Escherichia coli	cfu/100mL	1	0	0	0	0
Fecal coliform bacteria	cfu/100mL	1	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	0.032	ND(0.020)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.010)
pH, lab	s.u.	7.52	7.81	7.62	7.93	7.24
Phenol	mg/L	ND(0.0010)	0.0017	0.0019	ND(0.0010)	ND(0.0068)
Phosphorus	mg/L	ND(0.030)	0.042	0.035	0.0779	0.0186
Sulfate	mg/L	456	474	413	506	361
Total coliform bacteria	cfu/100mL	50	30	170	ND(10)	30
Total dissolved solids (TDS)	mg/L	994	882	884	1080	887
Total kjeldahl nitrogen (TKN)	mg/L	0.18	ND(0.15)	0.23	0.25	0.24
Total suspended solids (TSS)	mg/L	72.8	116	42.0	101	11.7

002823

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017	GW-45804-111616-TS-014
Sample Date:		11/26/2014	5/28/2015	11/10/2015	5/18/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Turbidity	NTU	44.8	6.42	36.7	70.5	15.0
Un-ionized ammonia	mg/L	0.00030	0.00103	ND(0.0017)	0.0021	ND(0.000045)
Field Parameters						
Conductivity, field	mS/cm	434	0.934	1.03	0.983	0.953
Dissolved oxygen (DO), field	mg/L	8.84	8.93	0	1.26	0
Oxidation reduction potential (ORP), field	millivolts	80	175	-40	78	85
pH, field	s.u.	7.48	7.52	8.31	8.32	6.96
Temperature, field	Deg C	8.44	12.6	12.08	13.77	11.08
Turbidity, field	NTU	-	211	0.3	21	14.8

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017	GW-45804-111616-TS-014
Sample Date:		11/26/2014	5/28/2015	11/10/2015	5/18/2016	11/16/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	--	--	--	--
Acenaphthene	µg/L	-	--	--	--	--
Acenaphthylene	µg/L	-	--	--	--	--
Acridine	µg/L	-	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	--	--	--	--
Chrysene	µg/L	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	--	--	--	--
Fluoranthene	µg/L	-	--	--	--	--
Fluorene	µg/L	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	--	--	--	--
Naphthalene	µg/L	-	--	--	--	--
Phenanthrene	µg/L	-	--	--	--	--
Pyrene	µg/L	-	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-060217-TS-015**	**GW-45804-113017-TS-012**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	**Units**		
Metals			
Arsenic (dissolved)	mg/L	-	-
Boron (dissolved)	mg/L	-	-
Cadmium (dissolved)	mg/L	-	-
Chromium (dissolved)	mg/L	-	-
Cobalt (dissolved)	mg/L	-	-
Copper (dissolved)	mg/L	-	-
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	-	-
Magnesium (dissolved)	mg/L	-	-
Manganese (dissolved)	mg/L	0.0185	ND(0.00050)
Mercury (dissolved)	mg/L	-	-
Molybdenum (dissolved)	mg/L	-	-
Nickel (dissolved)	mg/L	-	-
Zinc (dissolved)	mg/L	-	-
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	270	286
Ammonia-N	mg/L	ND(0.111)	ND(0.264)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-
Chemical oxygen demand (COD)	mg/L	-	-
Chloride	mg/L	-	-
Color (apparent)	color unit	-	-
Color (apparent)	TCU	-	-
Conductivity	umhos/cm	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.7	ND(3.0)
Escherichia coli	cfu/100mL	1	1
Fecal coliform bacteria	cfu/100mL	-	-
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	-	-
pH, lab	s.u.	-	-
Phenol	mg/L	-	-
Phosphorus	mg/L	0.0134	0.0245
Sulfate	mg/L	-	-
Total coliform bacteria	cfu/100mL	-	-
Total dissolved solids (TDS)	mg/L	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	-

002826

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-060217-TS-015**	**GW-45804-113017-TS-012**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	**Units**		
Turbidity	NTU	-	-
Un-ionized ammonia	mg/L	ND(0.0006)	ND(0.0018)
Field Parameters			
Conductivity, field	mS/cm	0.947	0.536
Dissolved oxygen (DO), field	mg/L	0	0
Oxidation reduction potential (ORP), field	millivolts	44	90
pH, field	s.u.	7.4	7.62
Temperature, field	Deg C	11.21	8.56
Turbidity, field	NTU	2.2	17.8

002827

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW3-08**	**MW3-08**
Sample ID:		**GW-45804-060217-TS-015**	**GW-45804-113017-TS-012**
Sample Date:		**6/2/2017**	**11/30/2017**
Parameters:	**Units**		
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-
		-	-
Semi-Volatiles			
1-Methylnaphthalene	µg/L	-	-
2-Methylnaphthalene	µg/L	-	-
Acenaphthene	µg/L	-	-
Acenaphthylene	µg/L	-	-
Acridine	µg/L	-	-
Anthracene	µg/L	-	-
Benzo(a)anthracene	µg/L	-	-
Benzo(a)pyrene	µg/L	-	-
Benzo(b)fluoranthene	µg/L	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-
Benzo(g,h,i)perylene	µg/L	-	-
Benzo(k)fluoranthene	µg/L	-	-
Carcinogenic potency equivalent	µg/L	-	-
Chrysene	µg/L	-	-
Dibenz(a,h)anthracene	µg/L	-	-
Fluoranthene	µg/L	-	-
Fluorene	µg/L	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-
Naphthalene	µg/L	-	-
Phenanthrene	µg/L	-	-
Pyrene	µg/L	-	-

002828

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MMD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	0.052
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	0.00122
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0299	0.0180	0.0235	0.0192
Nickel (dissolved)	mg/L	-	-	-	0.0110
Zinc (dissolved)	mg/L	0.0691	0.0131	0.0090	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	367	416	378	388
Ammonia-N	mg/L	0.069	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)
Chloride	mg/L	94.6	73.6	70.4	81.3
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	20.3	36.5	77.5	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0
Escherichia coli	cfu/100mL	0	0	ND(2)	-
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	-	-	-	7.54
Phenol	mg/L	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.158	0.098	0.479	0.100
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	0	40	2	-
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21
Total suspended solids (TSS)	mg/L	-	-	-	24.0
Turbidity	NTU	-	-	-	-
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	-
Field Parameters					
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06
Dissolved oxygen (DO), field	mg/L	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-
pH, field	s.u.	7.44	5.95	7.00	6.43

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MMD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012
		Original	Original	Original	Original
Parameters:	**Units**				
Temperature, field	Deg C	11.7	7.75	10.5	11.89
Turbidity, field	NTU	-	455	389	-

002830

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MMD-006	GW-45804-110911-TS-003	GW-45804-051412-MB-001
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012
		Original	Original	Original	Original
Parameters:	**Units**				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	340	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002831

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/23/2012	11/12/2012	5/22/2013	11/14/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	0.072	0.056	0.058
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00020	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00373	0.00056	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	0.0014	ND(0.0010)
Iron (dissolved)	mg/L	-	0.320	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	-	0.320	0.416	0.220
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0461	0.0204	0.0195
Nickel (dissolved)	mg/L	-	0.0053	0.0083	0.0063
Zinc (dissolved)	mg/L	-	0.0053	0.0105	0.0041
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	387	405	372
Ammonia-N	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	23	13	21
Chloride	mg/L	-	72.3	75	69.2
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	91.7	39.4 J	29.7	61.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	1.7	1.6	2.0
Escherichia coli	cfu/100mL	0	ND(2)	ND(10)	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.50)	0.13
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.50)	ND(0.10)
pH, lab	s.u.	-	7.67	7.60	7.58
Phenol	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	0.228	0.058	0.109
Sulfate	mg/L	-	697	731	691
Total coliform bacteria	cfu/100mL	16	2	ND(100)	ND(10)
Total dissolved solids (TDS)	mg/L	-	1540	1450	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	ND(0.15)	ND(0.15)	0.18
Total suspended solids (TSS)	mg/L	-	1370	100	361
Turbidity	NTU	22.0	4.60 J	10.3	6.56
Un-ionized ammonia	mg/L	-	ND(0.00049)	ND(0.0000023)	ND(0.000019)
Field Parameters					
Conductivity, field	mS/cm	2.03	1.75	1.99	0.96
Dissolved oxygen (DO), field	mg/L	-	4.99	6.26	7.73
Oxidation reduction potential (ORP), field	millivolts	-	18	47	-
pH, field	s.u.	6.27	7.57	5.20	6.20

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/23/2012	11/12/2012	5/22/2013	11/14/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Temperature, field	Deg C	12.51	12.0	13.4	10.4
Turbidity, field	NTU	-	355	594	56

002833

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/23/2012	11/12/2012	5/22/2013	11/14/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	ND(0.028)	-	-
2-Methylnaphthalene	µg/L	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	ND(4.0)	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	0.0061
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	ND(0.060)	-
Chrysene	µg/L	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	-	ND(0.020)	ND(0.020)	-
Fluorene	µg/L	-	ND(0.020)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	ND(0.020)	-
Naphthalene	µg/L	-	ND(0.020)	ND(0.020)	-
Phenanthrene	µg/L	-	ND(0.020)	ND(0.020)	-
Pyrene	µg/L	-	ND(0.020)	ND(0.020)	-

002834

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007
Sample Date:		5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)
Boron (dissolved)	mg/L	0.052	0.062	0.060	ND(0.10)	0.054
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000049
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	0.00068
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	0.00021
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00050
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	0.270	0.0861	0.167	0.154	0.207
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0201	0.0233	0.0199	0.0242	0.0188
Nickel (dissolved)	mg/L	0.0061	0.0051	0.0055	0.0052	0.00675
Zinc (dissolved)	mg/L	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)	0.0017
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	360	338	343	349	338
Ammonia-N	mg/L	ND(0.067)	ND(0.050)	ND(0.050)	ND(0.050)	0.030
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	68.1	65	77.6	82.6	70.8
Color (apparent)	color unit	1.7 J	10.9			ND(1.0)
Color (apparent)	TCU	-	-	2.4	1.6	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(1.0)	1.1	1.5	2.3	3.5
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.32	0.18	0.18
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.40	7.66	7.77	7.63	7.79
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0058	0.0029	ND(0.0010)
Phosphorus	mg/L	ND(0.030)	0.032	ND(0.030)	ND(0.030)	ND(0.0030)
Sulfate	mg/L	621	695	665	755	680
Total coliform bacteria	cfu/100mL	0	0	9	1	1
Total dissolved solids (TDS)	mg/L	1370	1390	1300	1380	1500
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.21)	ND(0.15)	ND(0.15)	0.56	ND(0.15)
Total suspended solids (TSS)	mg/L	7.2	10.0	8.5	2.4	ND(2.0)
Turbidity	NTU	0.22	4.22	ND(0.44)	0.69	0.16
Un-ionized ammonia	mg/L	0.00024	ND(0.00012)	ND(0.00015)	ND(0.0016)	0.00029
Field Parameters						
Conductivity, field	mS/cm	2.04	-	1.42	1.4	1.22
Dissolved oxygen (DO), field	mg/L	0.58	-	2.21	0	5.67
Oxidation reduction potential (ORP), field	millivolts	99	-	181	-7	106
pH, field	s.u.	7.11	7.07	6.93	8.15	7.58

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007
Sample Date:		5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Temperature, field	Deg C	12.82	8.5	15.63	10.14	11.88
Turbidity, field	NTU	57	-	0	0.6	1

002836

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007
Sample Date:		5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-			--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	ND(100)	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	ND(250)	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	ND(250)	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--
Acenaphthene	µg/L	-	-	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--
Acridine	µg/L	-	-	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--
Chrysene	µg/L	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--
Fluoranthene	µg/L	-	-	--	--	--
Fluorene	µg/L	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--
Naphthalene	µg/L	-	-	--	--	--
Phenanthrene	µg/L	-	-	--	--	--
Pyrene	µg/L	-	-	--	--	--

002837

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW4-08**
Sample ID:		**GW-45804-111516-TS-008**
Sample Date:		**11/15/2016**
		Original
Parameters:	**Units**	
Metals		
Arsenic (dissolved)	mg/L	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0010)
Copper (dissolved)	mg/L	0.0517
Iron (dissolved)	mg/L	ND(0.10)
Lead (dissolved)	mg/L	ND(0.00050)
Manganese (dissolved)	mg/L	0.160
Mercury (dissolved)	mg/L	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0211
Nickel (dissolved)	mg/L	0.0064
Zinc (dissolved)	mg/L	ND(0.010)
General Chemistry		
Alkalinity, total (as CaCO3)	mg/L	342
Ammonia-N	mg/L	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)
Chemical oxygen demand (COD)	mg/L	10
Chloride	mg/L	95.9
Color (apparent)	color unit	ND(2.0)
Color (apparent)	TCU	–
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.1
Escherichia coli	cfu/100mL	0
Fecal coliform bacteria	cfu/100mL	0
Nitrate (as N)	mg/L	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)
pH, lab	s.u.	7.05
Phenol	mg/L	0.0020
Phosphorus	mg/L	0.0038
Sulfate	mg/L	816
Total coliform bacteria	cfu/100mL	0
Total dissolved solids (TDS)	mg/L	1620
Total kjeldahl nitrogen (TKN)	mg/L	0.15
Total suspended solids (TSS)	mg/L	ND(2.0)
Turbidity	NTU	1.21
Un-ionized ammonia	mg/L	0.000194
Field Parameters		
Conductivity, field	mS/cm	1.69
Dissolved oxygen (DO), field	mg/L	0
Oxidation reduction potential (ORP), field	millivolts	77
pH, field	s.u.	7.24

002838

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW4-08**
Sample ID:		**GW-45804-111516-TS-008**
Sample Date:		**11/15/2016**
		Original
Parameters:	**Units**	
Temperature, field	Deg C	10.39
Turbidity, field	NTU	2

002839

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW4-08**
Sample ID:		**GW-45804-111516-TS-008**
Sample Date:		**11/15/2016**
		Original
Parameters:	**Units**	
Petroleum Products		
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	–
Total Petroleum Hydrocarbons (C10-C16)	µg/L	–
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	–
Total Petroleum Hydrocarbons (C16-C34)	µg/L	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)
Semi-Volatiles		
1-Methylnaphthalene	µg/L	–
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	–
2-Methylnaphthalene	µg/L	–
Acenaphthene	µg/L	–
Acenaphthylene	µg/L	–
Acridine	µg/L	–
Anthracene	µg/L	ND(0.020)
Benzo(a)anthracene	µg/L	–
Benzo(a)pyrene	µg/L	ND(0.0050)
Benzo(b)fluoranthene	µg/L	–
Benzo(b)pyridine (Quinoline)	µg/L	–
Benzo(g,h,i)perylene	µg/L	–
Benzo(k)fluoranthene	µg/L	–
Carcinogenic potency equivalent	µg/L	–
Chrysene	µg/L	–
Dibenz(a,h)anthracene	µg/L	–
Fluoranthene	µg/L	–
Fluorene	µg/L	–
Indeno(1,2,3-cd)pyrene	µg/L	–
Naphthalene	µg/L	–
Phenanthrene	µg/L	–
Pyrene	µg/L	–

002840

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051910-MB-009	GW-45804-110210-TS-011	GW-45804-051711-MMD-007	GW-45804-110911-TS-002
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012
Boron (dissolved)	mg/L	-	-	-	-
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-
Iron (dissolved)	mg/L	0.400	0.487	0.301	0.781
Lead (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.292
Mercury (dissolved)	mg/L	-	-	-	-
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0360
Nickel (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	459	427	376	387
Ammonia-N	mg/L	0.117	0.084	0.081	0.052
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-
Chloride	mg/L	81.4	203	87.3	83.4
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	25.4	93.5	139	66.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.0	2.7	3.1
Escherichia coli	cfu/100mL	0	0	0	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)
pH, lab	s.u.	-	-	-	-
Phenol	mg/L	-	-	-	-
Phosphorus	mg/L	0.974	1.05	1.23	1.49
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	0	4	3	2
Total dissolved solids (TDS)	mg/L	1950	1920	1700	1730
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-
Turbidity	NTU	-	-	-	-
Un-ionized ammonia	mg/L	0.00085	0.000021	0.00030	0.00014

002841

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051910-MB-009	GW-45804-110210-TS-011	GW-45804-051711-MMD-007	GW-45804-110911-TS-002
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011
		Original	Original	Original	Original
Parameters:	Units				

002842

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW4-09**	**MW4-09**	**MW4-09**	**MW4-09**
Sample ID:		**GW-45804-051910-MB-009**	**GW-45804-110210-TS-011**	**GW-45804-051711-MMD-007**	**GW-45804-110911-TS-002**
Sample Date:		**5/19/2010**	**11/2/2010**	**5/17/2011**	**11/9/2011**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.96	2.41	2.55	2.46
Dissolved oxygen (DO), field	mg/L	-	3.39	-	-
Oxidation reduction potential (ORP), field	millivolts	-	5	-	-
pH, field	s.u.	7.46	6.00	7.3	7.04
Temperature, field	Deg C	11.4	11.4	7.68	11.4
Turbidity, field	NTU	-	-	-	-5
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	570	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1520	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	3900	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(250)	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	0.0309	0.0159	0.0050	0.0074
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-

002843

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051910-MB-009	GW-45804-110210-TS-011	GW-45804-051711-MMD-007	GW-45804-110911-TS-002
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011
		Original	Original	Original	Original
Parameters:	**Units**				
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-009
Sample Date:		5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.059	-	0.059	0.065
Cadmium (dissolved)	mg/L	0.00010	-	0.00011	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00231	-	0.00186	0.00287
Copper (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.099	-	ND(0.050)	0.247
Lead (dissolved)	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.372	-	0.422	0.317
Mercury (dissolved)	mg/L	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0317	-	0.0226	0.0462
Nickel (dissolved)	mg/L	0.0054	-	0.0110	0.0058
Zinc (dissolved)	mg/L	ND(0.0030)	-	0.0073	0.0054
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	351	-	396	383
Ammonia-N	mg/L	ND(0.050)	-	ND(0.050)	0.066
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	-	13	21
Chloride	mg/L	78.0	-	80.4	66
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	-	271	11.2 J	33.5
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.7	-	1.8	1.6
Escherichia coli	cfu/100mL	-	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	0.13	-	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.50)
pH, lab	s.u.	7.67	-	7.74	7.73
Phenol	mg/L	ND(0.0010)	-	ND(0.0010)	0.0040
Phosphorus	mg/L	0.672	-	0.293	0.906
Sulfate	mg/L	-	-	718	796
Total coliform bacteria	cfu/100mL	-	0	10	ND(10)
Total dissolved solids (TDS)	mg/L	1740	-	1600	1540
Total kjeldahl nitrogen (TKN)	mg/L	0.19	-	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	5280	-	528	1710
Turbidity	NTU	-	67.0	2.60 J	94.0
Un-ionized ammonia	mg/L	-	-	ND(0.0065)	0.0000073

002845

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-009
Sample Date:		5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original
Parameters:	Units				

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-009
Sample Date:		5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	2.13	2.1	1.88	1.98
Dissolved oxygen (DO), field	mg/L	-	-	5.47	8.74
Oxidation reduction potential (ORP), field	millivolts	-	-	-78	-8
pH, field	s.u.	6.27	6.27	8.70	5.54
Temperature, field	Deg C	10.32	13.03	13.3	14.5
Turbidity, field	NTU	-	-	640	-5
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0121	-	ND(0.010)	0.0063
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	ND(0.020)	ND(0.020)

002847

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051412-MB-002	GW-45804-052312-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TS-009
Sample Date:		5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original
Parameters:	Units				
Fluorene	µg/L	-	-	ND(0.020)	ND(0.039)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	ND(0.020)	ND(0.020)

002848

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111015-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.070	0.059	0.071	0.064	0.10
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00144	0.00061	0.00145	0.00065	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)
Iron (dissolved)	mg/L	1.66	0.221	0.382	0.380	0.13
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.218	0.182	0.234	0.169	0.137
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0361	0.0445	0.0397	0.0415	0.0532
Nickel (dissolved)	mg/L	0.0023	0.0022	ND(0.0020)	0.0022	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0095	0.0091	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	350	309	329	310	346
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.131)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	42	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	67.4	73.5	69	63.7	71.4
Color (apparent)	color unit	-	12.0	16.9	--	--
Color (apparent)	TCU	117	-	-	17.7	7.8
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.0	2.0	1.7	1.3	1.9
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	0.24	ND(0.50)	0.10	0.24
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.58	7.46	7.72	7.75	7.73
Phenol	mg/L	ND(0.0010)	0.0018	ND(0.0010)	0.0038	0.0030
Phosphorus	mg/L	1.75	0.070	0.097	0.045	ND(0.030)
Sulfate	mg/L	702	646	710	755	716
Total coliform bacteria	cfu/100mL	ND(10)	5	0	0	1
Total dissolved solids (TDS)	mg/L	1480	1360	1460	1280	1310
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	ND(0.15)	ND(0.15)	0.46	0.20
Total suspended solids (TSS)	mg/L	2950	110	61.2	23.3	10.4
Turbidity	NTU	19.4	22.0	9.33	13.9	8.22
Un-ionized ammonia	mg/L	ND(0.000018)	ND(0.00018)	ND(0.00016)	0.00041	ND(0.0019)

002849

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111015-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	Units					

002850

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111015-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	2.01	2	0.059	1.69	1.69
Dissolved oxygen (DO), field	mg/L	6.45	8.95	8.44	1.63	1.63
Oxidation reduction potential (ORP), field	millivolts	-	10	19	191	191
pH, field	s.u.	6.17	7.2	7.21	6.98	6.98
Temperature, field	Deg C	11.2	9.82	10.23	14.98	14.98
Turbidity, field	NTU	556	54.5	-	34.3	34.3
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	280	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	280	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	300	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	580	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--
Acenaphthene	µg/L	-	-	-	--	--
Acenaphthylene	µg/L	-	-	-	--	--
Acridine	µg/L	-	-	-	--	--
Anthracene	µg/L	ND(0.020)	0.038	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0064	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--
Chrysene	µg/L	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--
Fluoranthene	µg/L	-	-	-	--	--

002851

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111015-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Fluorene	µg/L	-	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--
Naphthalene	µg/L	-	-	-	--	--
Phenanthrene	µg/L	-	-	-	--	--
Pyrene	µg/L	-	-	-	--	--

002852

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051716-TS-008	GW-45804-111516-TS-007	GW-45804-060217-TS-014	GW-45804-112917-TS-008
Sample Date:		5/17/2016	11/15/2016	6/2/2017	11/29/2017
		Original	Original		
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.00010)	0.00017	-	-
Boron (dissolved)	mg/L	0.056	0.074	-	-
Cadmium (dissolved)	mg/L	0.000012	0.000021	-	-
Chromium (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	-
Cobalt (dissolved)	mg/L	0.00023	0.00036	-	-
Copper (dissolved)	mg/L	0.00035	0.00287	-	-
Iron (dissolved)	mg/L	0.045	0.410	0.055	0.38
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	-	-
Manganese (dissolved)	mg/L	0.160	0.126	0.127	0.0711
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	-
Molybdenum (dissolved)	mg/L	0.0268	0.0450	-	-
Nickel (dissolved)	mg/L	0.00136	0.00142	-	-
Zinc (dissolved)	mg/L	0.0029	ND(0.0010)	-	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	314	313	322	323
Ammonia-N	mg/L	0.037	0.073	ND(0.020)	0.294
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	-
Chemical oxygen demand (COD)	mg/L	ND(10)	14	-	-
Chloride	mg/L	64.4	77.2	-	-
Color (apparent)	color unit	3.8	13.2	-	-
Color (apparent)	TCU	--	--	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.3	1.6	3.5
Escherichia coli	cfu/100mL	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	-	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	-	-
pH, lab	s.u.	7.84	7.24	-	-
Phenol	mg/L	ND(0.0010)	0.0034	-	-
Phosphorus	mg/L	0.0046	0.0063	0.0061	0.0156
Sulfate	mg/L	683	710	-	-
Total coliform bacteria	cfu/100mL	1	0	-	-
Total dissolved solids (TDS)	mg/L	1420	1460	-	-
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	-	-
Total suspended solids (TSS)	mg/L	2.8	9.5	-	-
Turbidity	NTU	1.41	3.99	-	-
Un-ionized ammonia	mg/L	0.00058	0.000237	ND(0.0001)	0.0026

002853

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051716-TS-008	GW-45804-111516-TS-007	GW-45804-060217-TS-014	GW-45804-112917-TS-008
Sample Date:		5/17/2016	11/15/2016	6/2/2017	11/29/2017
		Original	Original		
Parameters:	Units				

002854

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW4-09**	**MW4-09**	**MW4-09**	**MW4-09**
Sample ID:		**GW-45804-051716-TS-008**	**GW-45804-111516-TS-007**	**GW-45804-060217-TS-014**	**GW-45804-112917-TS-008**
Sample Date:		**5/17/2016**	**11/15/2016**	**6/2/2017**	**11/29/2017**
		Original	**Original**		
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.04	1.58	1.57	1.09
Dissolved oxygen (DO), field	mg/L	0	0.15	0.19	0
Oxidation reduction potential (ORP), field	millivolts	45	-55	-38	41
pH, field	s.u.	7.66	7.09	7.15	7.68
Temperature, field	Deg C	15.72	11.96	13.14	10.04
Turbidity, field	NTU	6.6	1.4	20.4	2.4
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	-	-
Semi-Volatiles					
1-Methylnaphthalene	µg/L	--	--	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	-	-
2-Methylnaphthalene	µg/L	--	--	-	-
Acenaphthene	µg/L	--	--	-	-
Acenaphthylene	µg/L	--	--	-	-
Acridine	µg/L	--	--	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	--	--	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	--	--	-	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	-	-
Benzo(g,h,i)perylene	µg/L	--	--	-	-
Benzo(k)fluoranthene	µg/L	--	--	-	-
Carcinogenic potency equivalent	µg/L	--	--	-	-
Chrysene	µg/L	--	--	-	-
Dibenz(a,h)anthracene	µg/L	--	--	-	-
Fluoranthene	µg/L	--	--	-	-

002855

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-051716-TS-008	GW-45804-111516-TS-007	GW-45804-060217-TS-014	GW-45804-112917-TS-008
Sample Date:		5/17/2016	11/15/2016	6/2/2017	11/29/2017
		Original	Original		
Parameters:	Units				
Fluorene	µg/L	--	--	-	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	-	-
Naphthalene	µg/L	--	--	-	-
Phenanthrene	µg/L	--	--	-	-
Pyrene	µg/L	--	--	-	-

002856

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011
			Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**					
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-
Boron (dissolved)	mg/L		-	-	-	-	-
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L		-	-	-	-	-
Chromium (dissolved)	mg/L		-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	1.99	4.88	4.18	5.18	3.92
Lead (dissolved)	mg/L	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	116	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.65	3.25	2.99	3.59	3.42
Mercury (dissolved)	mg/L	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.024	0.018	0.022	0.0095	0.0133
Nickel (dissolved)	mg/L	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.139	ND(0.030)	ND(0.030)	0.0093	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	360	408	487	485	541

002857

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011
			Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**					
Ammonia-N	mg/L	4.0	0.698	0.663	0.320	3.90	4.77
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-
Chloride	mg/L	-	94.4	147	68.5	103	108
Color (apparent)	color unit	-	-	-	-	-	-
Color (apparent)	TCU	-	23.1	25.9	128	102	29.2
Conductivity	umhos/cm	-	2150	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.6	5.5	6.6	10.0	10.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)
Petroleum Products	mg/L	-	-	-	-	-	-
pH, lab	s.u.	-	7.68	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-
Phosphorus	mg/L	7.2	6.11	1.20	0.758	0.167	0.482
Sulfate	mg/L	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	3	0	6	10	4
Total dissolved solids (TDS)	mg/L	-	1750	1620	1350	1740	1610
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-
Turbidity	NTU	-	4.10	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	-	-
Field Parameters		-					
		-					
Conductivity, field	mS/cm	-	2.56	0.957	2.15	2.87	2.48
Dissolved oxygen (DO), field	mg/L	-	-	-	4.92	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-57	-	-
pH, field	s.u.	-	5.54	6.93	5.72	6.52	7.15
Temperature, field	Deg C	-	9.8	11.6	14.9	6.8	13.7
Turbidity, field	NTU	-	0	-	-	288	852

002858

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011
			Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**					
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	100	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	12500	ND(2500)	720	ND(250)	600
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	12400	ND(2500)	720	ND(250)	600
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	36800	4400	2010	550	1770
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	104000	13800	4500	-	4500
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	49300	4400	2830	550	2370
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-
Semi-Volatiles							
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-
Acenaphthene	µg/L	-	-	0.27	-	-	-
Acenaphthylene	µg/L	-	-	0.24	-	-	-
Acridine	µg/L	-	-	-	-	-	-
Anthracene	µg/L	-	-	0.25	0.141	0.023	0.100
Benzo(a)anthracene	µg/L	-	-	0.80	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.848	0.520	0.0435	0.244 J
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.55	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.54	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.55	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.88	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-
Fluoranthene	µg/L	-	-	1.64	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.51	-	-	-
Naphthalene	µg/L	-	-	ND(0.20)	-	-	-
Phenanthrene	µg/L	-	-	0.79	-	-	-

002859

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051810-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MMD-005	GW-45804-110911-TS-004
Sample Date:			1/13/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011
			Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**					
Pyrene	µg/L	-	-	1.41	-	-	-

002860

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-008	GW-45804-051412-MB-003
Sample Date:		11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012	5/14/2012
		Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**						
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0010	ND(0.0010)	-	-	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	0.054	0.056	-	-	0.067
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00080)	ND(0.00080)	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Iron (dissolved)	mg/L	3.83	6.27	6.24	-	-	5.88
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.47	4.73	4.79	-	-	3.88
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0129	0.0088	0.0088	-	-	0.0093
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	-	-	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0087	-	-	0.0030
Zirconium (dissolved)	mg/L	-	-	-	-	-	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	534	527	517	477	-	442

002861

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW5-09**	**MW5-09**	**MW5-09**	**MW5-09**	**MW5-09**	**MW5-09**
Sample ID:		**GW-45804-110911-TS-005**	**GW-45804-021512-MB-003**	**GW-45804-021512-MB-004**	**GW-45804-032112-MB-005**	**GW-45804-032112-MB-008**	**GW-45804-051412-MB-003**
Sample Date:		**11/9/2011**	**2/15/2012**	**2/15/2012**	**3/21/2012**	**3/21/2012**	**5/14/2012**
		Duplicate	**Original**	**Duplicate**	**Original**	**Original**	**Original**
Parameters:	**Units**						
Ammonia-N	mg/L	4.78	7.39	6.85	9.99	10.3	10.1
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.9)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	45	35	-	-	30
Chloride	mg/L	108	-	-	104	-	116
Color (apparent)	color unit	-	-	-	-	-	-
Color (apparent)	TCU	23.8	10.9	13.0	26.6	-	-
Conductivity	umhos/cm	-	-	-	2170	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.0	11.0	9.4	8.0	-	9.4
Escherichia coli	cfu/100mL	ND(2)	0	0	0	0	-
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0	0 J	0 J	-
Nitrate (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)
Nitrite (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)
Petroleum Products	mg/L	-	ND(1.0)	ND(1.0)	-	-	-
pH, lab	s.u.	-	7.56	7.53	7.08	-	7.58
Phenol	mg/L	-	0.0010	0.0010	-	-	ND(0.0010)
Phosphorus	mg/L	0.519	0.638	0.631	0.706	-	0.560
Sulfate	mg/L	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND(2)	0	0	1	0	-
Total dissolved solids (TDS)	mg/L	1610	1800	1780	1790	-	1720
Total kjeldahl nitrogen (TKN)	mg/L	-	10.8	9.87	-	-	11.8
Total suspended solids (TSS)	mg/L	-	2010 J	770 J	-	-	380
Turbidity	NTU	-	116	156	18.6	-	-
Un-ionized ammonia	mg/L	-	-	-	-	-	-
Field Parameters							
Conductivity, field	mS/cm	-	2.51	2.51	2.56	2.56	2.45
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-
pH, field	s.u.	7.15	6.57	6.57	5.23	5.23	6.26
Temperature, field	Deg C	13.7	7.52	7.52	8.4	8.4	10.23
Turbidity, field	NTU	-	-5	-5	-5	-5	-

002862

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-008	GW-45804-051412-MB-003
Sample Date:		11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012	5/14/2012
		Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**						
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(25)	ND(25)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(1000)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	560	720 J	ND(250) J	ND(2500)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	560	720 J	ND(250) J	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1640	2470 J	610 J	4700	-	690
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	4100	6300	-	10300	-	ND(2500)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2200	3190 J	610 J	4700	-	690
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-
Semi-Volatiles							
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-
Anthracene	µg/L	0.151	0.074	0.069	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.470 J	0.234	0.218	-	-	0.0225 J
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-

002863

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-110911-TS-005	GW-45804-021512-MB-003	GW-45804-021512-MB-004	GW-45804-032112-MB-005	GW-45804-032112-MB-008	GW-45804-051412-MB-003
Sample Date:		11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012	5/14/2012
		Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	Units						
Pyrene	µg/L	-	-	-	-	-	-

002864

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013
		Duplicate	Original	Original	Original	Original	Duplicate
Parameters:	**Units**						
Metals							
Aluminum (dissolved)	mg/L	-	-	ND(0.10)	-	-	-
Antimony (dissolved)	mg/L	-	-	ND(0.050)	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	0.0019	0.0012	ND(0.0010)
Barium (dissolved)	mg/L	-	-	0.15	-	-	-
Beryllium (dissolved)	mg/L	-	-	ND(0.010)	-	-	-
Bismuth (dissolved)	mg/L	-	-	ND(0.010)	-	-	-
Boron (dissolved)	mg/L	0.064	-	ND(0.50)	0.073	0.057	0.055
Cadmium (dissolved)	mg/L	ND(0.00010)	-	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	292	-	-	-
Chromium (dissolved)	mg/L	0.0015	-	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	-	ND(0.0050)	0.00333	0.00063	0.00056
Copper (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.95	-	5.58	6.79	7.31	7.34
Lead (dissolved)	mg/L	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	92.0	-	-	-
Manganese (dissolved)	mg/L	3.95	-	3.40	4.27	4.40	4.65
Mercury (dissolved)	mg/L	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0094	-	0.014	0.0158	0.0110	0.0108
Nickel (dissolved)	mg/L	ND(0.0020)	-	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	ND(0.50)	-	-	-
Potassium (dissolved)	mg/L	-	-	19	-	-	-
Selenium (dissolved)	mg/L	-	-	ND(0.0040)	-	-	-
Silicon (dissolved)	mg/L	-	-	10	-	-	-
Silver (dissolved)	mg/L	-	-	ND(0.0010)	-	-	-
Sodium (dissolved)	mg/L	-	-	101	-	-	-
Strontium (dissolved)	mg/L	-	-	3.31	-	-	-
Thallium (dissolved)	mg/L	-	-	ND(0.0030)	-	-	-
Tin (dissolved)	mg/L	-	-	ND(0.010)	-	-	-
Titanium (dissolved)	mg/L	-	-	ND(0.020)	-	-	-
Tungsten (dissolved)	mg/L	-	-	ND(0.10)	-	-	-
Uranium (dissolved)	mg/L	-	-	ND(0.050)	-	-	-
Vanadium (dissolved)	mg/L	-	-	ND(0.010)	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	-	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	ND(0.040)	-	-	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	488	-	-	-
Alkalinity, carbonate	mg/L	-	-	ND(10)	-	-	-
Alkalinity, hydroxide	mg/L	-	-	ND(10)	-	-	-
Alkalinity, total (as CaCO3)	mg/L	438	-	490	525	488	494

002865

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013
		Duplicate	Original	Original	Original	Original	Duplicate
Parameters:	**Units**						
Ammonia-N	mg/L	10.0	-	8.90	3.35	12.1	12.6
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	25	-	35	44	59	57
Chloride	mg/L	116	-	176	143	149	149
Color (apparent)	color unit	-	-	-	-	-	-
Color (apparent)	TCU	-	106	57.4	52.1 J	55.0	46.4
Conductivity	umhos/cm	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	-	8.1	6.3	12.1	11.1
Escherichia coli	cfu/100mL	-	0	0	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	1	0	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Petroleum Products	mg/L	-	-	-	-	-	-
pH, lab	s.u.	7.58	-	7.75	7.57	7.54	7.66
Phenol	mg/L	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.408	-	0.651	0.183	0.474	0.628
Sulfate	mg/L	-	-	-	424	572	572
Total coliform bacteria	cfu/100mL	-	ND(10)	0	2	ND(2)	2
Total dissolved solids (TDS)	mg/L	1710	-	1740	1430	2030	2020
Total kjeldahl nitrogen (TKN)	mg/L	12.2	-	10.8	3.99	13.5	14.1
Total suspended solids (TSS)	mg/L	246	-	304	88.0	700 J	1400 J
Turbidity	NTU	-	26.0	29.0	6.90 J	39.0 J	20.7 J
Un-ionized ammonia	mg/L	-	-	-	-	-	-
Field Parameters							
Conductivity, field	mS/cm	-	3.06	2.21	1.94	2.85	-
Dissolved oxygen (DO), field	mg/L	-	-	5.69	3.34	5.71	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-87	-	-
pH, field	s.u.	-	6.17	7.87	8.37	7.31	7.31
Temperature, field	Deg C	-	10.17	16.54	14.8	7.8	7.8
Turbidity, field	NTU	-	-	463	199	939	-

002866

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013
		Duplicate	Original	Original	Original	Original	Duplicate
Parameters:	**Units**						
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	-	ND(25)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	-	540	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	-	540	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	840	-	1600	510	ND(420)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	2700	-	4400	ND(2500)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	540	-	2140	510	ND(420)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-
Semi-Volatiles							
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	0.26	0.098	-	-
Acenaphthylene	µg/L	-	-	0.23	0.093	-	-
Acridine	µg/L	-	-	-	-	-	-
Anthracene	µg/L	0.023	-	ND(0.20)	0.060	ND(0.20)	ND(0.20)
Benzo(a)anthracene	µg/L	-	-	0.31	0.220	-	-
Benzo(a)pyrene	µg/L	0.0282 J	-	0.28	0.197	0.11 J	0.31 J
Benzo(b)fluoranthene	µg/L	-	-	0.33	0.184	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.23	0.117	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.20	0.162	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.38	0.228	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	0.038	-	-
Fluoranthene	µg/L	-	-	1.02	0.548	-	-
Fluorene	µg/L	-	-	ND(0.20)	0.034	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.20)	0.120	-	-
Naphthalene	µg/L	-	-	ND(0.20)	ND(0.020)	-	-
Phenanthrene	µg/L	-	-	0.29	0.153	-	-

002867

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-MB-004	GW-45804-052312-MB-004	GW-45804-08-08-12-MB-001	GW-45804-111212-MB-006	GW-45804-022713-TS-002	GW-45804-022713-TS-004
Sample Date:		5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013
		Duplicate	Original	Original	Original	Original	Duplicate
Parameters:	Units						
Pyrene	µg/L	-	-	0.85	0.480	-	-

002898

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-008	GW-45804-052914-MB-012	GW-45804-053014-MB-012
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	5/30/2014
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Barium (dissolved)	mg/L	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.054	0.074	0.080	ND(0.050)	0.063	-
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Calcium (dissolved)	mg/L	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	0.0033	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Cobalt (dissolved)	mg/L	0.00121	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	-
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Iron (dissolved)	mg/L	7.47	4.79	5.00	6.73	6.53	-
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Magnesium (dissolved)	mg/L	-	-	-	-	-	-
Manganese (dissolved)	mg/L	4.29	3.45	3.36	3.08	3.28	-
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Molybdenum (dissolved)	mg/L	0.0163	0.0103	0.0102	0.0061	0.0066	-
Nickel (dissolved)	mg/L	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	483	495	596	860	-	742 J

002869

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-008	GW-45804-052914-MB-012	GW-45804-053014-MB-012
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	5/30/2014
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Ammonia-N	mg/L	10.3	16.3	18.4	26.4	30.4	-
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0) J
Chemical oxygen demand (COD)	mg/L	38	30	55	ND(43)	41	-
Chloride	mg/L	320	144	149	209	-	231 J
Color (apparent)	color unit	-	-	-	163 J	-	260 J
Color (apparent)	TCU	28.0	86.5	130	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.3	9.5	8.6	7.5	7.1	-
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	0	-
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0	0	-
Nitrate (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	-	ND(0.10) J
Nitrite (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	-	ND(0.10) J
Petroleum Products	mg/L	-	-	-	-	-	-
pH, lab	s.u.	7.58	7.41	7.51	7.31	-	7.52 J
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0012	0.0076	0.0011	-
Phosphorus	mg/L	0.332	0.148	0.404	0.183	0.198	-
Sulfate	mg/L	581	773	630	297	-	421 J
Total coliform bacteria	cfu/100mL	100	10	ND(10)	0	0	-
Total dissolved solids (TDS)	mg/L	1910	1920	1760	1480	-	1640 J
Total kjeldahl nitrogen (TKN)	mg/L	10.8	16.8	20.3	26.9	28.0	-
Total suspended solids (TSS)	mg/L	650	16.4	391	21.5	-	17.6 J
Turbidity	NTU	19.2	28.0	50.0	57.0	51.0	-
Un-ionized ammonia	mg/L	-	-	-	-	-	-
Field Parameters							
Conductivity, field	mS/cm	2.84	2.54	2.55	2.57	2.86	2.86
Dissolved oxygen (DO), field	mg/L	5.71	5.69	7.15	4.86	0	0
Oxidation reduction potential (ORP), field	millivolts	-87	-101	-	-132	-168	-140
pH, field	s.u.	5.75	6.68	6.24	7.15 D 7.15	7.31	7.4
Temperature, field	Deg C	11.5	17.4	13.2	9.9 D 9.85	9.44	9.5
Turbidity, field	NTU	818	2.2	243	22.9	5.7	32.2

002870

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-008	GW-45804-052914-MB-012	GW-45804-053014-MB-012
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	5/30/2014
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	120	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	260	ND(250)	270	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	260	ND(250)	270	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	730	ND(250)	1010	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	990	ND(250)	1280	ND(380)	ND(380)	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-
Semi-Volatiles							
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.027)	-	-	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	-	-	ND(0.020)	-	-
Acenaphthene	µg/L	0.142	-	-	0.184	-	-
Acenaphthylene	µg/L	0.162	-	-	ND(0.187)	-	-
Acridine	µg/L	ND(4.0)	-	-	ND(4.0)	-	-
Anthracene	µg/L	0.048	ND(0.020)	0.029	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	0.181	-	-	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	0.159	ND(0.0050)	0.0634	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	0.199	-	-	ND(0.020)	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	ND(0.040)	-	-
Benzo(g,h,i)perylene	µg/L	0.113	-	-	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	0.167	-	-	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	0.257	-	-	ND(0.060)	-	-
Chrysene	µg/L	0.196	-	-	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	0.029	-	-	ND(0.020)	-	-
Fluoranthene	µg/L	0.525	-	-	0.121	-	-
Fluorene	µg/L	ND(0.13)	-	-	0.043	-	-
Indeno(1,2,3-cd)pyrene	µg/L	0.117	-	-	ND(0.020)	-	-
Naphthalene	µg/L	0.024 J	-	-	ND(0.050)	-	-
Phenanthrene	µg/L	0.132	-	-	ND(0.020)	-	-

002871

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-052213-TS-013	GW-45804-080713-TS-004	GW-45804-111413-TS-011	GW-45804-042114-TS-008	GW-45804-052914-MB-012	GW-45804-053014-MB-012
Sample Date:		5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	5/30/2014
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Pyrene	µg/L	0.458	-	-	0.079	-	-

002872

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Metals							
Aluminum (dissolved)	mg/L	-	-	--	--	--	--
Antimony (dissolved)	mg/L	-	-	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027	ND(0.0010)
Barium (dissolved)	mg/L	-	-	--	--	--	--
Beryllium (dissolved)	mg/L	-	-	--	--	--	--
Bismuth (dissolved)	mg/L	-	-	--	--	--	--
Boron (dissolved)	mg/L	0.096	0.066	ND(0.10)	ND(0.10)	0.10	0.12
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	4.68	7.82	14.5	7.65	10.9	4.86
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Magnesium (dissolved)	mg/L	-	-	--	--	--	--
Manganese (dissolved)	mg/L	2.50	2.45	5.33	3.60	3.86	2.94
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0144	0.0339	0.0156	0.0071	0.0204	0.00860
Nickel (dissolved)	mg/L	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Phosphorus (dissolved)	mg/L	-	-	--	--	--	--
Potassium (dissolved)	mg/L	-	-	--	--	--	--
Selenium (dissolved)	mg/L	-	-	--	--	--	--
Silicon (dissolved)	mg/L	-	-	--	--	--	--
Silver (dissolved)	mg/L	-	-	--	--	--	--
Sodium (dissolved)	mg/L	-	-	--	--	--	--
Strontium (dissolved)	mg/L	-	-	--	--	--	--
Thallium (dissolved)	mg/L	-	-	--	--	--	--
Tin (dissolved)	mg/L	-	-	--	--	--	--
Titanium (dissolved)	mg/L	-	-	--	--	--	--
Tungsten (dissolved)	mg/L	-	-	--	--	--	--
Uranium (dissolved)	mg/L	-	-	--	--	--	--
Vanadium (dissolved)	mg/L	-	-	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)
Zirconium (dissolved)	mg/L	-	-	--	--	--	--
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	--	--	--	--
Alkalinity, carbonate	mg/L	-	-	--	--	--	--
Alkalinity, hydroxide	mg/L	-	-	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	673 J	445	446	517	586	504

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Ammonia-N	mg/L	26.0 J	6.91	9.71	32.7	21.4	24.8
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	34 J	33	65	34	45	32
Chloride	mg/L	207 J	244	1160	174	693	165
Color (apparent)	color unit	102 J	101				
Color (apparent)	TCU	-	-	74.4	34.2	161	151
Conductivity	umhos/cm	-	-	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.4 J	9.2	5.4	7.7	8.5	7.8
Escherichia coli	cfu/100mL	0 J	0	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	1 J	0	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	-	-	--	--	--	--
pH, lab	s.u.	7.43 J	7.48	7.37	7.75	7.61	7.62
Phenol	mg/L	0.0011 J	0.0010	ND(0.0015)	0.0035	ND(0.0022)	0.0016
Phosphorus	mg/L	0.161 J	0.105	0.912	0.355	0.131	0.133
Sulfate	mg/L	411 J	172	227	880	505	675
Total coliform bacteria	cfu/100mL	2 J	0	96	ND(100)	100	0
Total dissolved solids (TDS)	mg/L	1420 J	1130	2470	1580	2300	1710
Total kjeldahl nitrogen (TKN)	mg/L	25.9 J	9.31	9.19	37.9	26.3	28.3
Total suspended solids (TSS)	mg/L	9.6 J	20.8	1020	530	25.3	10.6
Turbidity	NTU	48.7 J	116	43.0	47.0	130	83.3
Un-ionized ammonia	mg/L	-	-	0.0307	0.203	0.292	0.923
Field Parameters							
Conductivity, field	mS/cm	2.57	1.107	2.679	2.49	2.64	2.54
Dissolved oxygen (DO), field	mg/L	1.06	3.93	--	--	6.44	0.1
Oxidation reduction potential (ORP), field	millivolts	-139	-63	--	--	-125	-144
pH, field	s.u.	8.53	6.92	7.36	7.39	7.35	8.06
Temperature, field	Deg C	18.99	10.38	3.89	11.54	22.72	15.28
Turbidity, field	NTU	44	-	--	294	173	4.3

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250)	510	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250)	500	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250)	1500	530	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380)	2010	530	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	--	--	ND(250)
Semi-Volatiles							
1+2-Methylnaphthalene	µg/L	-	-	--	--	--	--
1-Methylnaphthalene	µg/L	-	-	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--	--
Acenaphthene	µg/L	-	-	--	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--	--
Acridine	µg/L	-	-	--	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020)	ND(0.20)	0.047	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--	--
Chrysene	µg/L	-	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--	--
Fluoranthene	µg/L	-	-	--	--	--	--
Fluorene	µg/L	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--	--
Naphthalene	µg/L	-	-	--	--	--	--
Phenanthrene	µg/L	-	-	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original
Parameters:	Units						
Pyrene	µg/L	-	-	--	--	--	--

002876

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012	GW-45804-060217-TS-011
Sample Date:		2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/2/2017
		Original	Original	Original	Original	
Parameters:	**Units**					
Metals						
Aluminum (dissolved)	mg/L	--	--	--	--	-
Antimony (dissolved)	mg/L	--	--	--	--	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.00018	0.0020	0.00099	-
Barium (dissolved)	mg/L	--	--	--	--	-
Beryllium (dissolved)	mg/L	--	--	--	--	-
Bismuth (dissolved)	mg/L	--	--	--	--	-
Boron (dissolved)	mg/L	ND(0.10)	0.069	0.12	0.087	-
Cadmium (dissolved)	mg/L	ND(0.00010)	0.000015	ND(0.00010)	ND(0.000010)	-
Calcium (dissolved)	mg/L	--	--	--	--	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.00063)	ND(0.0050)	ND(0.00050)	-
Cobalt (dissolved)	mg/L	ND(0.0010)	0.00014	ND(0.0010)	0.00024	-
Copper (dissolved)	mg/L	ND(0.0020)	0.00034	ND(0.0020)	ND(0.00075)	-
Iron (dissolved)	mg/L	5.58	6.66	10.3	4.66	5.40
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)	-
Magnesium (dissolved)	mg/L	--	--	--	--	-
Manganese (dissolved)	mg/L	3.07	3.06	3.58	2.67	2.50
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Molybdenum (dissolved)	mg/L	ND(0.00771)	0.00825	0.0174	0.00993	-
Nickel (dissolved)	mg/L	ND(0.0050)	0.00154	ND(0.0050)	0.00164	-
Phosphorus (dissolved)	mg/L	--	--	--	--	-
Potassium (dissolved)	mg/L	--	--	--	--	-
Selenium (dissolved)	mg/L	--	--	--	--	-
Silicon (dissolved)	mg/L	--	--	--	--	-
Silver (dissolved)	mg/L	--	--	--	--	-
Sodium (dissolved)	mg/L	--	--	--	--	-
Strontium (dissolved)	mg/L	--	--	--	--	-
Thallium (dissolved)	mg/L	--	--	--	--	-
Tin (dissolved)	mg/L	--	--	--	--	-
Titanium (dissolved)	mg/L	--	--	--	--	-
Tungsten (dissolved)	mg/L	--	--	--	--	-
Uranium (dissolved)	mg/L	--	--	--	--	-
Vanadium (dissolved)	mg/L	--	--	--	--	-
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.0040)	ND(0.010)	ND(0.0010)	-
Zirconium (dissolved)	mg/L	--	--	--	--	-
General Chemistry						
Alkalinity, bicarbonate	mg/L	--	--	--	--	-
Alkalinity, carbonate	mg/L	--	--	--	--	-
Alkalinity, hydroxide	mg/L	--	--	--	--	-
Alkalinity, total (as CaCO3)	mg/L	ND(459)	463	533	553	430

002877

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW5-09**	**MW5-09**	**MW5-09**	**MW5-09**	**MW5-09**
Sample ID:		**GW-45804-021016-TS-003**	**GW-45804-051816-TS-015**	**GW-45804-081616-TS-007**	**GW-45804-111616-TS-012**	**GW-45804-060217-TS-011**
Sample Date:		**2/10/2016**	**5/18/2016**	**8/16/2016**	**11/16/2016**	**6/2/2017**
		Original	**Original**	**Original**	**Original**	
Parameters:	**Units**					
Ammonia-N	mg/L	18.7	18.9	17.3	14.7	13.5
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	ND(26)	27	74	34	-
Chloride	mg/L	ND(135)	128	656	140	-
Color (apparent)	color unit	240 J	115	243	184	-
Color (apparent)	TCU	--	--	--	--	-
Conductivity	umhos/cm	--	--	--	--	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(6.6)	6.7	11.4	8.7	6.5
Escherichia coli	cfu/100mL	0	0	1	0	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	23	0	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	-
Petroleum Products	mg/L	--	--	--	--	-
pH, lab	s.u.	7.76	7.88	7.54	7.18	-
Phenol	mg/L	ND(0.0010)	ND(0.0019)	0.0056	ND(0.0026)	-
Phosphorus	mg/L	0.126	0.126	0.135	0.141	0.767
Sulfate	mg/L	ND(635)	749	405	504	-
Total coliform bacteria	cfu/100mL	0	0	600	0	-
Total dissolved solids (TDS)	mg/L	ND(1490)	1700	2350	1510	-
Total kjeldahl nitrogen (TKN)	mg/L	18.6	16.2	18.4	15.1	-
Total suspended solids (TSS)	mg/L	ND(7.4)	20.4	20.2	9.0	-
Turbidity	NTU	65.8 J	76.2	136	57.2	-
Un-ionized ammonia	mg/L	0.0588	0.159	0.0669	0.0450	0.0165
Field Parameters						
Conductivity, field	mS/cm	2.11	2.01	3.01	2.01	1.94
Dissolved oxygen (DO), field	mg/L	0	0	0	0	3.87
Oxidation reduction potential (ORP), field	millivolts	-115	-75	-82	-101	-87
pH, field	s.u.	7.29	7.64	6.95	7.06	6.81
Temperature, field	Deg C	5.82	10.31	18.56	14.14	10.8
Turbidity, field	NTU	65.4	0.6	0	29.9	0

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012	GW-45804-060217-TS-011
Sample Date:		2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/2/2017
		Original	Original	Original	Original	
Parameters:	**Units**					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	--	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	-
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	--	--	--	--	-
1-Methylnaphthalene	µg/L	--	--	--	--	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	-
2-Methylnaphthalene	µg/L	--	--	--	--	-
Acenaphthene	µg/L	--	--	--	--	-
Acenaphthylene	µg/L	--	--	--	--	-
Acridine	µg/L	--	--	--	--	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	--	--	--	--	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	--	--	--	--	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	-
Benzo(g,h,i)perylene	µg/L	--	--	--	--	-
Benzo(k)fluoranthene	µg/L	--	--	--	--	-
Carcinogenic potency equivalent	µg/L	--	--	--	--	-
Chrysene	µg/L	--	--	--	--	-
Dibenz(a,h)anthracene	µg/L	--	--	--	--	-
Fluoranthene	µg/L	--	--	--	--	-
Fluorene	µg/L	--	--	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	-
Naphthalene	µg/L	--	--	--	--	-
Phenanthrene	µg/L	--	--	--	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012	GW-45804-060217-TS-011
Sample Date:		2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/2/2017
		Original	Original	Original	Original	
Parameters:	Units					
Pyrene	µg/L	--	--	--	--	-

002880

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09
Sample ID:		GW-45804-083017-TS-004	GW-45804-112917-TS-006
Sample Date:		8/30/2017	11/29/2017
Parameters:	**Units**		
Metals			
Aluminum (dissolved)	mg/L	-	-
Antimony (dissolved)	mg/L	-	-
Arsenic (dissolved)	mg/L	-	-
Barium (dissolved)	mg/L	-	-
Beryllium (dissolved)	mg/L	-	-
Bismuth (dissolved)	mg/L	-	-
Boron (dissolved)	mg/L	-	-
Cadmium (dissolved)	mg/L	-	-
Calcium (dissolved)	mg/L	-	-
Chromium (dissolved)	mg/L	-	-
Cobalt (dissolved)	mg/L	-	-
Copper (dissolved)	mg/L	-	-
Iron (dissolved)	mg/L	3.38 J	4.29
Lead (dissolved)	mg/L	-	-
Magnesium (dissolved)	mg/L	-	-
Manganese (dissolved)	mg/L	1.89 J	1.09
Mercury (dissolved)	mg/L	-	-
Molybdenum (dissolved)	mg/L	-	-
Nickel (dissolved)	mg/L	-	-
Phosphorus (dissolved)	mg/L	-	-
Potassium (dissolved)	mg/L	-	-
Selenium (dissolved)	mg/L	-	-
Silicon (dissolved)	mg/L	-	-
Silver (dissolved)	mg/L	-	-
Sodium (dissolved)	mg/L	-	-
Strontium (dissolved)	mg/L	-	-
Thallium (dissolved)	mg/L	-	-
Tin (dissolved)	mg/L	-	-
Titanium (dissolved)	mg/L	-	-
Tungsten (dissolved)	mg/L	-	-
Uranium (dissolved)	mg/L	-	-
Vanadium (dissolved)	mg/L	-	-
Zinc (dissolved)	mg/L	-	-
Zirconium (dissolved)	mg/L	-	-
General Chemistry			
Alkalinity, bicarbonate	mg/L	-	-
Alkalinity, carbonate	mg/L	-	-
Alkalinity, hydroxide	mg/L	-	-
Alkalinity, total (as CaCO3)	mg/L	620 J	749

002881

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW5-09**	**MW5-09**
Sample ID:		**GW-45804-083017-TS-004**	**GW-45804-112917-TS-006**
Sample Date:		**8/30/2017**	**11/29/2017**
Parameters:	**Units**		
Ammonia-N	mg/L	9.86 J	8.11
Biochemical oxygen demand (carbonaceous)	mg/L	-	-
Chemical oxygen demand (COD)	mg/L	-	-
Chloride	mg/L	-	-
Color (apparent)	color unit	-	-
Color (apparent)	TCU	-	-
Conductivity	umhos/cm	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	13.0 J	11.2
Escherichia coli	cfu/100mL	0 J	0
Fecal coliform bacteria	cfu/100mL	-	-
Nitrate (as N)	mg/L	ND(0.020) J	ND(0.020)
Nitrite (as N)	mg/L	-	-
Petroleum Products	mg/L	-	-
pH, lab	s.u.	-	-
Phenol	mg/L	-	-
Phosphorus	mg/L	0.209 J	0.143
Sulfate	mg/L	-	-
Total coliform bacteria	cfu/100mL	-	-
Total dissolved solids (TDS)	mg/L	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	-
Turbidity	NTU	-	-
Un-ionized ammonia	mg/L	0.0583	0.0228
Field Parameters			
Conductivity, field	mS/cm	1.59	1.03
Dissolved oxygen (DO), field	mg/L	0.04	0.34
Oxidation reduction potential (ORP), field	millivolts	-106	-71
pH, field	s.u.	7.22	7.11
Temperature, field	Deg C	18.62	12.16
Turbidity, field	NTU	0	42.8

002882

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW5-09**	**MW5-09**
Sample ID:		**GW-45804-083017-TS-004**	**GW-45804-112917-TS-006**
Sample Date:		**8/30/2017**	**11/29/2017**
Parameters:	**Units**		
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-
Semi-Volatiles			
1+2-Methylnaphthalene	µg/L	-	-
1-Methylnaphthalene	µg/L	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-
2-Methylnaphthalene	µg/L	-	-
Acenaphthene	µg/L	-	-
Acenaphthylene	µg/L	-	-
Acridine	µg/L	-	-
Anthracene	µg/L	-	-
Benzo(a)anthracene	µg/L	-	-
Benzo(a)pyrene	µg/L	-	-
Benzo(b)fluoranthene	µg/L	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-
Benzo(g,h,i)perylene	µg/L	-	-
Benzo(k)fluoranthene	µg/L	-	-
Carcinogenic potency equivalent	µg/L	-	-
Chrysene	µg/L	-	-
Dibenz(a,h)anthracene	µg/L	-	-
Fluoranthene	µg/L	-	-
Fluorene	µg/L	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-
Naphthalene	µg/L	-	-
Phenanthrene	µg/L	-	-

002883

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-09
Sample ID:		GW-45804-083017-TS-004	GW-45804-112917-TS-006
Sample Date:		8/30/2017	11/29/2017
Parameters:	**Units**		
Pyrene	µg/L	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-008
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0032	0.0098	0.0101	0.0196
Barium (dissolved)	mg/L	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.068	ND(0.050)	0.179	0.252	ND(0.050)	0.058
Lead (dissolved)	mg/L	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	98.1	-	-	-	-	-
Manganese (dissolved)	mg/L	0.462	0.570	0.859	1.61	0.797	1.50
Mercury (dissolved)	mg/L	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	0.0633	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010
Nickel (dissolved)	mg/L	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.190	0.0074	0.0256	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	175	831	442	510	499	663
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	8.5	40.6
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-
Chloride	mg/L	29.7	38.8	93.4	166	63.7	82.1

002885

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-008
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Color (apparent)	TCU	6.1	161	53.2	187	239	102
Conductivity	umhos/cm	1920	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	266	9.0	90.0	16.7	25.0
Escherichia coli	cfu/100mL	0	20	24	1700	17	108
Fecal coliform bacteria	cfu/100mL	0	50	90	6000	80	160
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-
Petroleum Products	s.u.	7.90	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570
Sulfate	mg/L	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	80	350	18000	13700	1510
Total dissolved solids (TDS)	mg/L	1720	1960	1700	1640	1330	2290
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-
Turbidity	NTU	1.04	-	-	-	-	-
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0645

988200

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-008
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Field Parameters							
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	-	-
Oxidation reduction potential (ORP), field	millivolts	23	-341	-268	-292	-333	-
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.26
Temperature, field	Deg C	4.8	14.07	22.3	17.3	11.0	15.99
Turbidity, field	NTU	185	-	-	-	-	-
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

002887

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-081611-TS-004	GW-45804-111011-TS-009	GW-45804-021512-MB-002
Sample Date:		8/16/2011	11/10/2011	2/15/2012
		Original	Original	Original
Parameters:	**Units**			
Metals				
Aluminum (dissolved)	mg/L	-	-	-
Antimony (dissolved)	mg/L	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	0.0026	0.0073
Barium (dissolved)	mg/L	-	-	-
Beryllium (dissolved)	mg/L	-	-	-
Bismuth (dissolved)	mg/L	-	-	-
Boron (dissolved)	mg/L	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-
Chromium (dissolved)	mg/L	-	-	0.0026
Cobalt (dissolved)	mg/L	-	-	0.00060
Copper (dissolved)	mg/L	-	-	ND(0.0010)
Iron (dissolved)	mg/L	2.89	0.154	ND(0.050)
Lead (dissolved)	mg/L	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-
Manganese (dissolved)	mg/L	1.56	1.11	0.636
Mercury (dissolved)	mg/L	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	ND(0.010)	ND(0.0010)	0.0021
Nickel (dissolved)	mg/L	-	-	0.0041
Phosphorus (dissolved)	mg/L	-	-	-
Potassium (dissolved)	mg/L	-	-	-
Selenium (dissolved)	mg/L	-	-	-
Silicon (dissolved)	mg/L	-	-	-
Silver (dissolved)	mg/L	-	-	-
Sodium (dissolved)	mg/L	-	-	-
Strontium (dissolved)	mg/L	-	-	-
Thallium (dissolved)	mg/L	-	-	-
Tin (dissolved)	mg/L	-	-	-
Titanium (dissolved)	mg/L	-	-	-
Tungsten (dissolved)	mg/L	-	-	-
Uranium (dissolved)	mg/L	-	-	-
Vanadium (dissolved)	mg/L	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-
General Chemistry				
Alkalinity, bicarbonate	mg/L	-	-	-
Alkalinity, carbonate	mg/L	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-
Alkalinity, total (as CaCO3)	mg/L	452	477	941
Ammonia-N	mg/L	15.8	23.0	98.9
Biochemical oxygen demand (carbonaceous)	mg/L	2.5	12.6	149
Chemical oxygen demand (COD)	mg/L	-	-	524
Chloride	mg/L	87.6	74.1	-

002888

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW101-09**	**MW101-09**	**MW101-09**
Sample ID:		**GW-45804-081611-TS-004**	**GW-45804-111011-TS-009**	**GW-45804-021512-MB-002**
Sample Date:		**8/16/2011**	**11/10/2011**	**2/15/2012**
		Original	**Original**	**Original**
Parameters:	**Units**			
Color (apparent)	TCU	114	17.0	310
Conductivity	umhos/cm	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.3	7.7	104
Escherichia coli	cfu/100mL	1	2	2970
Fecal coliform bacteria	cfu/100mL	20	10	150000
Nitrate (as N)	mg/L	0.27	ND(0.30)	ND(1.0)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(1.0)
Nitrite/Nitrate	mg/L	-	-	ND(2.0)
Petroleum Products	s.u.	-	-	7.95
Phenol	mg/L	-	-	0.0890
Phosphorus	mg/L	0.127	0.134	1.36
Sulfate	mg/L	-	-	-
Total coliform bacteria	cfu/100mL	290	210	93000
Total dissolved solids (TDS)	mg/L	1660	1610	1160
Total kjeldahl nitrogen (TKN)	mg/L	-	-	127
Total suspended solids (TSS)	mg/L	-	-	10.0
Turbidity	NTU	-	-	200
Un-ionized ammonia	mg/L	0.0623	0.0858	-

002889

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-081611-TS-004	GW-45804-111011-TS-009	GW-45804-021512-MB-002
Sample Date:		8/16/2011	11/10/2011	2/15/2012
		Original	Original	Original
Parameters:	**Units**			
Field Parameters				
Conductivity, field	mS/cm	2.97	2.43	2.62
Dissolved oxygen (DO), field	mg/L	0	2.48	-
Oxidation reduction potential (ORP), field	millivolts	-279	-238	-
pH, field	s.u.	6.86	6.97	6.9
Temperature, field	Deg C	21.7	17.5	11.87
Turbidity, field	NTU	166	15.3	50.3
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	49
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	110
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	110
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)
Semi-Volatiles				
1-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-

002890

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Duplicate	Original	Original	Original
Parameters:	**Units**					
Metals						
Aluminum (dissolved)	mg/L	-	-	-	ND(0.10)	-
Antimony (dissolved)	mg/L	-	-	-	ND(0.050)	-
Arsenic (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	-	-	-	0.11	-
Beryllium (dissolved)	mg/L	-	-	-	ND(0.010)	-
Bismuth (dissolved)	mg/L	-	-	-	ND(0.010)	-
Boron (dissolved)	mg/L	-	-	0.064	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	-	-	ND(0.00010)	ND(0.00090)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	292	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	-	-	1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	88.9	-
Manganese (dissolved)	mg/L	-	-	1.21	1.12	1.17
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	-	-	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	ND(0.50)	-
Potassium (dissolved)	mg/L	-	-	-	24	-
Selenium (dissolved)	mg/L	-	-	-	ND(0.0040)	-
Silicon (dissolved)	mg/L	-	-	-	ND(10)	-
Silver (dissolved)	mg/L	-	-	-	ND(0.0010)	-
Sodium (dissolved)	mg/L	-	-	-	54.2	-
Strontium (dissolved)	mg/L	-	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	-	ND(0.0030)	-
Tin (dissolved)	mg/L	-	-	-	ND(0.010)	-
Titanium (dissolved)	mg/L	-	-	-	ND(0.020)	-
Tungsten (dissolved)	mg/L	-	-	-	ND(0.10)	-
Uranium (dissolved)	mg/L	-	-	-	ND(0.050)	-
Vanadium (dissolved)	mg/L	-	-	-	ND(0.010)	-
Zinc (dissolved)	mg/L	-	-	0.0052	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	ND(0.040)	-
General Chemistry						
Alkalinity, bicarbonate	mg/L	-	-	-	442	-
Alkalinity, carbonate	mg/L	-	-	-	ND(10)	-
Alkalinity, hydroxide	mg/L	-	-	-	ND(10)	-
Alkalinity, total (as CaCO3)	mg/L	288	285	284	445	466
Ammonia-N	mg/L	10.6	10.6	7.89	108	36.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.8)	ND(2.8)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	-	-	11	42	114
Chloride	mg/L	92.9	95.9	106	87.3	157

002891

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Duplicate	Original	Original	Original
Parameters:	**Units**					
Color (apparent)	TCU	61.2	48.9	60.4	34.4	189
Conductivity	umhos/cm	1810	1820	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.6	7.3	6.2	8.7	38.0
Escherichia coli	cfu/100mL	28	41	1	30	10
Fecal coliform bacteria	cfu/100mL	100 J	400 J	1	126	20
Nitrate (as N)	mg/L	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	ND(0.20)	-	-
Petroleum Products	s.u.	7.37	7.74	7.87	7.75	7.82
Phenol	mg/L	-	-	ND(0.0010)	0.0030	0.0280
Phosphorus	mg/L	0.150	0.143	0.079	0.310	0.138
Sulfate	mg/L	-	-	-	-	1060
Total coliform bacteria	cfu/100mL	93000	96000	21	190	110
Total dissolved solids (TDS)	mg/L	1560	1570	1530	1780	2240
Total kjeldahl nitrogen (TKN)	mg/L	-	-	9.54	110	40.6
Total suspended solids (TSS)	mg/L	-	-	6.5	7.2	17.0
Turbidity	NTU	7.00	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	0.000764	0.000763	-	-	0.568

002892

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Duplicate	Original	Original	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	-	-	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	-	-	123	-271	-546
pH, field	s.u.	5.39	5.39	6.5	5.2	7.70
Temperature, field	Deg C	13.3	13.3	15.79	24.2	16.5
Turbidity, field	NTU	169	169	52.3	4.3	0
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	ND(0.020)	-
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	ND(0.020)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	ND(0.020)	-
Chrysene	µg/L	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	ND(0.053)	-
Phenanthrene	µg/L	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	ND(0.020)	-

002893

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	0.0045	0.0025	0.0012	0.0063
Boron (dissolved)	mg/L	-	0.076	0.116	0.158	0.150
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00227	0.00085	ND(0.00050)	0.00351
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0028	ND(0.0010)
Iron (dissolved)	mg/L	48.3	34.5	4.08	ND(0.050)	12.8
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	2.24	1.21	0.179	0.711
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0543	0.0196	0.0177	0.0270
Nickel (dissolved)	mg/L	-	0.0030	ND(0.0020)	ND(0.0020)	0.0071
Zinc (dissolved)	mg/L	-	0.0085	0.0146	0.0074	0.0063
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	368	464	409	667
Ammonia-N	mg/L	4.0	6.98	11.8	9.32	13.7
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.6	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	74	27	30	55
Chloride	mg/L	-	157	141	135	164
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	-	76.5	29.8 J	8.2	121
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	14.8	ND(7.8)	5.8	13.0
Escherichia coli	cfu/100mL	25.6	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	ND(2) J	ND(2)	2	ND(2)
Nitrate (as N)	mg/L	1.3	0.21	5.52	2.15	0.18
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)
pH, lab	s.u.	-	7.26	7.82	7.20	7.37
Phenol	mg/L	-	ND(0.0010)	ND(0.0030)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.097	0.313	ND(0.030)	1.13
Sulfate	mg/L	-	1060	797	807	669
Total coliform bacteria	cfu/100mL	-	2	30	300	200
Total dissolved solids (TDS)	mg/L	-	2160	1860	1860	1910
Total kjeldahl nitrogen (TKN)	mg/L	-	11.4	13.5	9.62	14.3
Total suspended solids (TSS)	mg/L	-	153	386	10.0	226
Turbidity	NTU	-	380	22.0	0.71	65.3
Un-ionized ammonia	mg/L	-	0.00228	0.00241	0.00211	0.00858

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Field Parameters						
Conductivity, field	mS/cm	-	2.89	2.62	2.37	2.67
Dissolved oxygen (DO), field	mg/L	-	3.22	2.93	3.73	8.15
Oxidation reduction potential (ORP), field	millivolts	-	-73	-	38	-
pH, field	s.u.	-	6.32	5.74	5.60	6.26
Temperature, field	Deg C	-	5.4	16.5	22.32 D 22.3	15.5
Turbidity, field	NTU	-	329	97.5	24	73.9
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	360	ND(250)	2130
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	350	ND(250)	2110
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	920	ND(250)	7080
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	51400
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	1280	ND(250)	9210
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-

002895

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-03052013-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	-	0.048	0.59	ND(0.020)	0.67
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.097	1.26	0.0179	1.74
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

002896

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-042114-TS-003	GW-45804-052914-MB-010	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:		4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0019	0.0138	0.0146	0.0067
Boron (dissolved)	mg/L	0.151	0.112	0.161	0.157	0.079
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00166	0.00174	0.00056
Copper (dissolved)	mg/L	0.0022	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	0.209	4.76	4.85	10.7
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.0299	0.530	1.18	1.23	1.62
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0160	0.0230	0.0263	0.0281	0.0161
Nickel (dissolved)	mg/L	0.0022	0.0030	0.0046	0.0050	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0052	0.0111
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	476	460	507 J	519 J	485
Ammonia-N	mg/L	22.1	34.9	25.9 J	25.7 J	19.6
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.2	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(41)	14	23 J	32 J	26
Chloride	mg/L	194	140	114 J	115 J	111
Color (apparent)	color unit	16.8 J	15.9	39.4 J	35.6 J	101
Color (apparent)	TCU	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.4	3.6	5.8 J	5.8 J	6.7
Escherichia coli	cfu/100mL	60	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL	90	0	0 J	0 J	0
Nitrate (as N)	mg/L	0.64	0.64	0.31 J	0.34 J	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
pH, lab	s.u.	7.23	7.42	7.15 J	7.15 J	7.66
Phenol	mg/L	0.0032	ND(0.0010)	ND(0.0010) J	ND(0.0010) J	ND(0.0010)
Phosphorus	mg/L	ND(0.030)	0.032	0.066 J	0.062 J	0.151
Sulfate	mg/L	887	834	592 J	595 J	695
Total coliform bacteria	cfu/100mL	4200	50	0 J	0 J	1
Total dissolved solids (TDS)	mg/L	2040	1840	1430 J	1410 J	1560
Total kjeldahl nitrogen (TKN)	mg/L	23.0	31.8	28.1 J	26.0 J	21.7
Total suspended solids (TSS)	mg/L	6.8	3.6	15.2 J	10.4 J	230
Turbidity	NTU	13.6	0.85	21.7 J	16.3 J	43.0
Un-ionized ammonia	mg/L	0.0436	0.162	1.50 J	1.49 J	0.0664

002897

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-042114-TS-003	GW-45804-052914-MB-010	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:		4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	3.09	2.82	2.48	2.48	1.4
Dissolved oxygen (DO), field	mg/L	3.7	0.61	0.38	0.38	4.14
Oxidation reduction potential (ORP), field	millivolts	59	-52	-96	-96	-75
pH, field	s.u.	7 D 7.00	7.06	8.02	8.02	7.07
Temperature, field	Deg C	8.31 D 8.3	17.67	22.61	22.61	13.19
Turbidity, field	NTU	38.6	37.6	16.2	16.2	-
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250) J	ND(250) J	290
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380) J	ND(380) J	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-

002898

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-042114-TS-003	GW-45804-052914-MB-010	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:		4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	ND(0.020)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	-	-	-	-
Acenaphthene	µg/L	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	ND(0.020)	-	-	-	-
Acridine	µg/L	ND(4.0)	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	0.026
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	0.0063
Benzo(b)fluoranthene	µg/L	ND(0.020)	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	ND(0.020)	-	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	ND(0.060)	-	-	-	-
Chrysene	µg/L	ND(0.020)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	ND(0.020)	-	-	-	-
Fluorene	µg/L	ND(0.020)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-	-
Naphthalene	µg/L	ND(0.050)	-	-	-	-
Phenanthrene	µg/L	ND(0.020)	-	-	-	-
Pyrene	µg/L	ND(0.020)	-	-	-	-

002899

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011	GW-45804-021016-TS-006
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.10)	0.13	0.17	0.12	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	11.6	ND(0.50)	1.23	ND(0.10)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	2.02	0.088	1.41	0.0538	ND(0.0114)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	0.000014	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0090	0.0071	0.0135	0.0148	ND(0.00987)
Nickel (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	434	307	451	387	ND(323)
Ammonia-N	mg/L	19.2	ND(0.450)	11.2	1.38	0.237
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	41	18	25	16	ND(14)
Chloride	mg/L	133	197	185	136	ND(126)
Color (apparent)	color unit	--	--	--	--	ND(6.3) J
Color (apparent)	TCU	127	9.4	76.7	8.8	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.1	4.3	6.3	5.0	ND(4.5)
Escherichia coli	cfu/100mL	ND(2)	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0	0	0 J
Nitrate (as N)	mg/L	2.21	11.6	0.17	5.83	1.96
Nitrite (as N)	mg/L	0.111	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.64	7.47	7.77	7.28	7.72
Phenol	mg/L	ND(0.0034)	0.0027	0.0017	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	1.47	ND(0.030)	0.046	ND(0.030)	ND(0.030)
Sulfate	mg/L	1000	1010	769	705	ND(752)
Total coliform bacteria	cfu/100mL	4	20	20	15	ND(10) J
Total dissolved solids (TDS)	mg/L	1960	1920	1690	1520	ND(1480)
Total kjeldahl nitrogen (TKN)	mg/L	17.2	0.39	9.49	1.88	0.61
Total suspended solids (TSS)	mg/L	2630	6.8	26.3	6.4	ND(8.8)
Turbidity	NTU	40.1	ND(1.34)	3.99	4.34	ND(2.39) J
Un-ionized ammonia	mg/L	0.0881	0.00109	0.184	0.0147	0.000544

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011	GW-45804-021016-TS-006
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	1.681	2.51	2.65	2.13	1.1
Dissolved oxygen (DO), field	mg/L	–	2.12	1.35	0	0
Oxidation reduction potential (ORP), field	millivolts	–	247	-90	14	-18
pH, field	s.u.	7.45	6.83	7.55	7.50	7.08
Temperature, field	Deg C	5.94	16.08	19.48	15.26	7.87
Turbidity, field	NTU	–	0	16.4	4.4	0
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	1330	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	1310	--	--	--	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	4490	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	–	--	--	--	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	5820	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	–	--	ND(100)	–
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	–	--	ND(250)	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	–	--	ND(250)	–

002901

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011	GW-45804-021016-TS-006
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--
Anthracene	µg/L	0.83	ND(0.020)	0.020	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--
Benzo(a)pyrene	µg/L	2.26	0.0072	0.0284	0.0117	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--

002902

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
		Original	Original	Original		
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.0130	0.0087	0.00467	-	-
Boron (dissolved)	mg/L	0.073	0.12	0.111	-	-
Cadmium (dissolved)	mg/L	0.000012	ND(0.00010)	ND(0.000010)	-	-
Chromium (dissolved)	mg/L	ND(0.00058)	ND(0.0050)	ND(0.00050)	-	-
Cobalt (dissolved)	mg/L	0.00053	ND(0.0010)	0.00051	-	-
Copper (dissolved)	mg/L	0.00068	ND(0.0020)	ND(0.00235)	-	-
Iron (dissolved)	mg/L	1.60	7.07	6.55	0.344	0.157 J
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.00050)	0.000061	-	-
Manganese (dissolved)	mg/L	1.09	1.09	0.957	0.836	0.760 J
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	-	-
Molybdenum (dissolved)	mg/L	0.0201	0.0160	0.0196	-	-
Nickel (dissolved)	mg/L	0.00282	ND(0.0050)	0.00225	-	-
Zinc (dissolved)	mg/L	ND(0.0049)	ND(0.010)	0.0015	-	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	417	533	618	429	511 J
Ammonia-N	mg/L	12.2	28.6	17.1	9.25	15.9 J
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	-	-
Chemical oxygen demand (COD)	mg/L	15	ND(35)	43	-	-
Chloride	mg/L	81.3	85.7	97.2	-	-
Color (apparent)	color unit	18.0	237	216	-	-
Color (apparent)	TCU	--	--	--	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.8	9.3	10.4	5.3	11.2 J
Escherichia coli	cfu/100mL	0	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	0	2	0	-	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	4.31	0.68	ND(0.020) J
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	0.162	-	-
pH, lab	s.u.	7.86	7.54	7.05	-	-
Phenol	mg/L	ND(0.0024)	0.0044	ND(0.0024)	-	-
Phosphorus	mg/L	0.0116	0.0969	0.0440	0.0157	0.0365 J
Sulfate	mg/L	710	528	432	-	-
Total coliform bacteria	cfu/100mL	ND(10)	200	20	-	-
Total dissolved solids (TDS)	mg/L	1460	1370	1340	-	-
Total kjeldahl nitrogen (TKN)	mg/L	12.6	32.3	20.7	-	-
Total suspended solids (TSS)	mg/L	ND(9.2)	18.0	21.0	-	-
Turbidity	NTU	11.8	94.5	58.3	-	-
Un-ionized ammonia	mg/L	0.321	0.0906	0.0727	0.0380	0.0770

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
		Original	Original	Original		
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	1.76	1.91	0.604	1.91	1.32
Dissolved oxygen (DO), field	mg/L	0	1.36	1.44	0	0.09
Oxidation reduction potential (ORP), field	millivolts	-31	-89	-125	-61	-33
pH, field	s.u.	7.88	6.72	7.23	7.09	6.98
Temperature, field	Deg C	15.91	22.7	11.39	17.76	23.51
Turbidity, field	NTU	3.1	0	38	3	0
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	-	-

002904

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
		Original	Original	Original		
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	--	-	-
2-Methylnaphthalene	µg/L	--	--	--	-	-
Acenaphthene	µg/L	--	--	--	-	-
Acenaphthylene	µg/L	--	--	--	-	-
Acridine	µg/L	--	--	--	-	-
Anthracene	µg/L	ND(0.020)	0.032	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	--	--	--	-	-
Benzo(a)pyrene	µg/L	0.0144	0.0451	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	--	--	--	-	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	-	-
Benzo(g,h,i)perylene	µg/L	--	--	--	-	-
Benzo(k)fluoranthene	µg/L	--	--	--	-	-
Carcinogenic potency equivalent	µg/L	--	--	--	-	-
Chrysene	µg/L	--	--	--	-	-
Dibenz(a,h)anthracene	µg/L	--	--	--	-	-
Fluoranthene	µg/L	--	--	--	-	-
Fluorene	µg/L	--	--	--	-	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	-	-
Naphthalene	µg/L	--	--	--	-	-
Phenanthrene	µg/L	--	--	--	-	-
Pyrene	µg/L	--	--	--	-	-

002905

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-005
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Metals						
Aluminum (dissolved)	mg/L	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
Barium (dissolved)	mg/L	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Calcium (dissolved)	mg/L	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	10.0	6.20	17.3	15.9
Lead (dissolved)	mg/L	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	77.4	-	-	-
Manganese (dissolved)	mg/L	17.1	2.41	1.95	2.06	2.14
Mercury (dissolved)	mg/L	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.037	0.059	0.058	0.055
Nickel (dissolved)	mg/L	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Zirconium (dissolved)	mg/L	-	-	-	-	-
General Chemistry						
Alkalinity, bicarbonate	mg/L	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	530	220	444	426
Ammonia-N	mg/L	4.0	0.952	1.12	1.82	0.823
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.0	ND(2.0)	ND(2.0)	ND(2.0)

002906

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-005
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-
Chloride	mg/L	-	58.1	106	58.1	71.6
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	-	36.8	51.3	312	36.2
Conductivity	umhos/cm	-	1800	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.4	7.7	13.0	10.6
Escherichia coli	cfu/100mL	25.6	0	0	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	1	0	9	ND(2)
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Petroleum Products	mg/L	-	-	-	-	-
pH, lab	s.u.	-	7.77	-	-	-
Phenol	mg/L	-	-	-	-	-
Phosphorus	mg/L	7.2	1.36	4.90	1.94	2.61
Sulfate	mg/L	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	2	0	30	10
Total dissolved solids (TDS)	mg/L	-	1340	1280	1350	1260
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-
Turbidity	NTU	-	4.90	-	-	-
Un-ionized Ammonia	mg/L	-	0.000325	0.00324	0.00102	0.000267
Field Parameters						
Conductivity, field	mS/cm	-	2.3	1.67	1.54	2.07
Dissolved oxygen (DO), field	mg/L	-	-	-	-	3
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-125
pH, field	s.u.	-	6.22	7.11	6.09	5.99
Temperature, field	Deg C	-	8.8	9.9	19.3	15.0
Turbidity, field	NTU	-	-5	-	-	-
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	3300	2900	750	480
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	3300	2900	750	480
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	14300	13900	3120	1860

002907

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-005
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010
			Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**				
Petroleum Products (cont'd)						
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	46900	52900	6800	5900
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	17600	16800	3870	2340
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-
Acenaphthene	µg/L	-	-	ND(0.20)	-	-
Acenaphthylene	µg/L	-	-	ND(0.20)	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.20)	ND(0.20)	0.098
Benzo(a)anthracene	µg/L	-	-	0.44	-	-
Benzo(a)pyrene	µg/L	-	-	0.509	0.082	0.292
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.39	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.48	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.42	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	0.59	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-
Fluoranthene	µg/L	-	-	1.41	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.36	-	-
Naphthalene	µg/L	-	-	0.22	-	-
Phenanthrene	µg/L	-	-	0.91	-	-
Pyrene	µg/L	-	-	1.32	-	-

002908

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:		2/15/2011	2/15/2011	5/16/2011	5/16/2011
		Original	Duplicate	Original	Duplicate
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0053	0.0054
Barium (dissolved)	mg/L	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-
Iron (dissolved)	mg/L	24.0	24.7	10.5	10.4
Lead (dissolved)	mg/L	-	-	-	-
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	3.36	3.30	4.01	4.02
Mercury (dissolved)	mg/L	-	-	-	-
Molybdenum (dissolved)	mg/L	0.026	0.024	0.0249	0.0252
Nickel (dissolved)	mg/L	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	698	710	277	281
Ammonia-N	mg/L	0.931	0.832	0.935	1.06
Biochemical oxygen demand (carbonaceous)	mg/L	2.5	ND(2.0)	ND(2.0)	ND(2.0)

002909

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**	**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:		**GW-45804-021511-MB-001**	**GW-45804-021511-MB-002**	**GW-45804-051611-MMD-001**	**GW-45804-051611-MMD-002**
Sample Date:		**2/15/2011**	**2/15/2011**	**5/16/2011**	**5/16/2011**
		Original	**Duplicate**	**Original**	**Duplicate**
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	-	-	-	-
Chloride	mg/L	78.7	78.5	107	105
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	87.4	56.9	39.3	19.1
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.9	15.2	10.5	10.6
Escherichia coli	cfu/100mL	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Petroleum Products	mg/L	-	-	-	-
pH, lab	s.u.	-	-	-	-
Phenol	mg/L	-	-	-	-
Phosphorus	mg/L	0.628	0.701	1.09	0.400
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	0	0	1	1
Total dissolved solids (TDS)	mg/L	1190	1200	1820	1860
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-
Turbidity	NTU	-	-	-	-
Un-ionized Ammonia	mg/L	0.000218	0.000195	0.0000910	0.000103
Field Parameters					
Conductivity, field	mS/cm	2.35	2.35	2.79	2.79
Dissolved oxygen (DO), field	mg/L	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-130	-130	-	-
pH, field	s.u.	6.20	6.20	5.73	5.73
Temperature, field	Deg C	4.7	4.7	7.21	7.21
Turbidity, field	NTU	-	-	427	427
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(1000)	ND(1000)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	630	1500	4200	ND(2500)

002910

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002
Sample Date:		2/15/2011	2/15/2011	5/16/2011	5/16/2011
		Original	Duplicate	Original	Duplicate
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	5800	12200	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	630	2270	4200	ND(2500)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	0.031	0.069	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	0.113	0.232	0.0141	0.0821
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002911

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	0.0067	0.0042	-
Barium (dissolved)	mg/L	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-
Boron (dissolved)	mg/L	-	-	ND(0.050)	-
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	ND(0.00010)	-
Calcium (dissolved)	mg/L	-	-	-	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	-
Cobalt (dissolved)	mg/L	-	-	ND(0.00080)	-
Copper (dissolved)	mg/L	-	-	ND(0.0010)	-
Iron (dissolved)	mg/L	8.84	7.95	10.3	-
Lead (dissolved)	mg/L	-	-	ND(0.0010)	-
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	3.37	2.58	3.73	-
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	-
Molybdenum (dissolved)	mg/L	0.051	0.0250	0.0119	-
Nickel (dissolved)	mg/L	-	-	ND(0.0020)	-
Phosphorus (dissolved)	mg/L	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.0030)	ND(0.0030)	-
Zirconium (dissolved)	mg/L	-	-	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	380	483	511	426
Ammonia-N	mg/L	3.17	3.16	4.06	2.58
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	5.5	5.2	ND(3.0)

002912

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**	**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:		**GW-45804-081611-TS-003**	**GW-45804-110911-TS-006**	**GW-45804-021512-MB-001**	**GW-45804-032112-MB-004**
Sample Date:		**8/16/2011**	**11/9/2011**	**2/15/2012**	**3/21/2012**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	-	-	49	-
Chloride	mg/L	141	112	-	173
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	44.4	30.2	13.2	23.3
Conductivity	umhos/cm	-	-	-	1950
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	18.5	13.1	11.3
Escherichia coli	cfu/100mL	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0 J
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.50)	ND(0.5)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.50)	ND(0.5)
Petroleum Products	mg/L	-	-	ND(1.0)	-
pH, lab	s.u.	-	-	7.61	7.09
Phenol	mg/L	-	-	ND(0.0010)	-
Phosphorus	mg/L	0.511	0.710	0.475	0.592
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	1	2	0	0
Total dissolved solids (TDS)	mg/L	1680	1580	1560	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	5.55	-
Total suspended solids (TSS)	mg/L	-	-	465	-
Turbidity	NTU	-	-	162	27.0
Un-ionized Ammonia	mg/L	0.0329	0.0184	-	0.0000556
Field Parameters					
Conductivity, field	mS/cm	2.26	2.39	2.36	2.46
Dissolved oxygen (DO), field	mg/L	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-
pH, field	s.u.	7.34	7.29	5.9	5.99
Temperature, field	Deg C	19.9	13.7	4.65	6.8
Turbidity, field	NTU	-	881	-5	-5
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	520	1130	450	690

002913

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012
		Original	Original	Original	Original
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	3400	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	520	1420	450	690
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	0.033	0.021	ND(0.020)	-
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	0.135	0.0923	0.014	-
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002914

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Duplicate
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-
Arsenic (dissolved)	mg/L	-	0.0047	-	-
Barium (dissolved)	mg/L	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-
Boron (dissolved)	mg/L	-	0.056	-	-
Cadmium (dissolved)	mg/L	-	ND(0.00010)	-	-
Calcium (dissolved)	mg/L	-	-	-	-
Chromium (dissolved)	mg/L	-	ND(0.0010)	-	-
Cobalt (dissolved)	mg/L	-	ND(0.00050)	-	-
Copper (dissolved)	mg/L	-	ND(0.0010)	-	-
Iron (dissolved)	mg/L	-	9.87	-	-
Lead (dissolved)	mg/L	-	ND(0.0010)	-	-
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	-	3.47	-	-
Mercury (dissolved)	mg/L	-	ND(0.00010)	-	-
Molybdenum (dissolved)	mg/L	-	0.0168	-	-
Nickel (dissolved)	mg/L	-	ND(0.0020)	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.0030)	-	-
Zirconium (dissolved)	mg/L	-	-	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	-	364	-	-
Ammonia-N	mg/L	2.74	3.74	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.2	-	-

002915

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**	**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:		**GW-45804-032112-MB-009**	**GW-45804-051412-MB-005**	**GW-45804-052312-MB-002**	**GW-45804-052312-MB-003**
Sample Date:		**3/21/2012**	**5/14/2012**	**5/23/2012**	**5/23/2012**
		Original	**Original**	**Original**	**Duplicate**
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	-	36	-	-
Chloride	mg/L	-	182	-	-
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	-	-	158	112
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	11.0	-	-
Escherichia coli	cfu/100mL	0	-	0	0
Fecal coliform bacteria	cfu/100mL	0 J	-	0	0
Nitrate (as N)	mg/L	-	ND(0.10)	-	-
Nitrite (as N)	mg/L	-	ND(0.10)	-	-
Petroleum Products	mg/L	-	-	-	-
pH, lab	s.u.	-	7.59	-	-
Phenol	mg/L	-	ND(0.0010)	-	-
Phosphorus	mg/L	-	0.321	-	-
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	0	-	2	4
Total dissolved solids (TDS)	mg/L	-	1620	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	5.33	-	-
Total suspended solids (TSS)	mg/L	-	567	-	-
Turbidity	NTU	-	-	58.0 J	23.0 J
Un-ionized Ammonia	mg/L	0.0000590	-	-	-
Field Parameters					
Conductivity, field	mS/cm	2.46	2.34	2.3	-
Dissolved oxygen (DO), field	mg/L	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-
pH, field	s.u.	5.09	6.46	6.29	-
Temperature, field	Deg C	6.8	10.77	11.06	-
Turbidity, field	NTU	-5	-	-	-
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-

002916

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Duplicate
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.0299	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	µg/L	-	-	-	-

002917

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012
		Original	Duplicate	Original	Duplicate
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-
Antimony (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0044	0.0044
Barium (dissolved)	mg/L	0.13	0.13	-	-
Beryllium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-
Bismuth (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-
Boron (dissolved)	mg/L	ND(0.50)	ND(0.50)	0.068	0.065
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	262	273	-	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00087	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.83	8.05	5.48	4.85
Lead (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	70.1	69.6	-	-
Manganese (dissolved)	mg/L	2.83	2.75	1.99	2.10
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.024	0.024	0.0115	0.0127
Nickel (dissolved)	mg/L	ND(0.020)	ND(0.020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	ND(0.50)	ND(0.50)	-	-
Potassium (dissolved)	mg/L	23	23	-	-
Selenium (dissolved)	mg/L	ND(0.0040)	ND(0.0040)	-	-
Silicon (dissolved)	mg/L	15	15	-	-
Silver (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	-
Sodium (dissolved)	mg/L	79.1	78.8	-	-
Strontium (dissolved)	mg/L	2.74	2.60	-	-
Thallium (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	-
Tin (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-
Titanium (dissolved)	mg/L	ND(0.020)	ND(0.020)	-	-
Tungsten (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-
Uranium (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-
Vanadium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0044	ND(0.0030)
Zirconium (dissolved)	mg/L	ND(0.040)	ND(0.040)	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	562	555	-	-
Alkalinity, carbonate	mg/L	ND(10)	ND(10)	-	-
Alkalinity, hydroxide	mg/L	ND(10)	ND(10)	-	-
Alkalinity, total (as CaCO3)	mg/L	567	560	535	528
Ammonia-N	mg/L	4.82	5.22	4.95	4.77
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	3.9 J	6.8 J

002918

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**	**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:		**GW-45804-08-08-12-MB-002**	**GW-45804-08-08-12-MB-003**	**GW-45804-111212-MB-004**	**GW-45804-111212-MB-005**
Sample Date:		**8/8/2012**	**8/8/2012**	**11/12/2012**	**11/12/2012**
		Original	**Duplicate**	**Original**	**Duplicate**
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	53	51	42 J	55 J
Chloride	mg/L	119	119	120	116
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	184	88.6	65.6 J	79.5 J
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	10.2	11.7	12.0
Escherichia coli	cfu/100mL	0	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Petroleum Products	mg/L	-	-	-	-
pH, lab	s.u.	7.96	8.00	7.83	7.63
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.756	0.527	0.564	0.718
Sulfate	mg/L	-	-	435	430
Total coliform bacteria	cfu/100mL	0	0	20 J	ND(2) J
Total dissolved solids (TDS)	mg/L	1430	1410	1370	1380
Total kjeldahl nitrogen (TKN)	mg/L	6.61	6.74	6.21	5.74
Total suspended solids (TSS)	mg/L	484	594	466	773
Turbidity	NTU	54.0	30.0	9.30 J	5.70 J
Un-ionized Ammonia	mg/L	-	-	0.0917	0.0883
Field Parameters					
Conductivity, field	mS/cm	1.82	-	2.29	-
Dissolved oxygen (DO), field	mg/L	6.1	-	8.24	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-132	-
pH, field	s.u.	7.7	-	7.75	7.75
Temperature, field	Deg C	18.24	-	15.1	15.1
Turbidity, field	NTU	6.92	-	840	-
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(25)	ND(25)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	480	520	630 J	ND(250) J

002919

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	GW-45804-111212-MB-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012
		Original	Duplicate	Original	Duplicate
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	2500	ND(2500)	3000	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	480	520	630 J	ND(250) J
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.28)	ND(0.28)	ND(0.028)	ND(0.028)
2-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.20)	ND(0.20)	0.036	0.037
Benzo(a)pyrene	µg/L	ND(0.10)	ND(0.10)	0.040	0.042
Benzo(b)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.040	0.040
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	ND(0.20)	ND(0.20)	0.051	0.071
Benzo(k)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.033	0.034
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	ND(0.20)	ND(0.20)	0.046	0.053
Dibenz(a,h)anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	ND(0.20)	0.34	0.129	0.145
Fluorene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	0.021
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.20)	ND(0.20)	0.026	0.032
Naphthalene	µg/L	ND(0.20)	ND(0.20)	0.034	0.034
Phenanthrene	µg/L	ND(0.20)	ND(0.20)	0.072 J	0.094 J
Pyrene	µg/L	ND(0.20)	0.36	0.154	0.178

002920

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Original
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-
Arsenic (dissolved)	mg/L	0.0020	0.0035	0.0034	0.0071
Barium (dissolved)	mg/L	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-
Boron (dissolved)	mg/L	ND(0.050)	0.069	0.067	0.076
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.39	8.87	8.75	5.93
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	4.08	4.27	4.50	3.20
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0069	0.0130	0.0130	0.0191
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	476	399	401	447
Ammonia-N	mg/L	3.68	4.49	4.35	7.02
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)

002921

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Original
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	63	49	44	36 J
Chloride	mg/L	184	190	186	148
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	23.6	34.0	33.7	126
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	17.6	15.8	16.5	13.9
Escherichia coli	cfu/100mL	ND(2)	ND(10)	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(10)	ND(10)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Petroleum Products	mg/L	-	-	-	-
pH, lab	s.u.	7.61	7.70	7.67	7.49
Phenol	mg/L	ND(0.0010)	0.0030	0.0030	ND(0.0010)
Phosphorus	mg/L	0.662	0.728	0.703	0.093
Sulfate	mg/L	587	683	689	682
Total coliform bacteria	cfu/100mL	ND(2)	ND(100)	ND(100)	10
Total dissolved solids (TDS)	mg/L	1660	1650	1640	1760
Total kjeldahl nitrogen (TKN)	mg/L	5.28	5.52	5.98	6.98
Total suspended solids (TSS)	mg/L	2680	646	748	26.8
Turbidity	NTU	32.0	20.5 J	40.0 J	34.0
Un-ionized Ammonia	mg/L	0.0388	0.00156	0.00151	0.0151
Field Parameters					
Conductivity, field	mS/cm	2.47	-	2.38	2.32
Dissolved oxygen (DO), field	mg/L	6.86	-	5.54	5.46
Oxidation reduction potential (ORP), field	millivolts	-	-	-131	-119
pH, field	s.u.	7.78	6.11	6.11	6.63
Temperature, field	Deg C	6.9	12.3	12.3	20.7
Turbidity, field	NTU	-5	-	-5	0
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(630)	490	420	ND(250)

002922

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Original
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(630)	490	420	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	ND(4.0)	ND(4.0)	-
Anthracene	µg/L	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	0.033	0.022	-
Benzo(a)pyrene	µg/L	ND(0.10)	0.0342	0.0252	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	0.047	0.035	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	0.054	0.044	-
Benzo(k)fluoranthene	µg/L	-	0.036	0.024	-
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	ND(0.060)	-
Chrysene	µg/L	-	0.041	0.031	-
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	-	0.104 J	0.080 J	-
Fluorene	µg/L	-	ND(0.13)	ND(0.097)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	0.029	0.024	-
Naphthalene	µg/L	-	0.036 J	0.033 J	-
Phenanthrene	µg/L	-	0.062	0.056	-
Pyrene	µg/L	-	0.131	0.101	-

002923

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014
		Duplicate	Original	Original	Original
Parameters:	**Units**				
Metals					
Aluminum (dissolved)	mg/L	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-
Arsenic (dissolved)	mg/L	0.0068	0.0029	0.0012	0.0024
Barium (dissolved)	mg/L	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-
Boron (dissolved)	mg/L	0.075	0.067	ND(0.050)	0.075
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-
Chromium (dissolved)	mg/L	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.90	6.07	9.19	8.82
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	3.20	3.74	4.90	5.02
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0199	0.0107	0.0049	0.0084
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041
Zirconium (dissolved)	mg/L	-	-	-	-
General Chemistry					
Alkalinity, bicarbonate	mg/L	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	446	511	474	475 J
Ammonia-N	mg/L	6.93	7.12	5.47	7.40 J
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J

002924

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014
		Duplicate	Original	Original	Original
Parameters:	**Units**				
Chemical oxygen demand (COD)	mg/L	148 J	51	ND(58)	102 J
Chloride	mg/L	147	143	176	179 J
Color (apparent)	color unit	-	-	191 J	230 J
Color (apparent)	TCU	80.0	176	-	-
Conductivity	umhos/cm	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.7	11.6	8.6	8.2 J
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	ND(2) J
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	ND(2) J
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J
Petroleum Products	mg/L	-	-	-	-
pH, lab	s.u.	7.50	7.61	7.30	7.68 J
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J
Phosphorus	mg/L	0.118	0.638	0.046	0.127 J
Sulfate	mg/L	675	546	477	504 J
Total coliform bacteria	cfu/100mL	10	ND(2)	0	ND(2) J
Total dissolved solids (TDS)	mg/L	1770	1580	1450	1510 J
Total kjeldahl nitrogen (TKN)	mg/L	7.01	7.89	6.21	7.43 J
Total suspended solids (TSS)	mg/L	23.6	905	24.5	38.0 J
Turbidity	NTU	32.0	53.8	117	96.0 J
Un-ionized Ammonia	mg/L	0.0149	0.00316	0.0215	0.0364 J
Field Parameters					
Conductivity, field	mS/cm	-	2.24	2.38	2.39
Dissolved oxygen (DO), field	mg/L	-	8.06	5.69	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-148	-176
pH, field	s.u.	6.83	6.21	7.34 D 7.34	7.32
Temperature, field	Deg C	20.7	12.5	7.2 D 7.17	10.56
Turbidity, field	NTU	-	641	33.8	30.1
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1240	ND(250)	ND(250) J

002925

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014
		Duplicate	Original	Original	Original
Parameters:	**Units**				
Petroleum Products (cont'd)					
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C8-C50)	µg/L	ND(250)	1530	ND(380)	ND(380) J
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-
Semi-Volatiles					
1+2-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-
Acridine	µg/L	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	ND(0.050)	-
Chrysene	µg/L	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	ND(0.020)	-

002926

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004
Sample Date:		8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Aluminum (dissolved)	mg/L	-	-	--	--	--
Antimony (dissolved)	mg/L	-	-	--	--	--
Arsenic (dissolved)	mg/L	0.0040	0.0017	ND(0.0010)	0.0018	ND(0.00010)
Barium (dissolved)	mg/L	-	-	--	--	--
Beryllium (dissolved)	mg/L	-	-	--	--	--
Bismuth (dissolved)	mg/L	-	-	--	--	--
Boron (dissolved)	mg/L	0.092	0.066	ND(0.050)	0.079	ND(0.010)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	-	-	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	5.81	5.12	10.7	9.11	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	--	--	--
Manganese (dissolved)	mg/L	3.17	3.31	3.97	4.47	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0151	0.0063	0.0022	0.0056	ND(0.000050)
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Phosphorus (dissolved)	mg/L	-	-	--	--	--
Potassium (dissolved)	mg/L	-	-	--	--	--
Selenium (dissolved)	mg/L	-	-	--	--	--
Silicon (dissolved)	mg/L	-	-	--	--	--
Silver (dissolved)	mg/L	-	-	--	--	--
Sodium (dissolved)	mg/L	-	-	--	--	--
Strontium (dissolved)	mg/L	-	-	--	--	--
Thallium (dissolved)	mg/L	-	-	--	--	--
Tin (dissolved)	mg/L	-	-	--	--	--
Titanium (dissolved)	mg/L	-	-	--	--	--
Tungsten (dissolved)	mg/L	-	-	--	--	--
Uranium (dissolved)	mg/L	-	-	--	--	--
Vanadium (dissolved)	mg/L	-	-	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	0.0070	ND(0.0030)	ND(0.0030)	0.0019
Zirconium (dissolved)	mg/L	-	-	--	--	--
General Chemistry						
Alkalinity, bicarbonate	mg/L	-	-	--	--	--
Alkalinity, carbonate	mg/L	-	-	--	--	--
Alkalinity, hydroxide	mg/L	-	-	--	--	--
Alkalinity, total (as CaCO3)	mg/L	534 J	545	573	469	ND(10)
Ammonia-N	mg/L	10.4 J	8.37	8.57	10.6	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0)	2.6	ND(2.0)	ND(2.0)

002927

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004
Sample Date:		8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Chemical oxygen demand (COD)	mg/L	43 J	39	45	41	ND(10)
Chloride	mg/L	160 J	126	149	356	ND(0.50)
Color (apparent)	color unit	82.2 J	159			
Color (apparent)	TCU	-	-	54.2	79.0	ND(1.0)
Conductivity	umhos/cm	-	-	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.7 J	10.9	7.8	10.7	ND(1.0)
Escherichia coli	cfu/100mL	0 J	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	0 J	0	ND(2)	0	0
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.010)
Petroleum Products	mg/L	-	-	--	--	--
pH, lab	s.u.	7.51 J	7.84	7.71	7.69	7.18
Phenol	mg/L	0.0018 J	ND(0.0010)	ND(0.0029)	0.0027	0.0021
Phosphorus	mg/L	0.079 J	0.088	0.938	0.073	ND(0.030)
Sulfate	mg/L	497 J	425	405	579	ND(0.30)
Total coliform bacteria	cfu/100mL	0 J	0	12	10	1
Total dissolved solids (TDS)	mg/L	1450 J	1340	1410	1600	ND(10)
Total kjeldahl nitrogen (TKN)	mg/L	9.80 J	9.06	6.99	11.6	ND(0.15)
Total suspended solids (TSS)	mg/L	12.0 J	15.4	1480	21.4	ND(2.0)
Turbidity	NTU	62.2 J	52.6	27.4	96.0	ND(0.10)
Un-ionized Ammonia	mg/L	1.90 J	0.0287	0.0261	0.0477	--
Field Parameters						
Conductivity, field	mS/cm	2.34	0.579	1.245	2.47	0.661
Dissolved oxygen (DO), field	mg/L	2.02	3.03	--	1.04	0.91
Oxidation reduction potential (ORP), field	millivolts	-154	-103	--	-86	-252
pH, field	s.u.	8.64	7.14	7.44	7.19	7.59
Temperature, field	Deg C	20.31	11.26	4.4	13.32	19.3
Turbidity, field	NTU	45.1	-	--	0	252
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250)	260	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250)	260	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250)	1290	ND(250)	ND(250)

002928

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004
Sample Date:		8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Petroleum Products (cont'd)						
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380)	1540	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	--	--
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	-	-	--	--	--
1-Methylnaphthalene	µg/L	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--
Acenaphthene	µg/L	-	-	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--
Acridine	µg/L	-	-	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050)	0.056	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--
Chrysene	µg/L	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--
Fluoranthene	µg/L	-	-	--	--	--
Fluorene	µg/L	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--
Naphthalene	µg/L	-	-	--	--	--
Phenanthrene	µg/L	-	-	--	--	--
Pyrene	µg/L	-	-	--	--	--

002929

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006
Sample Date:		11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Aluminum (dissolved)	mg/L	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--
Arsenic (dissolved)	mg/L	0.0015	ND(0.0010)	0.00116	0.0016	0.00108
Barium (dissolved)	mg/L	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--
Boron (dissolved)	mg/L	ND(0.10)	ND(0.10)	0.065	0.11	0.078
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.00018	ND(0.0010)	0.00027
Copper (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.0020)	0.00058
Iron (dissolved)	mg/L	5.82	8.02	7.89	4.96	4.06
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--
Manganese (dissolved)	mg/L	4.17	5.16	4.72	3.37	2.50
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00940	ND(0.00609)	0.00789	0.0107	0.00879
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00161	ND(0.0050)	0.00105
Phosphorus (dissolved)	mg/L	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0012)	ND(0.010)	ND(0.0010)
Zirconium (dissolved)	mg/L	--	--	--	--	--
General Chemistry						
Alkalinity, bicarbonate	mg/L	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	469	ND(439)	398	516	558
Ammonia-N	mg/L	8.08	6.90	6.81	7.18	6.85
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006
Sample Date:		11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Chemical oxygen demand (COD)	mg/L	36	ND(33)	33	ND(44)	45
Chloride	mg/L	199	ND(157)	155	148	128
Color (apparent)	color unit		211	200	216	196
Color (apparent)	TCU	222	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.5	ND(8.3)	8.8	11.0	10.9
Escherichia coli	cfu/100mL	0	0	0	1	0
Fecal coliform bacteria	cfu/100mL	0	0	0	60	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	--	--	--	--	--
pH, lab	s.u.	7.70	7.89	7.91	7.74	7.34
Phenol	mg/L	0.0029	ND(0.0010)	ND(0.0021)	0.0060	0.0022
Phosphorus	mg/L	0.101	0.056	0.0653	0.0820	0.0943
Sulfate	mg/L	660	ND(620)	726	580	511
Total coliform bacteria	cfu/100mL	0	0	10	3900	0
Total dissolved solids (TDS)	mg/L	1690	ND(1540)	1690	1550	1580
Total kjeldahl nitrogen (TKN)	mg/L	8.47	6.70	7.50	7.70	5.62
Total suspended solids (TSS)	mg/L	16.2	ND(16.0)	27.6	6.2	2.6
Turbidity	NTU	86.2	87.3 J	101	60.3	50.9
Un-ionized Ammonia	mg/L	0.355	0.0172	0.244	0.0285	0.0254
Field Parameters						
Conductivity, field	mS/cm	2.29	1.25	1.87	1.8	1.86
Dissolved oxygen (DO), field	mg/L	0.57	0	0	0	3.14
Oxidation reduction potential (ORP), field	millivolts	-167	-115	-94	-91	-129
pH, field	s.u.	D 8.11	7.22	8.16	6.97	7.1
Temperature, field	Deg C	13.66	4.85	11.99	18.33	13.5
Turbidity, field	NTU	2.3	0	1.6	0	0.2
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

002931

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006
Sample Date:		11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Petroleum Products (cont'd)						
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)	--	--	--	--
Semi-Volatiles						
1+2-Methylnaphthalene	µg/L	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--

002932

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-060117-TS-009	GW-45804-083017-TS-002	GW-45804-112917-TS-005
Sample Date:		6/1/2017	8/30/2017	11/29/2017
Parameters:	**Units**			
Metals				
Aluminum (dissolved)	mg/L	-	-	-
Antimony (dissolved)	mg/L	-	-	-
Arsenic (dissolved)	mg/L	-	-	-
Barium (dissolved)	mg/L	-	-	-
Beryllium (dissolved)	mg/L	-	-	-
Bismuth (dissolved)	mg/L	-	-	-
Boron (dissolved)	mg/L	-	-	-
Cadmium (dissolved)	mg/L	-	-	-
Calcium (dissolved)	mg/L	-	-	-
Chromium (dissolved)	mg/L	-	-	-
Cobalt (dissolved)	mg/L	-	-	-
Copper (dissolved)	mg/L	-	-	-
Iron (dissolved)	mg/L	6.06	3.65 J	3.64
Lead (dissolved)	mg/L	-	-	-
Magnesium (dissolved)	mg/L	-	-	-
Manganese (dissolved)	mg/L	3.97	2.33 J	2.28
Mercury (dissolved)	mg/L	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-
Nickel (dissolved)	mg/L	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-
Potassium (dissolved)	mg/L	-	-	-
Selenium (dissolved)	mg/L	-	-	-
Silicon (dissolved)	mg/L	-	-	-
Silver (dissolved)	mg/L	-	-	-
Sodium (dissolved)	mg/L	-	-	-
Strontium (dissolved)	mg/L	-	-	-
Thallium (dissolved)	mg/L	-	-	-
Tin (dissolved)	mg/L	-	-	-
Titanium (dissolved)	mg/L	-	-	-
Tungsten (dissolved)	mg/L	-	-	-
Uranium (dissolved)	mg/L	-	-	-
Vanadium (dissolved)	mg/L	-	-	-
Zinc (dissolved)	mg/L	-	-	-
Zirconium (dissolved)	mg/L	-	-	-
General Chemistry				
Alkalinity, bicarbonate	mg/L	-	-	-
Alkalinity, carbonate	mg/L	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-
Alkalinity, total (as CaCO3)	mg/L	495	554 J	686
Ammonia-N	mg/L	6.61	6.98 J	7.54
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**	**MW102-09**	**MW102-09**
Sample ID:		**GW-45804-060117-TS-009**	**GW-45804-083017-TS-002**	**GW-45804-112917-TS-005**
Sample Date:		**6/1/2017**	**8/30/2017**	**11/29/2017**
Parameters:	**Units**			
Chemical oxygen demand (COD)	mg/L	-	-	-
Chloride	mg/L	-	-	-
Color (apparent)	color unit	-	-	-
Color (apparent)	TCU	-	-	-
Conductivity	umhos/cm	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.2	13.6 J	10.9
Escherichia coli	cfu/100mL	0	0 J	0
Fecal coliform bacteria	cfu/100mL	-	-	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)
Nitrite (as N)	mg/L	-	-	-
Petroleum Products	mg/L	-	-	-
pH, lab	s.u.	-	-	-
Phenol	mg/L	-	-	-
Phosphorus	mg/L	0.0852	0.104 J	0.0818
Sulfate	mg/L	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-
Total dissolved solids (TDS)	mg/L	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-
Turbidity	NTU	-	-	-
Un-ionized Ammonia	mg/L	0.0153	0.0468	0.0312
Field Parameters				
Conductivity, field	mS/cm	2.03	1.68	1.53
Dissolved oxygen (DO), field	mg/L	0	0.77	0
Oxidation reduction potential (ORP), field	millivolts	-109	-123	-92
pH, field	s.u.	7.04	7.24	7.31
Temperature, field	Deg C	11.71	19.79	11.22
Turbidity, field	NTU	0	0	59
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-

002934

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-060117-TS-009	GW-45804-083017-TS-002	GW-45804-112917-TS-005
Sample Date:		6/1/2017	8/30/2017	11/29/2017
Parameters:	**Units**			
Petroleum Products (cont'd)				
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-
Semi-Volatiles				
1+2-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene	µg/L	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acridine	µg/L	-	-	-
Anthracene	µg/L	-	-	-
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-

002935

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:			**GW-45804-051810-MB-004**	**GW-45804-051810-MB-005**	**GW-45804-081910-MMD-001**	**GW-45804-081910-MMD-002**
Sample Date:			**5/18/2010**	**5/18/2010**	**8/19/2010**	**8/19/2010**
			Original	**Duplicate**	**Original**	**Duplicate**
Parameters:	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	0.011	0.012	0.012	0.012
Boron (dissolved)	mg/L	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Chromium (dissolved)	mg/L	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	22.9	23.8	10.9	11.1
Lead (dissolved)	mg/L	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	6.78	7.00	7.77	7.70
Mercury (dissolved)	mg/L	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
Nickel (dissolved)	mg/L	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
		-				
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	264	266	186	192
Ammonia-N	mg/L	4.0	2.35	2.26	1.50	1.21
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-
Chloride	mg/L	-	107	106	78.7	78.4
Color (apparent)	color unit	-	-	-	-	-
Color (apparent)	TCU	-	83.8	87.8	520	498
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.0	8.9	8.7	10.2
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-
Phosphorus	mg/L	7.2	0.057	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	0	0
Total dissolved solids (TDS)	mg/L	-	970	990	926	892
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-
Un-ionized ammonia	mg/L	-	0.00799	0.00769	0.00108	0.000871

002936

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010
			Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**				
Field Parameters						
Conductivity, field	mS/cm	-	1.423	1.423	0.99	0.99
Dissolved oxygen (DO), field	mg/L	-	1.89	1.89	0	0
Oxidation reduction potential (ORP), field	millivolts	-	-123	-123	-152	-152
pH, field	s.u.	-	7.05	7.05	6.20	6.20
Temperature, field	Deg C	-	13.82	13.82	19.2	19.2
Turbidity, field	NTU	-	-	-	-	-
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-

002937

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010
			Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**TLP[1]**				
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-

002938

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-110210-TS-009**	**GW-45804-021511-MB-003**	**GW-45804-051611-MMD-003**	**GW-45804-081611-TS-001**
Sample Date:		**11/2/2010**	**2/15/2011**	**5/16/2011**	**8/16/2011**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L	-	-	-	-
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-
Iron (dissolved)	mg/L	7.64	7.87	6.33	6.79
Lead (dissolved)	mg/L	-	-	-	-
Manganese (dissolved)	mg/L	5.63	6.44	4.06	4.38
Mercury (dissolved)	mg/L	-	-	-	-
Molybdenum (dissolved)	mg/L	ND(0.010)	0.010	0.0062	ND(0.010)
Nickel (dissolved)	mg/L	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	152	189	202	190
Ammonia-N	mg/L	0.855	0.606	0.552	0.656
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-
Chloride	mg/L	40.1	44.3	58.9	50.8
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	367	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.6	10.0	9.0	11.2
Escherichia coli	cfu/100mL	0	0	0	1
Fecal coliform bacteria	cfu/100mL	0	0	0	10
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-
pH, lab	s.u.	-	-	-	-
Phenol	mg/L	-	-	-	-
Phosphorus	mg/L	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	1	0	10	20
Total dissolved solids (TDS)	mg/L	670	680	778	558
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-
Turbidity	NTU	-	-	-	-
Un-ionized ammonia	mg/L	0.000396	0.000132	0.000262	0.00404

002939

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-110210-TS-009**	**GW-45804-021511-MB-003**	**GW-45804-051611-MMD-003**	**GW-45804-081611-TS-001**
Sample Date:		**11/2/2010**	**2/15/2011**	**5/16/2011**	**8/16/2011**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L	0	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-143	-129	-	-165
pH, field	s.u.	6.17	6.17	6.43	7.17
Temperature, field	Deg C	14.3	4.7	6.88	18.1
Turbidity, field	NTU	-	-	14.3	89.1
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-110210-TS-009	GW-45804-021511-MB-003	GW-45804-051611-MMD-003	GW-45804-081611-TS-001
Sample Date:		11/2/2010	2/15/2011	5/16/2011	8/16/2011
		Original	Original	Original	Original
Parameters:	**Units**				
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	ug/L	-	-	-	-

002941

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-081611-TS-002**	**GW-45804-111011-TS-011**	**GW-45804-111011-TS-012**	**GW-45804-021512-MB-005**
Sample Date:		**8/16/2011**	**11/10/2011**	**11/10/2011**	**2/15/2012**
		Duplicate	**Original**	**Duplicate**	**Original**
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.011	0.0092	-	0.0071
Boron (dissolved)	mg/L	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00080)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	6.41	5.99	-	7.59
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)
Manganese (dissolved)	mg/L	4.31	4.37	-	5.45
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0079	-	0.0049
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	-	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183
Ammonia-N	mg/L	0.665	0.508	0.517	0.642
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	26
Chloride	mg/L	51.0	38.9	37.7	-
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	269	103	75.3	14.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	ND(1.0)
pH, lab	s.u.	-	-	-	7.61
Phenol	mg/L	-	-	-	0.0010
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0
Total dissolved solids (TDS)	mg/L	564	546	546	612
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.47
Total suspended solids (TSS)	mg/L	-	-	-	13.0
Turbidity	NTU	-	-	-	77.0
Un-ionized ammonia	mg/L	0.00410	0.00168	0.00171	-

002942

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-081611-TS-002**	**GW-45804-111011-TS-011**	**GW-45804-111011-TS-012**	**GW-45804-021512-MB-005**
Sample Date:		**8/16/2011**	**11/10/2011**	**11/10/2011**	**2/15/2012**
		Duplicate	**Original**	**Duplicate**	**Original**
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	-	0.75	-	1.05
Dissolved oxygen (DO), field	mg/L	-	1.55	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-153	-	-
pH, field	s.u.	-	7.10	7.10	5.78
Temperature, field	Deg C	-	12.0	12.0	6
Turbidity, field	NTU	-	13.4	-	484
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012
		Duplicate	Original	Duplicate	Original
Parameters:	**Units**				
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-
Acenaphthene	µg/L	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-
Acridine	µg/L	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-
Chrysene	µg/L	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-
Fluoranthene	µg/L	-	-	-	-
Fluorene	µg/L	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-
Naphthalene	µg/L	-	-	-	-
Phenanthrene	µg/L	-	-	-	-
Pyrene	ug/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-051512-MB-008**	**GW-45804-111212-MB-001**	**GW-45804-022713-TS-003**	**GW-45804-052213-TS-006**
Sample Date:		**5/15/2012**	**11/12/2012**	**2/27/2013**	**5/22/2013**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.0067	0.0087	0.0074	0.0061
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	7.12	8.77	11.6	7.17
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.72	7.35	6.51	4.03
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0041	0.0063	0.0044	0.0060
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0060
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	212	272	309	201
Ammonia-N	mg/L	0.814	0.939	1.08	1.11
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	30	46	44	36
Chloride	mg/L	81.5	62.4	111	92
Color (apparent)	color unit	-	-	-	-
Color (apparent)	TCU	277	322 J	75.9	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	9.9	13.6	17.9
Escherichia coli	cfu/100mL	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	-
pH, lab	s.u.	7.87	7.74	7.60	7.52
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.046	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	328	278	317
Total coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	10
Total dissolved solids (TDS)	mg/L	748	860	900	734
Total kjeldahl nitrogen (TKN)	mg/L	1.61	1.66	2.08	1.65
Total suspended solids (TSS)	mg/L	7.0	15.0	32.0	14.0
Turbidity	NTU	81.0	8.50 J	108	59.0
Un-ionized ammonia	mg/L	-	0.197	0.00558	0.000496

002945

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		5/15/2012	11/12/2012	2/27/2013	5/22/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.21	1	1.62	1.28
Dissolved oxygen (DO), field	mg/L	1.66	9.47	1.62	2.38
Oxidation reduction potential (ORP), field	millivolts	-139	-119	-109	-
pH, field	s.u.	6.64	6.84	7.48	6.15
Temperature, field	Deg C	12.98	16.3	6.6	14.3
Turbidity, field	NTU	94.3	129	74.4	117
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		5/15/2012	11/12/2012	2/27/2013	5/22/2013
		Original	Original	Original	Original
Parameters:	**Units**				
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	ND(0.020)	-	0.030
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	ND(0.028)	-	-
2-Methylnaphthalene	µg/L	-	ND(0.020)	-	0.025
Acenaphthene	µg/L	-	ND(0.020)	-	0.070
Acenaphthylene	µg/L	-	ND(0.020)	-	ND(0.020)
Acridine	µg/L	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	ND(0.020)
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	ND(0.060)
Chrysene	µg/L	-	ND(0.020)	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	ND(0.020)
Fluoranthene	µg/L	-	ND(0.020)	-	ND(0.020)
Fluorene	µg/L	-	ND(0.020)	-	0.054
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	ND(0.020)
Naphthalene	µg/L	-	ND(0.020)	-	ND(0.020)
Phenanthrene	µg/L	-	ND(0.020)	-	0.022
Pyrene	ug/L	-	ND(0.020)	-	ND(0.020)

002947

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014
		Original	Original	Original	Original
Parameters:	**Units**				
Metals					
Arsenic (dissolved)	mg/L	0.0103	0.0100	0.0031	0.0063
Boron (dissolved)	mg/L	0.056	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00096	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)
Iron (dissolved)	mg/L	5.03	5.22	2.69	5.16
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.73	2.79	1.78	2.99
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0061	0.0052	0.0060	0.0042
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)
Zinc (dissolved)	mg/L	0.0147	ND(0.0030)	0.0146	0.0070
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	179	183	341	224 J
Ammonia-N	mg/L	1.28	0.674	0.867	1.30 J
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.6	ND(2.0)	ND(2.0) J
Chemical oxygen demand (COD)	mg/L	27	82	ND(34)	54 J
Chloride	mg/L	65	51.9	71.1	87.2 J
Color (apparent)	color unit	-	-	59.4 J	283 J
Color (apparent)	TCU	208	60.0	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	9.3	7.7	6.9 J
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0 J
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0 J
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite/Nitrate	mg/L	-	-	-	-
pH, lab	s.u.	7.44	7.11	7.26	7.89 J
Phenol	mg/L	ND(0.0010)	0.0048	0.0024	0.0014 J
Phosphorus	mg/L	ND(0.030)	1.54	ND(0.030)	0.043 J
Sulfate	mg/L	195	171	272	193 J
Total coliform bacteria	cfu/100mL	100	ND(10)	7	0 J
Total dissolved solids (TDS)	mg/L	630	524	828	650 J
Total kjeldahl nitrogen (TKN)	mg/L	2.31	0.81	ND(1.57)	2.15 J
Total suspended solids (TSS)	mg/L	3.2	2750	53.5	4.0 J
Turbidity	NTU	18.7	106	47.0	34.0 J
Un-ionized ammonia	mg/L	0.00423	0.000291	0.00164	0.00788 J

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-080713-TS-008**	**GW-45804-111413-TS-008**	**GW-45804-042114-TS-006**	**GW-45804-053014-MB-015**
Sample Date:		**8/7/2013**	**11/14/2013**	**4/21/2014**	**5/30/2014**
		Original	**Original**	**Original**	**Original**
Parameters:	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.06	0.868	1.76	1.19
Dissolved oxygen (DO), field	mg/L	4.62	7.53	4.62	0
Oxidation reduction potential (ORP), field	millivolts	174	-	-101	-154
pH, field	s.u.	6.91	6.19	7.06 D 7.06	7.43
Temperature, field	Deg C	17.7	12.7	9.34 D 9.3	9.98
Turbidity, field	NTU	32.1	250	28.1	38.8
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	420	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	420	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1280	ND(250)	ND(250) J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1700	ND(380)	ND(380) J
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-

002949

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014
		Original	Original	Original	Original
Parameters:	**Units**				
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	0.037	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-
Acridine	µg/L	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	0.047	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	ND(0.020)	-
Pyrene	ug/L	-	-	ND(0.020)	-

002950

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052815-TS-002
Sample Date:		8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/28/2015
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.0101	0.0081	0.0063	0.0064	0.0067
Boron (dissolved)	mg/L	0.053	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	3.91	4.80	7.30	7.22	4.77
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.96	2.41	4.09	4.03	2.48
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0049	0.0047	0.0029	0.0029	0.0041
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0092	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	202 J	209	306	308	228
Ammonia-N	mg/L	1.49 J	1.03	0.969	1.09	1.01
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	30 J	30	29	25	32
Chloride	mg/L	62.7 J	52	84.7	87.7	78.5
Color (apparent)	color unit	138 J	203			
Color (apparent)	TCU	-	-	132	133	225
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.3 J	9.9	7.0	7.0	11.6
Escherichia coli	cfu/100mL	0 J	0	ND(2)	2	0
Fecal coliform bacteria	cfu/100mL	1 J	0	ND(2)	ND(2)	2
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)
Nitrite/Nitrate	mg/L	-	-	--	--	--
pH, lab	s.u.	7.54 J	7.92	7.71	7.72	7.84
Phenol	mg/L	0.0023 J	ND(0.0010)	ND(0.0027)	ND(0.0025)	0.0034
Phosphorus	mg/L	ND(0.030) J	0.039	0.363	0.357	ND(0.030)
Sulfate	mg/L	109 J	126	174	185	90.1
Total coliform bacteria	cfu/100mL	7 J	300	178	128	50
Total dissolved solids (TDS)	mg/L	458 J	479	655	676	431
Total kjeldahl nitrogen (TKN)	mg/L	2.10 J	1.32	1.48	1.59	1.72
Total suspended solids (TSS)	mg/L	ND(2.0) J	3.6	448	390	8.3
Turbidity	NTU	7.03 J	19.6	52.0	53.0	24.8
Un-ionized ammonia	mg/L	0.317 J	0.00646	0.0113	0.0127	0.00653

002951

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052815-TS-002
Sample Date:		8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/28/2015
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	0.719	0.517	0.681	0.681	0.609
Dissolved oxygen (DO), field	mg/L	0.21	3.82	--	--	2.3
Oxidation reduction potential (ORP), field	millivolts	-147	-96	--	--	-43
pH, field	s.u.	8.77	7.41	7.89	7.89	7.34
Temperature, field	Deg C	18.75	11.08	5.1	5.1	13.59
Turbidity, field	NTU	28.9	-	--	--	0
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250)	310	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250)	310	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250)	960 J	370 J	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380)	1260 J	ND(380) J	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	--	--

002952

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052815-TS-002
Sample Date:		8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/28/2015
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--
Acenaphthene	µg/L	-	-	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--
Acridine	µg/L	-	-	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.20)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050)	0.078	ND(0.050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--
Chrysene	µg/L	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--
Fluoranthene	µg/L	-	-	--	--	--
Fluorene	µg/L	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--
Naphthalene	µg/L	-	-	--	--	--
Phenanthrene	µg/L	-	-	--	--	--
Pyrene	ug/L	-	-	--	--	--

002953

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005
Sample Date:		8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.00896	0.00851	0.00519	0.00527	0.00631
Boron (dissolved)	mg/L	0.045	0.042	ND(0.029)	ND(0.027)	0.030
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.00050)	0.00088	ND(0.00086)	ND(0.00080)	0.00063
Cobalt (dissolved)	mg/L	0.00011	0.00013	0.00071	0.00067	0.00069
Copper (dissolved)	mg/L	ND(0.00020)	ND(0.00020)	ND(0.00067) J	ND(0.00020) J	ND(0.00020)
Iron (dissolved)	mg/L	4.92	4.74	3.73	3.81	5.32
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	2.92	2.71	2.58	2.58	2.95
Mercury (dissolved)	mg/L	0.000013	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00467	0.00376	ND(0.00385)	ND(0.00379)	0.00372
Nickel (dissolved)	mg/L	0.00056	0.00052	ND(0.00178)	ND(0.00158)	0.00142
Zinc (dissolved)	mg/L	0.0023	0.0016	0.0069 J	ND(0.0022) J	0.0015
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	262	254	ND(249)	ND(253)	292
Ammonia-N	mg/L	1.16	1.00	0.867	0.909	1.19
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	32	32	ND(29)	ND(28)	32
Chloride	mg/L	86.8	56.9	ND(43.4)	ND(44.2)	80.4
Color (apparent)	color unit			189 J	191 J	233
Color (apparent)	TCU	247	207	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	10.1	ND(8.5)	ND(8.5)	9.6
Escherichia coli	cfu/100mL	12	0	0	0	0
Fecal coliform bacteria	cfu/100mL	40	0	0	0	0
Nitrate (as N)	mg/L	0.022	ND(0.020)	ND(0.025)	ND(0.024)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
Nitrite/Nitrate	mg/L	--	--	--	--	--
pH, lab	s.u.	7.93	7.58	7.82	7.80	7.90
Phenol	mg/L	0.0021	0.0036	ND(0.0010)	ND(0.0010)	0.0021
Phosphorus	mg/L	ND(0.030)	0.048	ND(0.030)	ND(0.030)	0.0261
Sulfate	mg/L	102	88.2	ND(197)	ND(176)	144
Total coliform bacteria	cfu/100mL	50	2	ND(100)	ND(100)	10
Total dissolved solids (TDS)	mg/L	565	374	ND(489)	ND(488)	711
Total kjeldahl nitrogen (TKN)	mg/L	1.87	1.59	1.35	1.36	1.83
Total suspended solids (TSS)	mg/L	ND(2.0)	ND(2.0)	ND(3.4)	ND(3.5)	20.1
Turbidity	NTU	16.6	18.3	ND(33.5) J	ND(31.4) J	61.1
Un-ionized ammonia	mg/L	0.0170	0.0265	0.00287	0.00301	0.0130

002954

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005
Sample Date:		8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	2.56	0.602	0.843	--	0.695
Dissolved oxygen (DO), field	mg/L	1.46	3.92	0	--	0.12
Oxidation reduction potential (ORP), field	millivolts	-179	-136	-73	--	-67
pH, field	s.u.	7.62	7.96	7.3	--	7.7
Temperature, field	Deg C	17.28	13.49	6.17	--	9.63
Turbidity, field	NTU	0	1.9	17.6	--	6.7
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	ND(250)	--	--	--

002955

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005
Sample Date:		8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016
		Original	Original	Original	Duplicate	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--
Pyrene	ug/L	--	--	--	--	--

002956

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007	GW-45804-112917-TS-002	GW-45804-112917-TS-003
Sample Date:		8/16/2016	11/15/2016	6/1/2017	11/29/2017	11/29/2017
		Original	Original			Duplicate
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.00817	0.0101	-	-	-
Boron (dissolved)	mg/L	0.046	0.044	-	-	-
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	-	-
Chromium (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	-	-
Cobalt (dissolved)	mg/L	0.00194	0.00022	-	-	-
Copper (dissolved)	mg/L	ND(0.00020)	0.0403	-	-	-
Iron (dissolved)	mg/L	5.93	8.40	3.76	1.24	1.30
Lead (dissolved)	mg/L	ND(0.000050)	0.000107	-	-	-
Manganese (dissolved)	mg/L	3.79	4.29	2.11	1.43	1.46
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	-	-
Molybdenum (dissolved)	mg/L	0.00983	0.00371	-	-	-
Nickel (dissolved)	mg/L	0.00436	0.00078	-	-	-
Zinc (dissolved)	mg/L	0.0124	0.0024	-	-	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	322	329	347	323	332
Ammonia-N	mg/L	1.34	1.43	1.51	0.820	0.821
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	-	-
Chemical oxygen demand (COD)	mg/L	ND(39)	44	-	-	-
Chloride	mg/L	101	83.5	-	-	-
Color (apparent)	color unit	260	343	-	-	-
Color (apparent)	TCU	--	--	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.5	10.3	-	-	-
Escherichia coli	cfu/100mL	6	0	7.8	10.6	10.5
Fecal coliform bacteria	cfu/100mL	50	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020)	-	-	-
Nitrite (as N)	mg/L	ND(0.050)	ND(0.010)	ND(0.020)	0.076	0.095
Nitrite/Nitrate	mg/L	--	--	-	-	-
pH, lab	s.u.	7.63	7.11	-	-	-
Phenol	mg/L	0.0032	0.0011	-	-	-
Phosphorus	mg/L	0.0156	0.0243	0.0258	0.0121 J	0.0079 J
Sulfate	mg/L	223	283	-	-	-
Total coliform bacteria	cfu/100mL	3200	100	-	-	-
Total dissolved solids (TDS)	mg/L	810	897	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	2.07	2.62	-	-	-
Total suspended solids (TSS)	mg/L	9.0	10.3	-	-	-
Turbidity	NTU	66.0	111	-	-	-
Un-ionized ammonia	mg/L	0.00369	0.00431	0.0027	0.0021	0.0021

002957

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**	**MW103-09**
Sample ID:		**GW-45804-081616-TS-005**	**GW-45804-111516-TS-004**	**GW-45804-060117-TS-007**	**GW-45804-112917-TS-002**	**GW-45804-112917-TS-003**
Sample Date:		**8/16/2016**	**11/15/2016**	**6/1/2017**	**11/29/2017**	**11/29/2017**
		Original	**Original**			**Duplicate**
Parameters:	**Units**					
Field Parameters						
Conductivity, field	mS/cm	0.826	1.02	0.936	0.601	–
Dissolved oxygen (DO), field	mg/L	0	0	2.64	0	–
Oxidation reduction potential (ORP), field	millivolts	-72	-107	-79	33	–
pH, field	s.u.	6.81	7.06	6.94	7.13	–
Temperature, field	Deg C	18.38	11.98	11.14	10.06	–
Turbidity, field	NTU	0	4.9	11.14	30.9	–
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	-	-	-

002958

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007	GW-45804-112917-TS-002	GW-45804-112917-TS-003
Sample Date:		8/16/2016	11/15/2016	6/1/2017	11/29/2017	11/29/2017
		Original	Original			Duplicate
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	-	-	-
2-Methylnaphthalene	µg/L	--	--	-	-	-
Acenaphthene	µg/L	--	--	-	-	-
Acenaphthylene	µg/L	--	--	-	-	-
Acridine	µg/L	--	--	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)anthracene	µg/L	--	--	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	-	-	-
Benzo(b)fluoranthene	µg/L	--	--	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	-	-	-
Benzo(g,h,i)perylene	µg/L	--	--	-	-	-
Benzo(k)fluoranthene	µg/L	--	--	-	-	-
Carcinogenic potency equivalent	µg/L	--	--	-	-	-
Chrysene	µg/L	--	--	-	-	-
Dibenz(a,h)anthracene	µg/L	--	--	-	-	-
Fluoranthene	µg/L	--	--	-	-	-
Fluorene	µg/L	--	--	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	-	-	-
Naphthalene	µg/L	--	--	-	-	-
Phenanthrene	µg/L	--	--	-	-	-
Pyrene	ug/L	--	--	-	-	-

002959

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**						
Metals								
Arsenic (dissolved)	mg/L	-	0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	0.00204	0.0086	0.00481	0.00345	0.00164	ND(0.0050)
Copper (dissolved)	mg/L	-	0.0043	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)
Iron (dissolved)	mg/L	48.3	0.932	19.6	23.9	4.96	4.62	18.2
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Manganese (dissolved)	mg/L	17.1	1.62	19.4	17.5	7.70	5.35	13.3
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.186	0.0164	0.0172	0.0814	0.0232	0.0191
Nickel (dissolved)	mg/L	-	0.0073	ND(0.010)	0.0023	0.0102	0.0028	ND(0.010)
Zinc (dissolved)	mg/L	-	0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)
		-						
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	633	290	389	263	308	207	575
Ammonia-N	mg/L	4.0	7.46	4.69	8.87	14.3	4.80	13.2
Biochemical oxygen demand (carbonaceous)	mg/L	-	16.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	99	72	68	95	ND(54)	74
Chloride	mg/L	-	170	219	162	147	185	189
Color (apparent)	color unit	-	-	-	-	-	120 J	153 J
Color (apparent)	TCU	-	82.9	173 J	362	76.7	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	25.3	51.2	18.5	21.0	10.3	11.1
Escherichia coli	cfu/100mL	25.6	0	4	ND(2)	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	ND(0) J	6	10	ND(2)	0	0
Nitrate (as N)	mg/L	1.3	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)
pH, lab	s.u.	-	7.86	7.73	7.50	7.57	7.55	7.58
Phenol	mg/L	-	0.0016	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0117
Phosphorus	mg/L	7.2	0.060	0.082	0.070	0.640	0.066	0.111
Sulfate	mg/L	-	685	531	800	713	452	507
Total coliform bacteria	cfu/100mL	-	100	1700	10400	10	1	0
Total dissolved solids (TDS)	mg/L	-	1770	1500	2030	1600	1170	1580
Total kjeldahl nitrogen (TKN)	mg/L	-	9.95	6.85	8.80	14.8	5.67	13.6
Total suspended solids (TSS)	mg/L	-	72.0	78.0	106	564	32.0	202
Turbidity	NTU	-	61.0	162	43.0	75.0	54.0	132
Un-ionized ammonia	mg/L	-	0.0198	0.0292	0.0214	0.0536	0.0281	0.101
Field Parameters								

002960

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**						
Conductivity, field	mS/cm	-	2.15	2.17	2.53	2.5	2.41	2.55
Dissolved oxygen (DO), field	mg/L	-	3.61	3.67	7.86	7.24	6.62	2
Oxidation reduction potential (ORP), field	millivolts	-	-176	-	-122	-	-118	-145
pH, field	s.u.	-	7.14	7.20	6.55	7.12	7.03 D 7.40	7.3
Temperature, field	Deg C	-	8.0	17.3	21.59 D 21.6	13.1	9.32 D 10.5	17.06
Turbidity, field	NTU	-	76.4	150	150	104	148	444
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	1380	1940	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	1800	2500	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-

002961

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-03052013-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**TLP[1]**						
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	0.024	ND(0.0050)	0.0079	0.391	0.0212	0.0435
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	0.029	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	0.023	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	0.041	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	0.035	-

002962

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002	GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005
Sample Date:		8/21/2014	11/26/2014	4/9/2015	5/28/2015	8/13/2015	11/10/2015	2/10/2016
		Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**							
Metals								
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	0.0019
Boron (dissolved)	mg/L	ND(0.10)	ND(0.10)	0.088	0.199	0.11	0.13	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00129	ND(0.00050)	0.0040	0.0032	0.0022
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0020	0.0024	0.0107	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	15.8	2.74	0.765	0.071	9.28	7.79	7.75
Lead (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	0.00056	ND(0.00050)	0.00088
Manganese (dissolved)	mg/L	14.6	11.5	3.46	0.548	12.5	9.30	7.40
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	0.000023	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0139	0.0177	0.0136	0.0174	0.0172	0.0152	ND(0.0101)
Nickel (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.0027	0.0045	0.0060	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0040	ND(0.0030)	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	493 J	536	485	381	400	341	ND(373)
Ammonia-N	mg/L	11.2 J	7.20	7.38	1.93	12.3	8.15	1.72
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	76 J	55	56	23	47	41	ND(25)
Chloride	mg/L	128 J	129	193	197	114	66.1	ND(87.8)
Color (apparent)	color unit	85.8 J	210					163
Color (apparent)	TCU	-	-	198	66.9	130	142	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.3 J	13.9	8.8	6.5	9.4	9.5	ND(5.9)
Escherichia coli	cfu/100mL	0 J	0	ND(2)	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0 J	0	ND(2)	0	0	0	0
Nitrate (as N)	mg/L	0.13 J	ND(0.10)	0.37	24.9	1.85	0.93	2.87
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10)	ND(0.10)	0.361	0.090	ND(0.050)	0.011
pH, lab	s.u.	7.34 J	7.52	7.49	7.71	7.90	7.78	7.75
Phenol	mg/L	ND(0.0010) J	ND(0.0010)	0.0032	0.0020	0.0020	0.0032	0.0010
Phosphorus	mg/L	0.693 J	0.069	0.598	0.042	0.041	0.086	ND(0.030)
Sulfate	mg/L	539 J	512	646	693	621	385	ND(552)
Total coliform bacteria	cfu/100mL	ND(10) J	2	30 J	0	40	5	ND(10)
Total dissolved solids (TDS)	mg/L	1270 J	1470	1620	1470	1180	1130	ND(1370)
Total kjeldahl nitrogen (TKN)	mg/L	15.0 J	9.81	8.06	2.12	10.9	5.69	2.18
Total suspended solids (TSS)	mg/L	647 J	61.0	1240	92.4	35.1	52.8	26.5
Turbidity	NTU	57.8 J	124	20.9	38.0	8.07	68.1	80.9 J
Un-ionized ammonia	mg/L	0.856 J	0.0259	0.000644	0.0170	0.256	0.190	0.00335
Field Parameters								

002963

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002	GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005
Sample Date:		8/21/2014	11/26/2014	4/9/2015	5/28/2015	8/13/2015	11/10/2015	2/10/2016
		Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**							
Conductivity, field	mS/cm	2.53	0.628	–	2.12	1.46	1.82	0.888
Dissolved oxygen (DO), field	mg/L	6.28	6.19	–	10.14	0.17	3.54	2.75
Oxidation reduction potential (ORP), field	millivolts	-134	-90	–	-24	-120	-136	91
pH, field	s.u.	8.13	7.15	5.68	7.38	7.56	8.15	6.77
Temperature, field	Deg C	22.61	11.56	7.4	15.43	17.49	10.0	14.98
Turbidity, field	NTU	684	-	–	132	260	89	28.5
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100)	–	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	610 J	ND(250)	300	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	600 J	ND(250)	–	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	2430 J	ND(250)	1110	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	12600 J	-	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	3040 J	ND(380)	1410	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	--	--	ND(250)	--

002964

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002	GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111015-TS-003	GW-45804-021016-TS-005
Sample Date:		8/21/2014	11/26/2014	4/9/2015	5/28/2015	8/13/2015	11/10/2015	2/10/2016
		Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**							
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	--	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	--	--	--	--	--
Acenaphthene	µg/L	-	-	--	--	--	--	--
Acenaphthylene	µg/L	-	-	--	--	--	--	--
Acridine	µg/L	-	-	--	--	--	--	--
Anthracene	µg/L	ND(0.20) J	ND(0.020)	ND(0.20)	ND(0.020)	0.021	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.426 J	0.0183	0.311	0.0510	0.0199	0.0166	0.0051
Benzo(b)fluoranthene	µg/L	-	-	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--	--	--
Chrysene	µg/L	-	-	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--	--	--	--
Fluoranthene	µg/L	-	-	--	--	--	--	--
Fluorene	µg/L	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--	--	--	--
Naphthalene	µg/L	-	-	--	--	--	--	--
Phenanthrene	µg/L	-	-	--	--	--	--	--
Pyrene	µg/L	-	-	--	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010	GW-45804-060117-TS-004	GW-45804-083017-TS-001	GW-45804-113017-TS-009
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017	11/30/2017
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Metals							
Arsenic (dissolved)	mg/L	0.0014	0.0035	0.00226	-	-	-
Boron (dissolved)	mg/L	0.11	0.10	0.126	-	-	-
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	-	-	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	-	-	-
Cobalt (dissolved)	mg/L	0.0020	0.0020	0.00090	-	-	-
Copper (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.00304	-	-	-
Iron (dissolved)	mg/L	6.27	14.5	6.05	3.43	2.24 J	0.573
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.000050)	-	-	-
Manganese (dissolved)	mg/L	6.02	8.13	4.01	1.73	1.99 J	2.36
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	-	-	-
Molybdenum (dissolved)	mg/L	0.0146	0.0130	0.0132	-	-	-
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00183	-	-	-
Zinc (dissolved)	mg/L	ND(0.010)	0.012	ND(0.0010)	-	-	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	360	415	364	444	543 J	536
Ammonia-N	mg/L	3.97	5.41	1.20	2.62	3.89 J	5.09
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	-	-	-
Chemical oxygen demand (COD)	mg/L	27	ND(48)	25	-	-	-
Chloride	mg/L	134	61.3	54.3	-	-	-
Color (apparent)	color unit	102	141	103	-	-	-
Color (apparent)	TCU	--	--	--	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.7	9.2	7.3	5.5	7.8 J	10.7
Escherichia coli	cfu/100mL	0	0	0	0	0 J	0
Fecal coliform bacteria	cfu/100mL	0	0	0	-	-	-
Nitrate (as N)	mg/L	ND(0.10)	15.6	2.28	0.81	0.109 J	3.27
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	0.037	-	-	-
pH, lab	s.u.	7.86	7.68	7.18	-	-	-
Phenol	mg/L	ND(0.0012)	0.0042	ND(0.0023)	-	-	-
Phosphorus	mg/L	0.0291	0.0449	0.0066	0.0193	0.0141 J	0.0089
Sulfate	mg/L	968	519	454	-	-	-
Total coliform bacteria	cfu/100mL	ND(10)	100	0	-	-	-
Total dissolved solids (TDS)	mg/L	1760	1300	1120	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	4.56	5.97	2.30	-	-	-
Total suspended solids (TSS)	mg/L	40.3	104	23.5	-	-	-
Turbidity	NTU	77.5	91.5	57.3	-	-	-
Un-ionized ammonia	mg/L	0.0906	0.0766	0.0196	0.0109	0.0259	0.0224
Field Parameters							

002966

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010	GW-45804-060117-TS-004	GW-45804-083017-TS-001	GW-45804-113017-TS-009
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017	11/30/2017
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Conductivity, field	mS/cm	1.94	1.87	1.21	1.95	1.58	0.959
Dissolved oxygen (DO), field	mg/L	0	0.79	1.21	1.44	1.39	0.44
Oxidation reduction potential (ORP), field	millivolts	-73	-124	93	-84	-108	--
pH, field	s.u.	7.8	7.42	7.89	7.13	7.16	7.33
Temperature, field	Deg C	16.4	21.88	9.26	16.72	22.18	11.42
Turbidity, field	NTU	20.1	0	129	15.1	0	73.3
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	--	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	330	ND(250)	-	-	-
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	--	--	--	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	-	-	-

002967

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010	GW-45804-060117-TS-004	GW-45804-083017-TS-001	GW-45804-113017-TS-009
Sample Date:		5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017	11/30/2017
		Original	Original	Original	Original	Original	Original
Parameters:	**Units**						
Semi-Volatiles							
1-Methylnaphthalene	µg/L	--	--	--	-	-	-
2-Methylnaphthalene	µg/L	--	--	--	-	-	-
Acenaphthene	µg/L	--	--	--	-	-	-
Acenaphthylene	µg/L	--	--	--	-	-	-
Acridine	µg/L	--	--	--	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)anthracene	µg/L	--	--	--	-	-	-
Benzo(a)pyrene	µg/L	0.0127	0.0554	ND(0.0050)	-	-	-
Benzo(b)fluoranthene	µg/L	--	--	--	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	-	-	-
Benzo(g,h,i)perylene	µg/L	--	--	--	-	-	-
Benzo(k)fluoranthene	µg/L	--	--	--	-	-	-
Carcinogenic potency equivalent	µg/L	--	--	--	-	-	-
Chrysene	µg/L	--	--	--	-	-	-
Dibenz(a,h)anthracene	µg/L	--	--	--	-	-	-
Fluoranthene	µg/L	--	--	--	-	-	-
Fluorene	µg/L	--	--	--	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	-	-	-
Naphthalene	µg/L	--	--	--	-	-	-
Phenanthrene	µg/L	--	--	--	-	-	-
Pyrene	µg/L	--	--	--	-	-	-

002968

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013
			Original	Original	Original	Original	Duplicate
Parameters:	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	0.0059	0.0142	0.0078	0.0029	0.0028
Boron (dissolved)	mg/L	-	0.073	0.052	0.063	0.076	0.074
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	48.3	2.09	5.31	4.58	2.07	2.11
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	0.487	0.650	0.630	0.512	0.518
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0090	0.0141	0.0106	0.0087	0.0086
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	-	ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0059
		-					
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	482	365	382	429	427
Ammonia-N	mg/L	4.0	34.3	22.3	28.2	25.5	27.2
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	46	15	13	32	30
Chloride	mg/L	-	173	128	199	164	164
Color (apparent)	color unit	-	-	-	-	-	-
Color (apparent)	TCU	-	27.1	58.9 J	52.9	83.5	73.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.5	ND(5.2)	5.1	4.5	4.1
Escherichia coli	cfu/100mL	25.6	7	ND(2)	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	50 J	ND(2)	ND(2)	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.82	7.76	7.41	7.54	7.51
Phenol	mg/L	-	ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.048	0.045	0.035	0.051	ND(0.030)
Sulfate	mg/L	-	970	963	1050	674	678
Total coliform bacteria	cfu/100mL	-	160	110	2	2	ND(10)
Total dissolved solids (TDS)	mg/L	-	2100	1880	2140	1610	1600
Total kjeldahl nitrogen (TKN)	mg/L	-	38.2	24.5	30.0	25.8	27.2
Total suspended solids (TSS)	mg/L	-	16.0	31.0	44.4	8.4	6.4
Turbidity	NTU	-	19.0	33.0	36.0	19.2	22.7
Un-ionized ammonia	mg/L	-	0.141	0.0793	0.0695	0.0296	0.0316
Field Parameters							

002969

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013
			Original	Original	Original	Original	Duplicate
Parameters:	**Units**	**TLP**[1]					
Conductivity, field	mS/cm	-	3.01	2.59	2.75	2.43	-
Dissolved oxygen (DO), field	mg/L	-	2.68	1.21	4.33	6.79	-
Oxidation reduction potential (ORP), field	millivolts	-	-215	-	-101	-	-
pH, field	s.u.	-	7.11	6.90	6.63	6.47	6.47
Temperature, field	Deg C	-	14.5	19.1	22.6 D 22.55	17.3	17.3
Turbidity, field	NTU	-	170	119	34.2	11.2	-
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	550	ND(250)	560
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-

002970

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013
			Original	Original	Original	Original	Duplicate
Parameters:	**Units**	**TLP[1]**					
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-

002971

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005	GW-45804-112514-TS-003
Sample Date:		4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014	11/25/2014
		Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	**Units**						
Metals							
Arsenic (dissolved)	mg/L	0.0092	0.0078	0.0040	0.0049	ND(0.0010)	0.0011
Boron (dissolved)	mg/L	0.062	0.061	0.065	0.067	0.068	0.073
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.216	0.212	0.080	0.095	0.296	2.75
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.443	0.413	0.443	0.532	0.568	0.580
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0070
Nickel (dissolved)	mg/L	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0211
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	911	980	600	608	438 J	406
Ammonia-N	mg/L	76.0	75.5	57.8	57.8	18.2 J	18.6
Biochemical oxygen demand (carbonaceous)	mg/L	9.0	10.1	8.1	6.6	3.0 J	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(54)	65	34	30	19 J	11
Chloride	mg/L	246	245	218	217	114 J	111
Color (apparent)	color unit	46.9 J	53.9 J	55.5 J	70.7 J	12.4 J	67.7
Color (apparent)	TCU	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.3	9.4	5.2	5.2	4.4 J	4.2
Escherichia coli	cfu/100mL	390	360	0	0	0 J	0
Fecal coliform bacteria	cfu/100mL	450	430	0	0	0 J	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.50)
pH, lab	s.u.	7.25	7.26	7.55	7.59	7.41 J	7.76
Phenol	mg/L	0.0083	0.0103	0.0074	0.0090	0.0023 J	ND(0.0010)
Phosphorus	mg/L	0.067	0.067	0.134	0.107	0.072 J	0.089
Sulfate	mg/L	429	427	649	649	509 J	738
Total coliform bacteria	cfu/100mL	4400	4800	2	1	ND(10) J	10
Total dissolved solids (TDS)	mg/L	1610	1600	1740	1730	1290 J	1480
Total kjeldahl nitrogen (TKN)	mg/L	74.3	75.0	48.4	51.2	19.3 J	20.7
Total suspended solids (TSS)	mg/L	20.0 J	4.4 J	11.6 J	4.0 J	16.8 J	21.3
Turbidity	NTU	51.0	59.0	18.2	28.0	3.47 J	20.9
Un-ionized ammonia	mg/L	0.174	0.173	0.396	0.396	17.0 J	0.0553
Field Parameters							

002972

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005	GW-45804-112514-TS-003
Sample Date:		4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014	11/25/2014
		Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	**Units**						
Conductivity, field	mS/cm	2.12	-	3.02	3.02	2.02	0.695
Dissolved oxygen (DO), field	mg/L	4.53	-	5.33	5.33	0.26	2.72
Oxidation reduction potential (ORP), field	millivolts	-73	-	-318	-318	-276	-71
pH, field	s.u.	7.4 D 7.03	7.03	7.19	7.19	9.87	6.93
Temperature, field	Deg C	9.3 D 10.47	9.3	18.92	18.92	21.66	16.4
Turbidity, field	NTU	31.8	-	24.6	24.6	108	-
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	330 J	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380) J	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-

002973

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005	GW-45804-112514-TS-003
Sample Date:		4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014	11/25/2014
		Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	**Units**						
Semi-Volatiles							
1-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Acenaphthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Acridine	µg/L	ND(4.0)	ND(4.0)	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	ND(0.040)	-	-	-	-
Benzo(g,h,i)perylene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	ND(0.060)	ND(0.060)	-	-	-	-
Chrysene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Fluorene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Naphthalene	µg/L	ND(0.050)	ND(0.050)	-	-	-	-
Phenanthrene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-
Pyrene	µg/L	ND(0.020)	ND(0.020)	-	-	-	-

002974

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006	GW-45804-021016-TS-010
Sample Date:		4/8/2015	5/27/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.010)	0.0011	ND(0.0010)	ND(0.0014)
Boron (dissolved)	mg/L	0.060	ND(0.10)	ND(0.10)	0.11	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00078	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.010)	ND(0.0020)	ND(0.0020)	0.0045
Iron (dissolved)	mg/L	1.39	7.40	4.59	7.61	5.77
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.889	1.06	0.699	0.669	0.567
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0181	0.0150	0.0146	0.0181	ND(0.0187)
Nickel (dissolved)	mg/L	0.0035	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.030)	ND(0.010)	ND(0.010)	0.011
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	270	288	323	379	ND(371)
Ammonia-N	mg/L	15.3	13.7	16.2	8.71	8.85
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	27	16	14	14	ND(16)
Chloride	mg/L	135	175	225	155	ND(128)
Color (apparent)	color unit					100
Color (apparent)	TCU	21.4	40.9	133	84.0	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.6	3.6	4.4	4.6	ND(5.6)
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.76	7.53	7.85	7.46	7.72
Phenol	mg/L	ND(0.0053)	0.0057	ND(0.0010)	0.0026	0.0011
Phosphorus	mg/L	0.253	0.156	0.068	0.073	ND(0.030)
Sulfate	mg/L	1350	1360	1240	799	ND(822)
Total coliform bacteria	cfu/100mL	1730	2	100	1	ND(10)
Total dissolved solids (TDS)	mg/L	2460	2200	2250	1530	ND(1720)
Total kjeldahl nitrogen (TKN)	mg/L	15.5	14.9	13.8	5.61	5.70
Total suspended solids (TSS)	mg/L	402	293	16.0	15.0	ND(10.5)
Turbidity	NTU	9.71	21.0	17.0	110	68.1 J
Un-ionized ammonia	mg/L	0.131	0.135	0.376	0.135	0.0226
Field Parameters						

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006	GW-45804-021016-TS-010
Sample Date:		4/8/2015	5/27/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Conductivity, field	mS/cm	2.212	3.15	3.26	2.39	2.13
Dissolved oxygen (DO), field	mg/L	--	4.34	0.44	0.91	0
Oxidation reduction potential (ORP), field	millivolts	--	-6	-142	-150	-103
pH, field	s.u.	7.47	7.29	7.60	7.73	7.07
Temperature, field	Deg C	12.8	20.8	22.91	19.0	14.71
Turbidity, field	NTU	--	412	41.8	11.9	30.5
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	ND(250)	--

002976

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006	GW-45804-021016-TS-010
Sample Date:		4/8/2015	5/27/2015	8/13/2015	11/9/2015	2/10/2016
		Original	Original	Original	Original	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--

002977

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001	GW-45804-060117-TS-001
Sample Date:		5/18/2016	8/16/2016	8/16/2016	11/15/2016	6/1/2017
		Original	Original	Duplicate	Original	Original
Parameters:	**Units**					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Boron (dissolved)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	-
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Cobalt (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-
Copper (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0303	-
Iron (dissolved)	mg/L	4.45	4.08	4.13	2.20	2.18
Lead (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	-
Manganese (dissolved)	mg/L	0.637	0.536	0.534	0.652	0.382
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	-
Molybdenum (dissolved)	mg/L	0.0101	0.00807	0.00831	0.00710	-
Nickel (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.412	ND(0.010)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	376	449	451	406	500
Ammonia-N	mg/L	4.88	18.1	16.9	11.9	5.65
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	16	ND(18)	ND(18)	20	-
Chloride	mg/L	141	81.3	87.7	94.1	-
Color (apparent)	color unit	79.3	107	88.0	56.9	-
Color (apparent)	TCU	--	--	--	--	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.2	5.4	5.1	3.8	4.2
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	4	3	0	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-
pH, lab	s.u.	7.88	7.60	7.60	6.94	-
Phenol	mg/L	ND(0.0015)	ND(0.0016) J	0.0034 J	0.0016	-
Phosphorus	mg/L	0.0234	0.0381	0.0393	0.0306	0.0542 J
Sulfate	mg/L	965	671	722	947	-
Total coliform bacteria	cfu/100mL	ND(10)	100	100	200	-
Total dissolved solids (TDS)	mg/L	1840	1530	1520	1790	-
Total kjeldahl nitrogen (TKN)	mg/L	5.35	16.4	16.4	12.8	-
Total suspended solids (TSS)	mg/L	22.7	15.5	6.1	8.3	-
Turbidity	NTU	50.0	52.6	49.6	28.8	-
Un-ionized ammonia	mg/L	0.321	0.0476	0.0475	0.0258	0.0254
Field Parameters						

002978

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001	GW-45804-060117-TS-001
Sample Date:		5/18/2016	8/16/2016	8/16/2016	11/15/2016	6/1/2017
		Original	Original	Duplicate	Original	Original
Parameters:	**Units**					
Conductivity, field	mS/cm	2.25	1.93	–	2.1	1.7
Dissolved oxygen (DO), field	mg/L	3.07	0	–	0	3.93
Oxidation reduction potential (ORP), field	millivolts	-115	-90	–	-107	-122
pH, field	s.u.	8.22	6.72	–	6.7	7.09
Temperature, field	Deg C	18.12	21.89	–	18.57	18.97
Turbidity, field	NTU	0.4	0	–	41.3	4.1
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	–	--	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--	–	--	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(360)	ND(360)	ND(360)	ND(360)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	–	--	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	–	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	–	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001	GW-45804-060117-TS-001
Sample Date:		5/18/2016	8/16/2016	8/16/2016	11/15/2016	6/1/2017
		Original	Original	Duplicate	Original	Original
Parameters:	**Units**					
Semi-Volatiles						
1-Methylnaphthalene	µg/L	--	--	--	--	-
2-Methylnaphthalene	µg/L	--	--	--	--	-
Acenaphthene	µg/L	--	--	--	--	-
Acenaphthylene	µg/L	--	--	--	--	-
Acridine	µg/L	--	--	--	--	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	--	--	--	--	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-
Benzo(b)fluoranthene	µg/L	--	--	--	--	-
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	-
Benzo(g,h,i)perylene	µg/L	--	--	--	--	-
Benzo(k)fluoranthene	µg/L	--	--	--	--	-
Carcinogenic potency equivalent	µg/L	--	--	--	--	-
Chrysene	µg/L	--	--	--	--	-
Dibenz(a,h)anthracene	µg/L	--	--	--	--	-
Fluoranthene	µg/L	--	--	--	--	-
Fluorene	µg/L	--	--	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	-
Naphthalene	µg/L	--	--	--	--	-
Phenanthrene	µg/L	--	--	--	--	-
Pyrene	µg/L	--	--	--	--	-

002980

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW105-13**	**MW105-13**	**MW105-13**
Sample ID:		**GW-45804-060117-TS-002**	**GW-45804-083017-TS-006**	**GW-45804-112917-TS-001**
Sample Date:		**6/1/2017**	**8/30/2017**	**11/29/2017**
		Duplicate	**Original**	**Original**
Parameters:	**Units**			
Metals				
Arsenic (dissolved)	mg/L	-	-	-
Boron (dissolved)	mg/L	-	-	-
Cadmium (dissolved)	mg/L	-	-	-
Chromium (dissolved)	mg/L	-	-	-
Cobalt (dissolved)	mg/L	-	-	-
Copper (dissolved)	mg/L	-	-	-
Iron (dissolved)	mg/L	2.28	1.41 J	4.46
Lead (dissolved)	mg/L	-	-	-
Manganese (dissolved)	mg/L	0.385	0.145 J	0.256
Mercury (dissolved)	mg/L	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-
Nickel (dissolved)	mg/L	-	-	-
Zinc (dissolved)	mg/L	-	-	-
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	442	791 J	667
Ammonia-N	mg/L	5.43	34.5 J	45.6
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-
Chloride	mg/L	-	-	-
Color (apparent)	color unit	-	-	-
Color (apparent)	TCU	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.3	16.0 J	11.2
Escherichia coli	cfu/100mL	0	0 J	0
Fecal coliform bacteria	cfu/100mL	-	-	-
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)
Nitrite (as N)	mg/L	-	-	-
pH, lab	s.u.	-	-	-
Phenol	mg/L	-	-	-
Phosphorus	mg/L	0.0211 J	0.0481 J	0.0570
Sulfate	mg/L	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-
Total dissolved solids (TDS)	mg/L	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-
Turbidity	NTU	-	-	-
Un-ionized ammonia	mg/L	0.0246	0.1518	0.0816
Field Parameters				

002981

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW105-13**	**MW105-13**	**MW105-13**
Sample ID:		**GW-45804-060117-TS-002**	**GW-45804-083017-TS-006**	**GW-45804-112917-TS-001**
Sample Date:		**6/1/2017**	**8/30/2017**	**11/29/2017**
		Duplicate	**Original**	**Original**
Parameters:	**Units**			
Conductivity, field	mS/cm	--	1.84	2.12
Dissolved oxygen (DO), field	mg/L	--	1.7	0.91
Oxidation reduction potential (ORP), field	millivolts	--	-106	-83
pH, field	s.u.	--	6.98	6.77
Temperature, field	Deg C	--	22.17	16.47
Turbidity, field	NTU	--	8.7	81
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-

002982

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-060117-TS-002	GW-45804-083017-TS-006	GW-45804-112917-TS-001
Sample Date:		6/1/2017	8/30/2017	11/29/2017
		Duplicate	Original	Original
Parameters:	**Units**			
Semi-Volatiles				
1-Methylnaphthalene	µg/L	-	-	-
2-Methylnaphthalene	µg/L	-	-	-
Acenaphthene	µg/L	-	-	-
Acenaphthylene	µg/L	-	-	-
Acridine	µg/L	-	-	-
Anthracene	µg/L	-	-	-
Benzo(a)anthracene	µg/L	-	-	-
Benzo(a)pyrene	µg/L	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-
Chrysene	µg/L	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-
Fluoranthene	µg/L	-	-	-
Fluorene	µg/L	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-
Naphthalene	µg/L	-	-	-
Phenanthrene	µg/L	-	-	-
Pyrene	µg/L	-	-	-

002983

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014	GW-45804-021016-TS-009	GW-45804-051816-TS-011
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015	2/10/2016	5/18/2016
Sample Type:			Original	Original	Original	Duplicate	Original	Original
Parameters	**Units**	**TLP[1]**						
Metals								
Arsenic (dissolved)	mg/L	-	0.0011	0.00190	0.0012	0.0011	ND(0.0010)	0.00107
Boron (dissolved)	mg/L	-	0.095	0.165	0.18	0.18	ND(0.13)	0.129
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00068)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025
Copper (dissolved)	mg/L	-	ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00020)
Iron (dissolved)	mg/L	48.3	2.54	1.50	3.09	3.20	3.60	4.66
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	2.44	1.35	1.59	1.62	1.94	1.96
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0102	0.0164	0.0125	0.0127	ND(0.0121)	0.0108
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.00205	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00124
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0013)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	633	423	449	461	469	ND(474)	443
Ammonia-N	mg/L	4.0	10.9	2.93	2.90	3.86	4.79	4.18
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	27	34	38	41	ND(36)	36
Chloride	mg/L	-	153	112	114	119	ND(109)	101
Color (apparent)	TCU	-	95.7	71.6	189	143	150 J	132
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.0	9.9	12.7	10.7	ND(10.1)	9.9
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.92	7.94	7.66	7.68	7.88	7.89
Phenol	mg/L	-	0.0060	ND(0.0017)	0.0024	0.0033	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.068	0.057	0.060	0.074	0.055	0.101
Sulfate	mg/L	-	709	423	444	479	ND(495)	542
Total coliform bacteria	cfu/100mL	-	0	ND(1)	0	0	0	0
Total dissolved solids (TDS)	mg/L	-	1370	1100	1170	1180	ND(1350)	1390
Total kjeldahl nitrogen (TKN)	mg/L	-	11.9	3.30	3.38	3.91	4.48	4.12
Total suspended solids (TSS)	mg/L	-	6.8	11.5	7.3	7.9	21.0	30.0
Turbidity	NTU	-	25.0	14.1	60.2	47.7	89.0 J	84.5
Un-ionized ammonia	mg/L	-	0.171	0.0516	0.0823	0.109	0.0176	0.159
Field Parameters								

002984

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**MW106-15**	**MW106-15**	**MW106-15**	**MW106-15**	**MW106-15**	**MW106-15**
Sample ID:			**GW-45804-052815-TS-005**	**GW-45804-081215-TS-005**	**GW-45804-111015-TS-001**	**GW-45804-111015-TS-014**	**GW-45804-021016-TS-009**	**GW-45804-051816-TS-011**
Sample Date:			**5/28/2015**	**8/12/2015**	**11/10/2015**	**11/10/2015**	**2/10/2016**	**5/18/2016**
Sample Type:			**Original**	**Original**	**Original**	**Duplicate**	**Original**	**Original**
Parameters	**Units**	**TLP**[1]						
Conductivity, field	mS/cm	-	2.07	3.92	1.32	1.32	1.04	1.52
Dissolved oxygen (DO), field	mg/L	-	1.98	0.51	3.12	3.12	0	1.42
Oxidation reduction potential (ORP), field	millivolts	-	43	-122	-134	-134	-114	-97
pH, field	s.u.	-	7.76	7.35	8.01	8.01	7.25	8.22
Temperature, field	Deg C	-	13.75	17.5	12.9	12.9	8.88	10.63
Turbidity, field	NTU	-	0	149	13.8	13.8	212	41.2
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	540	420	400	290
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	ND(100)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	540	420	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	540	420	400	ND(380)
Semi-Volatiles								
Anthracene	µg/L	-	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

002985

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:		GW-45804-081616-TS-008	GW-45804-111616-TS-013	GW-45804-060217-TS-013	GW-45804-083017-TS-003	GW-45804-112917-TS-007
Sample Date:		8/16/2016	11/16/2016	6/2/2017	8/30/2017	11/29/2017
Sample Type:		Original	Original	Original	Original	Original
Parameters	**Units**					
Metals						
Arsenic (dissolved)	mg/L	0.00074	0.00082	-	-	-
Boron (dissolved)	mg/L	0.180	0.198	-	-	-
Cadmium (dissolved)	mg/L	ND(0.000010)	0.000018	-	-	-
Chromium (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	-	-
Cobalt (dissolved)	mg/L	0.00039	0.00099	-	-	-
Copper (dissolved)	mg/L	ND(0.00056)	ND(0.00069)	-	-	-
Iron (dissolved)	mg/L	0.838	2.19	6.05	4.24 J	3.57
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	-	-	-
Manganese (dissolved)	mg/L	1.06	2.62	1.52	1.19 J	1.48
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	-	-	-
Molybdenum (dissolved)	mg/L	0.0170	0.0180	-	-	-
Nickel (dissolved)	mg/L	0.00222	0.00174	-	-	-
Zinc (dissolved)	mg/L	0.0037	0.0023	-	-	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	467	497	477	536 J	511
Ammonia-N	mg/L	3.26	1.91	1.96	2.57 J	3.92
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	-	-
Chemical oxygen demand (COD)	mg/L	ND(39)	46	-	-	-
Chloride	mg/L	107	112	-	-	-
Color (apparent)	TCU	63.1	114	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	12.7	13.0	11.3	11.7 J	11.4
Escherichia coli	cfu/100mL	0	0	ND(10)	0 J	0
Fecal coliform bacteria	cfu/100mL	15	0	-	-	-
Nitrate (as N)	mg/L	0.24	ND(0.020)	ND(0.10)	ND(0.020) J	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.010)	-	-	-
pH, lab	s.u.	7.69	7.26	-	-	-
Phenol	mg/L	0.0039	ND(0.0053)	-	-	-
Phosphorus	mg/L	0.0684	0.0341	0.355	0.100 J	0.0671
Sulfate	mg/L	503	387	-	-	-
Total coliform bacteria	cfu/100mL	200	0	-	-	-
Total dissolved solids (TDS)	mg/L	1370	1230	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	3.43	2.27	-	-	-
Total suspended solids (TSS)	mg/L	22.3	4.6	-	-	-
Turbidity	NTU	30.5	34.5	-	-	-
Un-ionized ammonia	mg/L	0.0190	0.00827	0.0046	0.0130	0.0194
Field Parameters						

002986

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:		GW-45804-081616-TS-008	GW-45804-111616-TS-013	GW-45804-060217-TS-013	GW-45804-083017-TS-003	GW-45804-112917-TS-007
Sample Date:		8/16/2016	11/16/2016	6/2/2017	8/30/2017	11/29/2017
Sample Type:		Original	Original	Original	Original	Original
Parameters	**Units**					
Conductivity, field	mS/cm	1.57	1.63	1.69	1.66	1.78
Dissolved oxygen (DO), field	mg/L	0	0.33	0	0.74	0
Oxidation reduction potential (ORP), field	millivolts	-69	-13	-103	-119	-72
pH, field	s.u.	7.26	7.14	7.06	7.19	7.36
Temperature, field	Deg C	14.6	14.3	11.41	17.49	12.02
Turbidity, field	NTU	0	8.7	676	0	22.1
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	-	-	-
Semi-Volatiles						
Anthracene	µg/L	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	-	-	-

002987

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original	Original	Original
Parameters	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	0.0140	0.0138	ND(0.0010)	0.00018	ND(0.0010)
Boron (dissolved)	mg/L	-	0.23	0.24	0.11	0.070	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.0321	0.0330	ND(0.0050)	ND(0.00089)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00020	ND(0.0020)
Iron (dissolved)	mg/L	46.3	0.45	0.40	0.19	0.022	2.56
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	4.52	4.57	1.04	0.0650	1.01
Mercury (dissolved)	mg/L	-	0.000038 J	0.000018 J	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.00268	0.00206	0.00068	0.0150	0.00507
Nickel (dissolved)	mg/L	-	0.0075	0.0075	ND(0.0050)	0.00084	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0013)	0.168
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	1810	1820	436	153	354
Ammonia-N	mg/L	4.0	51.3	56.7	8.01	0.123	13.3
Biochemical oxygen demand (carbonaceous)	mg/L	-	1340	1380	4.3	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	2480	2840	38	16	23
Chloride	mg/L	-	483	460	162	45.3	111
Color (apparent)	TCU	-	1100	1110	119	27.3	102
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	985	1030	10.7	3.2	6.3
Escherichia coli	cfu/100mL	25.6	1000 J	4000 J	0	4	0
Fecal coliform bacteria	cfu/100mL	-	4000	4000	0	5	0
Nitrate (as N)	mg/L	1.3	ND(0.20)	ND(0.20)	ND(0.10)	0.112	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.050)	0.015	ND(0.050)
pH, lab	s.u.	-	7.11	7.15	7.52	8.34	6.92
Phenol	mg/L	-	1.07	1.07	0.0029	ND(0.0020)	ND(0.0033)
Phosphorus	mg/L	7.2	1.68	1.59	0.281	0.0099	0.118
Sulfate	mg/L	-	399	391	848	304	945
Total coliform bacteria	cfu/100mL	-	100000	130000	40	50	1
Total dissolved solids (TDS)	mg/L	-	3800	3620	1630	673	1880
Total kjeldahl nitrogen (TKN)	mg/L	-	85.7	86.1	7.98	0.26	14.0
Total suspended solids (TSS)	mg/L	-	12.3	15.6	64.1	27.0	5.1
Turbidity	NTU	-	463	418	81.3	47.9	36.1
Un-ionized ammonia	mg/L	-	0.108	--	0.292	0.0223	0.0412

002988

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original	Original	Original
Parameters	**Units**	**TLP[1]**					
Field Parameters							
Conductivity, field	mS/cm	-	5.44	5.44	2.48	0.769	2.14
Dissolved oxygen (DO), field	mg/L	-	1.37	1.37	3.33	1.56	4.41
Oxidation reduction potential (ORP), field	millivolts	-	-362	-362	-215	-113	-63
pH, field	s.u.	-	6.59	6.59	7.99	8.65	6.84
Temperature, field	Deg C	-	21.6	21.6	16.66	19.81	18.26
Turbidity, field	NTU	-	182	182	243	7.2	30.1
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	--	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	-	--	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	µg/L	-	ND(0.035)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

002989

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014
Sample Date:		6/2/2017	8/30/2017	8/30/2017	11/30/2017
Sample Type:		Original	Original	Original	Original
Parameters	**Units**				
Metals					
Arsenic (dissolved)	mg/L	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--
Cadmium (dissolved)	mg/L	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--
Cobalt (dissolved)	mg/L	--	--	--	--
Copper (dissolved)	mg/L	--	--	--	--
Iron (dissolved)	mg/L	0.304	<0.10	<0.10	1.14
Lead (dissolved)	mg/L	--	--	--	--
Manganese (dissolved)	mg/L	0.593	0.189	0.191	1.03
Mercury (dissolved)	mg/L	--	--	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	344	1280	1250	442
Ammonia-N	mg/L	14.1	91.1	88.8	33.3
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--
Chloride	mg/L	--	--	--	--
Color (apparent)	TCU	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.6	33.4	33.8	7.2
Escherichia coli	cfu/100mL	0	0	1	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--
Nitrate (as N)	mg/L	<0.10	<0.020	<0.020	<0.020
Nitrite (as N)	mg/L	--	--	--	--
pH, lab	s.u.	--	--	--	--
Phenol	mg/L	--	--	--	--
Phosphorus	mg/L	0.130	0.567	0.584	0.141
Sulfate	mg/L	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--
Turbidity	NTU	--	--	--	--
Un-ionized ammonia	mg/L	0.113	0.640	0.619	0.331

002990

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014
Sample Date:		6/2/2017	8/30/2017	8/30/2017	11/30/2017
Sample Type:		Original	Original	Original	Original
Parameters	**Units**				
Field Parameters					
Conductivity, field	mS/cm	1.7	2.86	--	2.2
Dissolved oxygen (DO), field	mg/L	3.13	7.56	--	1.85
Oxidation reduction potential (ORP), field	millivolts	-84	-239	--	-83
pH, field	s.u.	7.44	7.23	--	7.54
Temperature, field	Deg C	16.04	20.73	--	15.8
Turbidity, field	NTU	9.7	8.3	--	45.1
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--
Semi-Volatiles					
Anthracene	µg/L	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--

002991

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
☐ - Exceedence of the Tier I Trigger Level

002992

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

002993

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0010	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.00015	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	-	1.76	3.30	0.455
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	-	0.496	1.43	1.11
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.0438	0.0049	0.0058
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	-	0.0115	0.308	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	-	422	559	558
Ammonia-N	mg/L	-	-	0.2	-	**0.245**	**0.252**	**0.218**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	-	73.6	333	104
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	-	27.2	132	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	-	4.5	8.0	7.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	-	ND(0.10)	ND(0.10)	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	-	ND(0.10)	ND(0.10)	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	-	0.033	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	-	808	1580	1360
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	0.0057	0.00152	0.00303
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.972	1.228	1.58	2.05
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	10.92	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	-	6.68	8.02	7.41	7.76
Temperature, field	Deg C	15	AO	-	9.33	9.96	10.6	10.98
Turbidity, field	NTU	5	AO	-	125	-	-	16.5

002994

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

002995

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	-	-	0.111	0.078
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	0.0016	0.0036
Iron (dissolved)	mg/L	0.3	AO	10.6	2.30	-	2.36	1.16
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.31	-	1.23	1.94
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0066	-	0.0030	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	-	0.0038	0.0023
Zinc (dissolved)	mg/L	5	AO	-	0.0080	-	0.0285	0.0085
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	559	-	558	541
Ammonia-N	mg/L	-	-	0.2	0.478	-	1.60	0.478
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	13	30
Chloride	mg/L	250	AO	-	109	-	-	140
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	7.6	-	64.6	33.2 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	6.9	-	5.0	5.3
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	-	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(10)	-	0	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	-	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	7.74	7.66
Phenol	mg/L	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	-	0.037	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	446
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	-	0	ND(2)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1380	-	1300	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	3.85	0.59
Total suspended solids (TSS)	mg/L	-	-	-	-	-	5.6	2.0
Turbidity	NTU	5	AO	-	-	-	16.9	5.90 J
Un-ionized ammonia	mg/L	-	-	-	0.00171	-	-	0.0217
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.26	0.831	2.02	1.8
Dissolved oxygen (DO), field	mg/L	-	-	-	9.81	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-55
pH, field	s.u.	6.5-8.5	OG	-	7.21	6.55	6.57	8.28
Temperature, field	Deg C	15	AO	-	9.7	13.8	11.48	11.2
Turbidity, field	NTU	5	AO	-	40.7	-	-	113

002996

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	-	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

002997

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.108	0.111	0.079	0.080
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	0.0030	0.0310	0.0134	0.0691
Iron (dissolved)	mg/L	0.3	AO	10.6	1.06	0.733	1.72	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.17	1.11	1.30	1.20
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0043	0.0045	0.0041	0.0048
Nickel (dissolved)	mg/L	-	-	-	0.0086	0.0031	0.0022	0.0026
Zinc (dissolved)	mg/L	5	AO	-	0.0064	0.0146	0.0044	0.0065
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	550	584	570	563
Ammonia-N	mg/L	-	-	0.2	**0.809**	**1.91**	**3.72**	**1.13**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	34	34	23	19
Chloride	mg/L	250	AO	-	143	164	170	196
Color (apparent)	color unit	5	AO	-	-	-	45.7	7.5
Color (apparent)	TCU	5	AO	-	30.1 J	85.4	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	ND(5.2)	6.1	4.4	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.20	0.16	ND(0.10)	**0.68**
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.62	7.43	7.48	7.37
Phenol	mg/L	-	-	-	ND(0.0030)	ND(0.0010)	0.0023	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	325	358	355	345
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1270	1380	1400	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	2.04	3.52	1.16
Total suspended solids (TSS)	mg/L	-	-	-	4.8	7.2	6.4	4.8
Turbidity	NTU	5	AO	-	8.75	13.8	14.5	ND(0.59)
Un-ionized ammonia	mg/L	-	-	-	0.000166	0.000746	0.0128	0.00423
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.97	2.1	2.27	0.626
Dissolved oxygen (DO), field	mg/L	-	-	-	8.32	10.4	6.56	8.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-41	124
pH, field	s.u.	6.5-8.5	OG	-	5.84	6.16	7.13	7.08
Temperature, field	Deg C	15	AO	-	13.5	12.3	11.63	14.3
Turbidity, field	NTU	5	AO	-	196	1	4.3	-

002998

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

002999

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016
Sample Date:					5/28/2015	5/28/2015	11/10/2015	5/17/2016	11/16/2016
					Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**					
Metals									
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00013
Boron (dissolved)	mg/L	5	MAC	-	0.106	0.103	0.14	0.12	0.132
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.0010)	ND(0.0010)	0.00019
Copper (dissolved)	mg/L	-	-	-	0.0154	0.0173	0.0112	0.0147	0.00871
Iron (dissolved)	mg/L	0.3	AO	10.6	0.41[b]	0.635[b]	0.29	0.675	0.025
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.00050)	0.000089
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.32[b]	1.36[b]	1.54[b]	1.55[b]	1.686
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0048	0.0051	0.00551	0.00436	0.00404
Nickel (dissolved)	mg/L	-	-	-	0.0033	0.0031	ND(0.0050)	0.0075	0.00661
Zinc (dissolved)	mg/L	5	AO	-	0.0113 J	0.0064 J	ND(0.010)	0.013	0.0043
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	996	568[b]	574[b]	550[b]	580b	547b
Ammonia-N	mg/L	-	-	0.2	0.838[a]	0.850[a]	0.872[a]	0.795a	0.679a
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	25	25	25	28	26
Chloride	mg/L	250	AO	-	284[b]	247	83.7	566b	512b
Color (apparent)	color unit	5	AO	-				34.2	25.1
Color (apparent)	TCU	5	AO	-	36.6	37.9	43.1	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.2[b]	5.4[b]	5.4[b]	7.6	4.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.34	0.31	0.051	ND(0.10)	0.14
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	7.67	7.62	7.50	7.71	6.99
Phenol	mg/L	-	-	-	0.0018 J	0.0037 J	0.0027	0.0025	ND(0.0034)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.0037	0.0041
Sulfate	mg/L	500	AO	-	313	294	62.0	312	308
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	16	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1260[b]	1300[b]	1440[b]	1820b	1820b
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	0.95	0.97	1.08	1.05
Total suspended solids (TSS)	mg/L	-	-	-	3.0	ND(2.0)	4.0	5.5	4.1
Turbidity	NTU	5	AO	-	9.06[b]	9.74[b]	14.4[b]	9.26b	10.2b
Un-ionized ammonia	mg/L	-	-	-	0.00321	0.00328	0.0247	0.0107	0.00145
Field Parameters									
Conductivity, field	mS/cm	-	-	-	1.78	--	2.7	2.43	2.61
Dissolved oxygen (DO), field	mg/L	-	-	-	4.47	--	2.49	6.23	4.21
Oxidation reduction potential (ORP), field	millivolts	-	-	-	166	--	-2	51	149
pH, field	s.u.	6.5-8.5	OG	-	7.23	7.23	7.99	7.7	6.58
Temperature, field	Deg C	15	AO	-	13.56	13.6	13.44	12.35	13.02
Turbidity, field	NTU	5	AO	-	0	--	0.9	1.4	5.75

003000

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008	GW-45804-051716-TS-009	GW-45804-111616-TS-016
Sample Date:					5/28/2015	5/28/2015	11/10/2015	5/17/2016	11/16/2016
					Original	Duplicate	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	ND(250)	--	--
Semi-Volatiles									
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4
Sample ID:					GW-45804-060217-TS-016	GW-45804-113017-TS-013
Sample Date:					6/2/2017	11/30/2017
					Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]		
Metals						
Arsenic (dissolved)	mg/L	0.025	IMAC	-	--	--
Boron (dissolved)	mg/L	5	IMAC	-	--	--
Cadmium (dissolved)	mg/L	0.005	MAC	-	--	--
Chromium (dissolved)	mg/L	0.05	MAC	-	--	--
Cobalt (dissolved)	mg/L	-	-	-	--	--
Copper (dissolved)	mg/L	-	-	-	--	--
Iron (dissolved)	mg/L	0.3	AO	10.6	0.016	ND(0.10)
Lead (dissolved)	mg/L	0.01	MAC	-	--	--
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.82[b]	1.21[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	--	--
Molybdenum (dissolved)	mg/L	-	-	-	--	--
Nickel (dissolved)	mg/L	-	-	-	--	--
Zinc (dissolved)	mg/L	5	AO	-	--	--
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	567[b]	526[b]
Ammonia-N	mg/L	-	-	0.2	0.561[a]	0.642[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	--	--
Chemical oxygen demand (COD)	mg/L	-	-	-	--	--
Chloride	mg/L	250	AO	-	--	--
Color (apparent)	color unit	5	AO	-	--	--
Color (apparent)	TCU	5	AO	-	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.4	ND(6.4)
Escherichia coli	cfu/100mL	ND	MAC	5	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	--	--
Nitrate (as N)	mg/L	10	AO	0.5	0.18	0.503[a]
Nitrite (as N)	mg/L	1	AO	-	--	--
pH, lab	s.u.	6.5-8.5	OG	-	--	--
Phenol	mg/L	-	-	-	--	--
Phosphorus	mg/L	-	-	0.5	0.0030	ND(0.0030)
Sulfate	mg/L	500	AO	-	--	--
Total coliform bacteria	cfu/100mL	ND	MAC	-	--	--
Total dissolved solids (TDS)	mg/L	500	OAO	-	--	--
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	--	--
Total suspended solids (TSS)	mg/L	-	-	-	--	--
Turbidity	NTU	5	AO	-	--	--
Un-ionized ammonia	mg/L	-	-	-	0.0014	0.0042
Field Parameters						
Conductivity, field	mS/cm	-	-	-	2.7	2.45
Dissolved oxygen (DO), field	mg/L	-	-	-	2.68	3.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	129	208
pH, field	s.u.	6.5-8.5	OG	-	6.77	7.39
Temperature, field	Deg C	15	AO	-	13.89	14.79
Turbidity, field	NTU	5	AO	-	0.7	86.2[b]

003002

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4
Sample ID:					GW-45804-060217-TS-016	GW-45804-113017-TS-013
Sample Date:					6/2/2017	11/30/2017
					Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]		
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	--	--
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--
Semi-Volatiles						
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--
Acenaphthene	µg/L	-	-	-	--	--
Acenaphthylene	µg/L	-	-	-	--	--
Acridine	µg/L	-	-	-	--	--
Anthracene	µg/L	-	-	-	--	--
Benzo(a)anthracene	µg/L	-	-	-	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	--	--
Benzo(b)fluoranthene	µg/L	-	-	-	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--
Chrysene	µg/L	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--
Fluoranthene	µg/L	-	-	-	--	--
Fluorene	µg/L	-	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--
Naphthalene	µg/L	-	-	-	--	--
Phenanthrene	µg/L	-	-	-	--	--
Pyrene	µg/L	-	-	-	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0032	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	6.60	9.16	-	6.52
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.12	1.57	-	1.41
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0059	0.0042	-	0.0049
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	0.110	ND(0.0030)	-	0.0078
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	611	309	-	571
Ammonia-N	mg/L	-	-	0.2	0.157	0.104	-	0.117
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	2500	AO	-	64.0	63.0	-	58.1
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	137	-	109	232
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	9.4	9.9	-	11.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.462	-	0.031
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	4	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	892	-	1020
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.00083	0.00022	-	0.000126
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.6	1.32	1.36	1.96
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.94	0.5	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-98	-88	-
pH, field	s.u.	6.5-8.5	OG	-	7.2	6.90	6.29	6.69
Temperature, field	Deg C	15	AO	-	15.1	12.2	12	9.74
Turbidity, field	NTU	5	AO	-	-	-	-	29.7

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	7.17	6.97	7.19	7.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.42	1.37	1.71	1.52
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	0.0033	ND(0.0030)	0.0057
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	597	648	666	643
Ammonia-N	mg/L	-	-	0.2	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	27	34	30
Chloride	mg/L	2500	AO	-	56.7	76.7	82.1	94
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	50.1	258	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	11.1	12.9	9.5	15.1
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.91	7.67	7.46
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	0.0020
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	198	213
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	42	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAD	-	1000	1030	1090	1090
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.53	0.60	0.50
Total suspended solids (TSS)	mg/L	-	-	-	-	15.0	16.0	42.0
Turbidity	NTU	5	AO	-	-	80.0	8.60 J	90.0
Un-ionized ammonia	mg/L	-	-	-	0.00028	-	0.00076	0.000032
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.82	1.83	2	1.87
Dissolved oxygen (DO), field	mg/L	-	-	-	2.95	1.27	0.87	1.71
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-98	-77	-156	-
pH, field	s.u.	6.5-8.5	OG	-	6.97	6.4	7.32	5.84
Temperature, field	Deg C	15	AO	-	12.8	11.55	12.8	14.9
Turbidity, field	NTU	5	AO	-	73.1	94.5	15.7	53

003006

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)

003007

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.082	11.1	1.12	6.28[b]
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0838	1.02	0.0994	0.851[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0042	0.0027	0.0010	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	--
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	ND(0.0030)	0.0034	0.0035
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	74	309	84	166
Ammonia-N	mg/L	-	-	0.2	0.091	0.055	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	76	34	ND(10)	12
Chloride	mg/L	2500	AO	-	86.8	76.9	80	298[b]
Color (apparent)	color unit	5	AO	-	-	25.3	31.7	
Color (apparent)	TCU	5	AO	18.4	23.7	-	-	29.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	6.9	3.0	3.5	2.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	ND(2)	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	8.54	7.67	8.30	8.08
Phenol	mg/L	-	-	-	0.0133	0.0032	0.0015	0.0030
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	61.4	191	62	393
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	10	0	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	284	722	269	346
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.40	0.60	ND(0.15)	0.21
Total suspended solids (TSS)	mg/L	-	-	-	177	292	9.6	ND(2.0)
Turbidity	NTU	5	AO	-	8.60	145	6.03	3.53[b]
Un-ionized ammonia	mg/L	-	-	-	0.000038	0.00016	ND(0.0012)	0.0016
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.98	1.91	0.329	0.474
Dissolved oxygen (DO), field	mg/L	-	-	-	11.04	0.15	4.3	0.56
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-122	-154	-186
pH, field	s.u.	6.5-8.5	OG	-	6.22	6.98	7.98	7.94
Temperature, field	Deg C	15	AO	-	11.3	13.8	11.6	14.57
Turbidity, field	NTU	5	AO	-	187	44.5	-	0

003008

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(360)	ND(360)	ND(360)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	ND(0.020)	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003	GW-45804-060117-TS-006	GW-45804-112917-TS-004
Sample Date:					11/9/2015	5/17/2016	11/15/2016	6/1/2017	11/29/2017
					Original	Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Metals									
Arsenic (dissolved)	mg/L	0.025	IMAC	-	0.00015	ND(0.00010)	0.00017	--	--
Boron (dissolved)	mg/L	5	IMAC	-	0.023	0.022	0.023	--	--
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	0.05	MAC	-	0.00053	0.00056	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	--
Copper (dissolved)	mg/L	-	-	-	ND(0.00020)	0.00047	0.0539	--	--
Iron (dissolved)	mg/L	0.3	AO	10.6	0.133	1.08[b]	0.199	1.47[b]	ND(0.010)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.000050)	ND(0.000050)	0.000078	--	--
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0470	0.218[b]	0.0486	0.139[b]	0.0352
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--
Molybdenum (dissolved)	mg/L	-	-	-	0.00124	0.000422	0.00131	--	--
Nickel (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	--	--
Silver (dissolved)	mg/L	-	-	-	--	--	--	--	--
Zinc (dissolved)	mg/L	5	AO	-	0.0013	0.0031	0.0021	--	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	105	173	102	160	86
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	0.083	0.033	0.065	0.625[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	5.2	--	--
Chemical oxygen demand (COD)	mg/L	-	-	-	12	13	21	--	--
Chloride	mg/L	2500	AO	-	87.0	75.0	86.5	--	--
Color (apparent)	color unit	5	AO	-		48.2	31.6	--	--
Color (apparent)	TCU	5	AO	18.4	48.2	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.2	3.8	4.5	2.1	3.2
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	--	--
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	1	AO	-	ND(0.010)	ND(0.010)	ND(0.010)	--	--
pH, lab	s.u.	6.5-8.5	OG	-	8.82[b]	8.33	8.52[b]	--	--
Phenol	mg/L	-	-	-	0.0027	0.0035	0.0025	--	--
Phosphorus	mg/L	-	-	0.5	0.03[a]	0.0096	0.0060	0.0031	0.0061
Sulfate	mg/L	500	AO	-	17.4	42.1	0.34	--	--
Total coliform bacteria	cfu/100mL	ND	MAC	-	1[b]	5[b]	100[b]	--	--
Total dissolved solids (TDS)	mg/L	500	OAD	-	245	348	241	--	--
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.26	ND(0.15)	0.23	--	--
Total suspended solids (TSS)	mg/L	-	-	-	2.7	45.2	5.1	--	--
Turbidity	NTU	5	AO	-	13.3[b]	181[b]	12.3[b]	--	--
Un-ionized ammonia	mg/L	-	-	-	ND(0.045)	0.0318	0.0029	0.0011	0.0225
Field Parameters									
Conductivity, field	mS/cm	-	-	-	0.404	0.422	0.379	0.433	0.25
Dissolved oxygen (DO), field	mg/L	-	-	-	0	1.85	0	4.61	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-187	-260	-148	-266	83
pH, field	s.u.	6.5-8.5	OG	-	10.05[b]	9.38[b]	9.57[b]	7.96	8.11
Temperature, field	Deg C	15	AO	-	14.06	10.47	11.36	10.12	12.08
Turbidity, field	NTU	5	AO	-	2	37[b]	13.8[b]	78.8[b]	78.7[b]

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-110915-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003	GW-45804-060117-TS-006	GW-45804-112917-TS-004
Sample Date:					11/9/2015	5/17/2016	11/15/2016	6/1/2017	11/29/2017
					Original	Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	--	--
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	--
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	-	0.0023	-	0.0018
Boron (dissolved)	mg/L	5	MAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00022	0.00020	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	3.59	2.85	-	5.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.52	1.53	-	2.71
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0695	0.0527	-	0.0168
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0743	ND(0.0030)	-	0.0123
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	427	490	-	519
Ammonia-N	mg/L	-	-	0.2	0.373	0.311	-	0.476
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	83.5	70.6	-	106
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	143	-	90.6	203
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	8.5	9.7	-	10.3
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	-	0.072
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	10	2
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	1080	-	1450
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.000407	0.00152	-	0.0145
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.52	1.53	1.65	2.31
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.91	2.12	0.02
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-124	-31	-60
pH, field	s.u.	6.5-8.5	OG	-	6.62	7.24	6.14	8.12
Temperature, field	Deg C	15	AO	-	11.9	12.9	7.72	10.59
Turbidity, field	NTU	5	AO	-	-	-	-	4.2

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	-	0.068	0.078	0.074
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	0.00078	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.050)	5.77	6.02	5.55
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.321	**2.95**	**2.91**	**2.64**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	291	519	548	507
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	**1.85**	**2.33**	**2.45**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	23	51	36
Chloride	mg/L	250	AO	-	42.8	116	140	94.2
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	5.0	112	73.0	35.0 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.1	10.6	7.6	ND(5.2)
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	0.44	ND(0.10)	ND(0.10)	0.25
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.96	7.60	7.82
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	545	373
Total coliform bacteria	cfu/100mL	ND	MAC	-	340	2	10	140
Total dissolved solids (TDS)	mg/L	500	OAO	-	834	1550	1600	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	2.16	2.43	2.95
Total suspended solids (TSS)	mg/L	-	-	-	-	12.5	14.0	38.7
Turbidity	NTU	5	AO	-	-	79.0	7.60	53.0
Un-ionized ammonia	mg/L	-	-	-	ND(0.00031)	-	0.605	0.00202
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.961	2.37	1.95	2.17
Dissolved oxygen (DO), field	mg/L	-	-	-	-	1.7	0	5.62
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-73	-104	-
pH, field	s.u.	6.5-8.5	OG	-	7.48	6.36	9.17	6.41
Temperature, field	Deg C	15	AO	-	9.0	9.92	9.6	14.6
Turbidity, field	NTU	5	AO	-	62.3	165	28.7	48

003014

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.081	0.099	0.204	0.188
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	6.25	3.06	ND(0.050)	0.178
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	2.38	1.34	0.648	0.0575[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0211	0.0133	0.0301	0.0351
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0034	0.0075	0.0075	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	996	548	466	489	305
Ammonia-N	mg/L	-	-	0.2	4.60	2.69	0.273	0.099
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	46	19	ND(10)	ND(10)
Chloride	mg/L	250	AO	-	157	103	127	48.9
Color (apparent)	color unit	5	AO	-	-	34.6 J	61.9	
Color (apparent)	TCU	5	AO	-	35.7	-	-	15.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	13.5	4.2	2.5	2.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	0.15	0.40	0.336[a]
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.53	7.76	7.54	8.02
Phenol	mg/L	-	-	-	ND(0.0010)	0.0030	0.0015	0.0014
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.030
Sulfate	mg/L	500	AO	-	639	279	333	172
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	10	0	1[b]
Total dissolved solids (TDS)	mg/L	500	OAO	-	1750	1030	1140	523[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	5.09	2.65	0.42	0.43
Total suspended solids (TSS)	mg/L	-	-	-	26.4	10.0	24.4	28.1
Turbidity	NTU	5	AO	-	69.6	23.5	11.4	3.44
Un-ionized ammonia	mg/L	-	-	-	0.00197	0.0104	0.00386	0.0020
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.32	1.69	0.557	0.661
Dissolved oxygen (DO), field	mg/L	-	-	-	7.89	8.74	10.48	6.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-84	24	144
pH, field	s.u.	6.5-8.5	OG	-	6.24	7.22	7.90	7.73
Temperature, field	Deg C	15	AO	-	11.1	10.44	7.2	17.05
Turbidity, field	NTU	5	AO	-	0	5.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	–
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	–
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	–
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	–
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	–
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	–
Acridine	µg/L	-	-	-	-	ND(4.0)	-	–
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	–
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	–
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	–
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	–
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	–
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	–
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	–
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	–
Naphthalene	µg/L	-	-	-	-	ND(0.050)	-	–
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	–
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	–

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002	GW-45804-060117-TS-005
Sample Date:					11/9/2015	5/17/2016	5/17/2016	11/15/2016	6/1/2017
					Original	Original	Duplicate	Original	
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**					
Metals									
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Boron (dissolved)	mg/L	5	MAC	-	0.29	0.13	0.14	0.27	--
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Cobalt (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Copper (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0607	--
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.10)	1.49[b]	1.55[b]	ND(0.10)	1.00[b]
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	--
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0439	0.425[b]	0.433[b]	0.0256	0.314[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L	-	-	-	0.0816	0.242	0.247	0.0847	--
Nickel (dissolved)	mg/L	-	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Silver (dissolved)	mg/L	-	-	-	--	--	--	--	--
Zinc (dissolved)	mg/L	5	-	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	261	259	257	301	340
Ammonia-N	mg/L	-	-	0.2	0.955[a]	0.991[a]	0.964[a]	0.057	0.240[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	-	-	-	14	69 J	19 J	13	--
Chloride	mg/L	250	AO	-	52.5	92.7	91.6	81.2	--
Color (apparent)	color unit	5	AO	-		47.7	66.3	38.4	--
Color (apparent)	TCU	5	AO	-	59.8	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	4.3	4.4	3.9	1.9	2.2
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0	--
Nitrate (as N)	mg/L	10	AO	0.5	0.61[a]	ND(0.020)	ND(0.020)	0.487	0.071
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)	--
pH, lab	s.u.	6.5-8.5	OG	-	7.72	7.89	7.90	7.39	--
Phenol	mg/L	-	-	-	0.0019	0.0023 J	0.0034 J	0.0048	--
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.0408	0.0390	0.0160	0.0105
Sulfate	mg/L	500	AO	-	256	213	211	271	--
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	40[b]	40[b]	190[b]	--
Total dissolved solids (TDS)	mg/L	500	OAO	-	664[b]	738[b]	713[b]	777[b]	--
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.04	0.70	0.68	0.30	--
Total suspended solids (TSS)	mg/L	-	-	-	6.0	23.3 J	86.0 J	8.7	--
Turbidity	NTU	5	AO	-	4.96	28.4[b]	28.6[b]	43.8[b]	--
Un-ionized ammonia	mg/L	-	-	-	0.177	0.0571	0.0543	0.00036	0.0021
Field Parameters									
Conductivity, field	mS/cm	-	-	-	0.331	0.802	--	0.926	0.844
Dissolved oxygen (DO), field	mg/L	-	-	-	2.36	1.56	--	0	4.18
Oxidation reduction potential (ORP), field	millivolts	-	-	-	136	-49	--	-29	-49
pH, field	s.u.	6.5-8.5	OG	-	8.84[b]	8.54[b]	--	7.43	7.55
Temperature, field	Deg C	15	AO	-	11.35	13.8	--	10.39	13.87
Turbidity, field	NTU	5	AO	-	2.6	3.7	--	48.2[b]	135[b]

003018

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002	GW-45804-060117-TS-005
Sample Date:					11/9/2015	5/17/2016	5/17/2016	11/15/2016	6/1/2017
					Original	Original	Duplicate	Original	
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]					
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(380)	ND(380)	ND(380)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-113017-TS-011
Sample Date:					11/30/2017
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Metals					
Arsenic (dissolved)	mg/L	0.025	MAC	-	--
Boron (dissolved)	mg/L	5	MAC	-	--
Cadmium (dissolved)	mg/L	0.005	MAC	-	--
Chromium (dissolved)	mg/L	0.05	MAC	-	--
Cobalt (dissolved)	mg/L	-	-	-	--
Copper (dissolved)	mg/L	-	-	-	--
Iron (dissolved)	mg/L	0.3	AO	10.6	0.163
Lead (dissolved)	mg/L	0.01	MAC	-	--
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.316[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	--
Molybdenum (dissolved)	mg/L	-	-	-	--
Nickel (dissolved)	mg/L	-	-	-	--
Silver (dissolved)	mg/L	-	-	-	--
Zinc (dissolved)	mg/L	5	-	-	--
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	259
Ammonia-N	mg/L	-	-	0.2	ND(0.550)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	--
Chemical oxygen demand (COD)	mg/L	-	-	-	--
Chloride	mg/L	250	AO	-	--
Color (apparent)	color unit	5	AO	-	--
Color (apparent)	TCU	5	AO	-	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	ND(2.6)
Escherichia coli	cfu/100mL	ND	MAC	5	0
Fecal coliform bacteria	cfu/100mL	-	-	-	--
Nitrate (as N)	mg/L	10	AO	0.5	0.616[a]
Nitrite (as N)	mg/L	1	AO	-	--
pH, lab	s.u.	6.5-8.5	OG	-	--
Phenol	mg/L	-	-	-	--
Phosphorus	mg/L	-	-	0.5	0.0150
Sulfate	mg/L	500	AO	-	--
Total coliform bacteria	cfu/100mL	ND	MAC	-	--
Total dissolved solids (TDS)	mg/L	500	OAO	-	--
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	--
Total suspended solids (TSS)	mg/L	-	-	-	--
Turbidity	NTU	5	AO	-	--
Un-ionized ammonia	mg/L	-	-	-	ND(0.0018)
Field Parameters					
Conductivity, field	mS/cm	-	-	-	0.53
Dissolved oxygen (DO), field	mg/L	-	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	33
pH, field	s.u.	6.5-8.5	OG	-	7.31
Temperature, field	Deg C	15	AO	-	8.53
Turbidity, field	NTU	5	AO	-	67.4[b]

003020

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-113017-TS-011
Sample Date:					11/30/2017
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]	
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	--
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	--
Acenaphthene	µg/L	-	-	-	--
Acenaphthylene	µg/L	-	-	-	--
Acridine	µg/L	-	-	-	--
Anthracene	µg/L	-	-	-	--
Benzo(a)anthracene	µg/L	-	-	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	--
Benzo(b)fluoranthene	µg/L	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	--
Chrysene	µg/L	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--
Fluoranthene	µg/L	-	-	-	--
Fluorene	µg/L	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--
Naphthalene	µg/L	-	-	-	--
Phenanthrene	µg/L	-	-	-	--
Pyrene	µg/L	-	-	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards, Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the Tier I Trigger Level
[ ] - Exceedence of the ODWQS

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0031	ND(0.0010)	-	0.0018	0.0013
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.000188	0.000110	0.000046	-	0.00001	0.000035
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.089	ND(0.050)	1.00	-	0.811	ND(0.050)
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	73.7	-	-	-	-	-
Manganese	mg/L	-	0.0433	0.0357	0.305	-	0.348	0.0346
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.264	0.348	0.134	-	0.345	0.187
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	0.0200	0.0067	0.0304	-	0.185	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	220	201	216	-	188	286
Ammonia-N	mg/L	-	ND(0.050)	0.103	0.096	-	0.110	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	83.1	83.6	79.2	-	122	122
Color (apparent)	TCU	-	6.7	9.9	-	9.1	21.3	12.0
Conductivity	umhos/cm	-	1480	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	3.1	6.7	-	5.2	4.9
Escherichia coli	cfu/100mL	100	0	1	-	1	35	1
Fecal coliform bacteria	cfu/100mL	4800	1	10	-	1	37	2
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(1.0)	0.57	0.94	-	1.32	0.55
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.08	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0044	0.0079	0.0095	-	0.0197	0.0061
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	8	350	-	2100	600	140
Total dissolved solids (TDS)	mg/L	-	1100	1010	1010	-	1170	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	0.92	-	-	-	-	-
Unionized ammonia	mg/L	0.02	ND(0.000014)	0.0025	0.00035	-	0.00034	ND(0.000094)

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1650	1263	1480	1750	1640	1740
Dissolved oxygen (DO), field	mg/L	-	-	-	10.51	10.4	11.2	12.6
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	171	-
pH, field	s.u.	6.5-8.5	8.31	7.85	7.27	8.2	7.06	6.96
Temperature, field	Deg C	-	4.0	22	8.1	6.7	12.28	8.6
Turbidity, field	NTU	-	73	-	-	-	6.7	10.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L			-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0083	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J = Estimated concentration.
ND = Non-detect at associated value.
U = Not present at or above the associated value.
R = Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	-	ND(0.0010)	0.0027	0.0025	ND(0.010)
Boron	mg/L	0.2	0.140	-	0.089	0.087	0.105	ND(0.10)
Cadmium	mg/L	0.0002	0.000092	-	0.00013	0.00016	0.00021	ND(0.00020)
Chromium	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt	mg/L	0.0009	0.00111	-	0.00233	0.00196	0.00277	ND(0.0050)
Copper	mg/L	0.005	0.0016	-	0.0011	ND(0.0010)	ND(0.0010)	ND(0.010)
Iron	mg/L	0.3	0.231	-	0.118	0.089	0.078	ND(0.50)
Lead	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0050)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0536	-	0.185	0.0636	0.0593	0.028
Mercury	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.275	-	0.558	0.455	0.408	0.583
Nickel	mg/L	0.025	0.0113	-	0.0157	0.0138	0.0238	0.016
Zinc	mg/L	0.03	0.0174	-	ND(0.0030)	ND(0.0030)	0.0053	ND(0.030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	268	-	232	145	178	136
Ammonia-N	mg/L	-	0.073	-	0.100	0.634	0.463	0.105
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	15	-	76	ND(10)	38	10
Chloride	mg/L	-	164	-	94.2	96.6	101	100
Color (apparent)	TCU	-	-	7.2	15.0	9.4 J	8.8	16.3
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.2	-	3.2	2.4	4.5	2.2
Escherichia coli	cfu/100mL	100	-	45	130	ND(10)	10	10
Fecal coliform bacteria	cfu/100mL	4800	-	11	150	ND(10)	3	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	1.10	-	0.34	1.26	1.30	0.33
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.87	-	8.08	8.11	8.14	8.12
Phenol	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	0.0050	ND(0.0010)	0.0036
Phosphorus	mg/L	0.01	0.0122	-	0.0093	0.0133	0.0092	0.0193
Sulfate	mg/L	-	-	-	664	570	696	489
Total coliform bacteria	cfu/100mL	-	-	260	1000	ND(1000)	600	2200
Total dissolved solids (TDS)	mg/L	-	1370	-	1420	1130	1370	1040
Total kjeldahl nitrogen (TKN)	mg/L	-	0.49	-	0.51	0.80	0.66	0.49
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	11.6	-	5.6	12.8	15.2	7.2
Turbidity	NTU	-	-	1.11	2.20	3.45	12.6	4.83
Unionized ammonia	mg/L	0.02	-	-	0.000189	0.000171	0.000153	0.0068

003025

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	2340	1920	1510	1590	1770	1560
Dissolved oxygen (DO), field	mg/L	-	-	-	12.19	8.13	10.16	8.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	66	-	-	9
pH, field	s.u.	6.5-8.5	6.97	7.06	7.02	6.74	6.45	6.14
Temperature, field	Deg C	-	18.66	17.64	7.2	20.3	2.4	20.43
Turbidity, field	NTU	-	-	-	67.1	58.6	11.5	12.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003026

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051616-TS-002	SW-45804-111416-TS-003	SW-45804-053017-TS-003	SW-45804-112917-TS-003
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/30/2017	11/29/2017
			Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Metals (Total)									
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.010)	ND(0.0010)	ND(0.0010)	0.00031	–	–
Boron	mg/L	0.2	0.096	0.11	ND(0.10)	ND(0.10)	0.095	–	–
Cadmium	mg/L	0.0002	0.00011	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00020)	–	–
Chromium	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	–	–
Cobalt	mg/L	0.0009	0.00141	ND(0.0050)	0.0020	ND(0.0010)	0.00079	–	–
Copper	mg/L	0.005	0.0013	ND(0.010)	ND(0.010)	ND(0.010)	0.0011	–	–
Iron	mg/L	0.3	0.061	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.50)	ND(0.50)
Lead	mg/L	0.005	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	0.00016	–	–
Magnesium	mg/L	-	-	-	-	–	--	–	–
Manganese	mg/L	-	0.0334	0.138	0.0843	0.0273	0.0314	0.131	0.300
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	–	–
Mercury (dissolved)	mg/L	-	-	-	-	–	--	–	–
Molybdenum	mg/L	0.04	0.301	0.239	0.258	0.220	0.273	–	–
Nickel	mg/L	0.025	0.0165	0.033	0.0196	0.0071	0.00955	–	–
Zinc	mg/L	0.03	0.0068	ND(0.030)	ND(0.030)	ND(0.030)	0.0068	–	–
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-	235	187	203	213	238	225	257
Ammonia-N	mg/L	-	0.061	1.10	ND(0.050)	0.028	ND(0.020)	0.109	0.275
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	–	--	–	–
Biochemical oxygen demand (carbonaceous)	mg/L	-	4.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	–	–
Chemical oxygen demand (COD)	mg/L	-	24	12	16	19	130	–	–
Chloride	mg/L	-	224	87.1	221	177	163	–	–
Color (apparent)	TCU	-	9.0	12.4	8.7	5.9	5.6	–	–
Conductivity	umhos/cm	-	-	-	-	–	--	–	–
Dissolved organic carbon (DOC)	mg/L	-	5.0	2.7	3.9	4.9	3.0	5.6	4.6
Escherichia coli	cfu/100mL	100	4	50	1	4	2	14	1
Fecal coliform bacteria	cfu/100mL	4800	6	110	10	30	10	–	–
Mineral oil and grease	mg/L	-	-	-	-	–	--	–	–
Nitrate (as N)	mg/L	1.82	0.56	2.80	0.68	1.85	1.03	0.611	0.675
Nitrite (as N)	mg/L	0.3	ND(0.10)	0.047	ND(0.050)	ND(0.050)	ND(0.010)	–	–
Oil and grease (HEM), total	mg/L	-	-	-	-	–	--	–	–
Oil and grease, animal and vegetable	mg/L	-	-	-	-	–	--	–	–
pH, lab	s.u.	6.5-8.5	7.88	8.14	7.85	8.08	7.83	–	–
Phenol	mg/L	0.005	ND(0.0010)	0.0051	0.0032	0.0017	0.0017	–	–
Phosphorus	mg/L	0.01	0.0068	0.0235	0.0082	0.0070	0.0044	0.0068	0.0077
Sulfate	mg/L	-	597	583	950	684	683	–	–
Total coliform bacteria	cfu/100mL	-	1900	2000	500	800	1000	–	–
Total dissolved solids (TDS)	mg/L	-	1440	1110	1630	1430	1280	–	–
Total kjeldahl nitrogen (TKN)	mg/L	-	0.31	1.34	0.32	0.51	0.39	–	–
Total phosphorus	mg/L	-	-	-	-	–	--	–	–
Total suspended solids (TSS)	mg/L	-	ND(2.0)	52.3	2.8	2.4	3.0	–	–
Turbidity	NTU	-	4.39	36.0	3.10	0.93	1.04	–	–
Un-ionized ammonia	mg/L	0.02	0.00069	0.0548	ND(0.0002)	0.0029	ND(0.000051)	0.0011	0.0013

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051616-TS-002	SW-45804-111416-TS-003	SW-45804-053017-TS-003	SW-45804-112917-TS-003
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/30/2017	11/29/2017
			Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Field Parameters									
Conductivity, field	uS/cm	-	960	1.53	2.36	1.26	1.78	1.66	1.66
Dissolved oxygen (DO), field	mg/L	-	21.17	10.05	6.58	3.45	8.1	5.28	5.67
Oxidation reduction potential (ORP), field	millivolts	-	117	-	46	124	183	-	122
pH, field	s.u.	6.5-8.5	7.84	8.23	5.53	5.62	7.11	7.52	7.56
Temperature, field	Deg C	-	2.57	19.92	9.12	12.51	8.23	16.11	5.21
Turbidity, field	NTU	-	-	106	1.3	0.4	0.8	0.9	9.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	170	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	-	--	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	450	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	-	--	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	--	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(360)	ND(360)	620	ND(360)	ND(380)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	170	-	--	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	450	-	--	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	ND(250)	-	--	-	-
Semi-Volatiles									
1-Methylnaphthalene	µg/L	2	-	-	-	-	--	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	--	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	--	-	-
Acenaphthene	µg/L	-	-	-	-	-	--	-	-
Acenaphthylene	µg/L	-	-	-	-	-	--	-	-
Acridine	µg/L	-	-	-	-	-	--	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	--	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	--	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	--	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	--	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	--	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	--	-	-
Chrysene	µg/L	0.0001	-	-	-	-	--	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	--	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	--	-	-
Fluorene	µg/L	0.2	-	-	-	-	--	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	--	-	-
Naphthalene	µg/L	7	-	-	-	-	--	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	--	-	-
Pyrene	µg/L	-	-	-	-	-	--	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051810-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002	SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004
Sample Date:			5/18/2010	11/5/2010	11/11/2010	5/17/2011	5/17/2011	11/17/2011
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	0.0035	-	ND(0.0010)	ND(0.0010)	0.0020
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.000062	0.000054	-	0.00017	0.00023	0.00007
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.221	0.76	-	0.180	0.184	ND(0.050)
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0750	0.899	-	0.0945	0.0961	0.201
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.208	0.141	-	0.246	0.252	0.179
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	0.0136	0.0439	-	0.0178	0.0161	0.0057
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	161	217	-	190	186	309
Ammonia-N	mg/L	-	0.079	0.162	-	0.060	0.073	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	69.0	66.8	-	70.0	69.8	182
Color (apparent)	TCU	-	17.4	-	23.7	23.5	19.0	13.7
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	5.2	-	4.4	4.1	5.1
Escherichia coli	cfu/100mL	100	370	-	3	22	19	0
Fecal coliform bacteria	cfu/100mL	4800	190	-	3	20	30	2
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	0.74	-	1.16	1.16	1.13
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.30)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0493	0.376	-	0.0090	0.0074	0.0043
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	270	-	2400	1400	1600	130
Total dissolved solids (TDS)	mg/L	-	1170	780	-	976	940	1390
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-
Unionized ammonia	mg/L	0.02	0.0025	0.00053	-	0.000125	0.000113	ND(0.000086)

003029

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051810-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002	SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004
Sample Date:			5/18/2010	11/5/2010	11/11/2010	5/17/2011	5/17/2011	11/17/2011
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1445	1200	1610	1600	1600	1630
Dissolved oxygen (DO), field	mg/L	-	-	12.6	12.04	-	-	17.19
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	7.79	7.28	6.56	6.8	6.8	7.03
Temperature, field	Deg C	-	21.3	7.2	6	11.13	11.13	5.7
Turbidity, field	NTU	-	-	-	-	14.2	14.2	24.7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	0.022	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	0.0556	-	0.0052	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004	SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	5/23/2013	11/13/2013
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	0.0013	-	ND(0.0010)	0.0022 J	ND(0.0010) J	ND(0.0010)
Cobalt	mg/L	0.0009	ND(0.00050)	-	ND(0.00050)	0.00068	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	0.0022	-	ND(0.0010)	0.0027 J	0.0016 J	ND(0.0010)
Iron	mg/L	0.3	0.717	-	0.157	1.31 J	0.518 J	0.164
Lead	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.186	-	0.123	0.120	0.0864	0.0716
Mercury	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0050	-	0.0058	0.0057	0.0058	0.0033
Nickel	mg/L	0.025	0.0021	-	ND(0.0020)	0.0027	ND(0.0020)	ND(0.0020)
Zinc	mg/L	0.03	0.0273	-	ND(0.0030)	0.0094	0.0072	0.0069
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	215	-	240	166	163	240
Ammonia-N	mg/L	-	0.068	-	ND(0.050)	0.056	0.051	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	40	-	42	32	40	34
Chloride	mg/L	-	86.2	-	121	81.6	82.6	112
Color (apparent)	TCU	-	-	67.9	29.6	56.5 J	59.4 J	30.3
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	17.6	-	8.0	12.7	12.6	9.2
Escherichia coli	cfu/100mL	100	-	105	11	40 J	20 J	10
Fecal coliform bacteria	cfu/100mL	4800	-	254	13	80 J	150 J	30
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	-	0.11	0.14	0.14	0.18
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.97	-	8.19	8.07	8.07	8.09
Phenol	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	0.0036 J	0.0050 J	0.0044
Phosphorus	mg/L	0.01	0.0799	-	0.1290	0.0970	0.0983	0.0213
Sulfate	mg/L	-	-	-	205	119	119	124
Total coliform bacteria	cfu/100mL	-	-	1200	1200	24000	17000	3000
Total dissolved solids (TDS)	mg/L	-	514	-	762	474	462	606
Total kjeldahl nitrogen (TKN)	mg/L	-	0.84	-	0.52	0.61	0.54	1.03
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	26.4	-	4.0	69.0	83.0	5.2
Turbidity	NTU	-	-	4.20	0.85	3.34	4.31	2.49
Unionized ammonia	mg/L	0.02	-	-	ND(0.00014)	0.000014	ND(0.000013)	ND(0.000016)

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004	SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	5/23/2013	11/13/2013
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	812	973	900	750	-	1040
Dissolved oxygen (DO), field	mg/L	-	-	-	13.84	7.64	-	10.24
Oxidation reduction potential (ORP), field	millivolts	-	-	-	ET	-		-
pH, field	s.u.	6.5-8.5	7.04	7.42	7.22	6.75	6.75	6.42
Temperature, field	Deg C	-	19.03	21.26	6.3	19.1	19.1	2.1
Turbidity, field	NTU	-	-	-	35.7	43.9	-	0
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052814-MB-005	SW-45804-112614-TS-001	SW-45804-052715-TS-004	SW-45804-110915-TS-004	SW-45804-051616-TS-003	SW-45804-111416-TS-004	SW-45804-053017-TS-004
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/30/2017
			Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Metals (Total)									
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00030	0.00042	0.00030	--
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	0.037	0.026	0.044	--
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000011	ND(0.000010)	ND(0.000010)	--
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00100	0.00097	ND(0.00050)	--
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00026	0.00035	0.00025	--
Copper	mg/L	0.005	0.0011	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Iron	mg/L	0.3	0.385	0.455	0.291	0.404	0.444	0.186	0.356
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00019	0.00018	0.00010	--
Magnesium	mg/L	-	-	-	-	-	--	--	--
Manganese	mg/L	-	0.133	0.0850	0.209	0.149	0.161	0.0837	0.0503
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Mercury (dissolved)	mg/L	-	-	-	-	-	--	--	--
Molybdenum	mg/L	0.04	0.0080	0.0082	0.0044	0.0102	0.00719	0.00887	--
Nickel	mg/L	0.025	0.0024	ND(0.0020)	ND(0.0020)	0.0022	0.0022	0.00263	--
Zinc	mg/L	0.03	0.0046	0.0039	0.0046	0.0033	ND(0.0030)	ND(0.0030)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-	234	203	238	234	217	236	175
Ammonia-N	mg/L	-	0.077	0.102	0.150	ND(0.050)	0.059	0.064	0.066
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	-	25	22	29	ND(10)	30	22	--
Chloride	mg/L	-	119	109	180	123	145	141	--
Color (apparent)	TCU	-	37.4	35.2	51.5	31.7	33.0	26.2	--
Conductivity	umhos/cm	-	-	-	-	-	--	--	--
Dissolved organic carbon (DOC)	mg/L	-	6.8	8.4	10.8	8.4	8.8	7.3	13.0
Escherichia coli	cfu/100mL	100	70	50	210	20	28	23	400
Fecal coliform bacteria	cfu/100mL	4800	100	70	340	40	80	50	--
Mineral oil and grease	mg/L	-	-	-	-	-	--	--	--
Nitrate (as N)	mg/L	1.82	0.18	0.43	ND(0.020)	0.46	ND(0.10)	0.280	0.039
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.010)	ND(0.050)	ND(0.050)	0.017	--
Oil and grease (HEM), total	mg/L	-	-	-	-	-	--	--	--
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	--	--	--
pH, lab	s.u.	6.5-8.5	8.25	8.01	8.13	8.02	8.32	7.96	--
Phenol	mg/L	0.005	0.0020	ND(0.0010)	0.0023	0.0017	0.00136	0.00044	--
Phosphorus	mg/L	0.01	0.0359	0.0368	0.0435	0.0213	0.361	0.0741	0.00460
Sulfate	mg/L	-	188	178	113	243	160	276	--
Total coliform bacteria	cfu/100mL	-	2900	1500	4000	600	1200	2000	--
Total dissolved solids (TDS)	mg/L	-	730	637	596	668	663	798	--
Total kjeldahl nitrogen (TKN)	mg/L	-	0.65	0.48	1.30	0.61	0.52	0.42	--
Total phosphorus	mg/L	-	-	-	-	-	--	--	--
Total suspended solids (TSS)	mg/L	-	5.2	8.0	7.6	8.0	19.0	8.1	--
Turbidity	NTU	-	3.52	7.32	7.11	3.81	5.50	4.41	--
Un-ionized ammonia	mg/L	0.02	0.0049	0.00174	0.0044	ND(0.0065)	0.0170	0.00032	0.0005

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052814-MB-005	SW-45804-112614-TS-001	SW-45804-052715-TS-004	SW-45804-110915-TS-004	SW-45804-051616-TS-003	SW-45804-111416-TS-004	SW-45804-053017-TS-004
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/16/2016	11/14/2016	5/30/2017
			Original	Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**							
Field Parameters									
Conductivity, field	uS/cm	-	1220	473	0.722	0.947	0.803	1.02	0.566
Dissolved oxygen (DO), field	mg/L	-	10.3	11.98	5.47	5.99	4.51	12.75	3.38
Oxidation reduction potential (ORP), field	millivolts	-	54	123.1	-	65	191	203	--
pH, field	s.u.	6.5-8.5	8.21	8.17	7.75	8.54	9.19	7.47	7.47
Temperature, field	Deg C	-	17.97	1.83	21.32	6.3	10.91	8.47	15.56
Turbidity, field	NTU	-	9.2	-	0	1	1	5.2	3.9
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	ND(100)	-	-	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	ND(250)	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	ND(250)	-	-	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	--
Acenaphthene	µg/L	-	-	-	-	-	-	-	--
Acenaphthylene	µg/L	-	-	-	-	-	-	-	--
Acridine	µg/L	-	-	-	-	-	-	-	--
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	--
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	--
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	--
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	--
Chrysene	µg/L	0.0001	-	-	-	-	-	-	--
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	--
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	--
Fluorene	µg/L	0.2	-	-	-	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	--
Naphthalene	µg/L	7	-	-	-	-	-	-	--
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	--
Pyrene	µg/L	-	-	-	-	-	-	-	--

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-112917-TS-004	SW-45804-051810-MB-004	SW-45804-051810-MB-005	SW-45804-110516-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/29/2017	5/18/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	ND(0.0010)	ND(0.0010)	0.0014	-	ND(0.0010)
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	-	0.00031	0.00031	0.00013	-	0.00020
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.535	0.178	0.166	1.58	-	0.153
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.133	0.110	0.105	0.199	-	0.101
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.116	0.115	0.0330	-	0.0509
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	-	0.0127	0.0040	0.0104	-	0.0062
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	247	214	206	229	-	239
Ammonia-N	mg/L	-	0.422	0.105	0.153	0.058	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	-	100	107	74.3	-	68.1
Color (apparent)	TCU	-	-	33.1	26.8	-	35.1	39.8
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	7.8	5.9	5.5	8.2	-	11.2
Escherichia coli	cfu/100mL	100	190	28	108	-	12	31
Fecal coliform bacteria	cfu/100mL	4800	-	120	170	-	23	39
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.500	ND(0.10)	0.51	0.14	-	ND(0.30)
Nitrite (as N)	mg/L	0.3	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0225	0.0280	0.0390	0.0218	-	0.0109
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	240	260	-	300	1500
Total dissolved solids (TDS)	mg/L	-	-	960	942	572	-	634
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	0.0024	0.0070	0.0102	0.00034	-	ND(0.00022)

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-112917-TS-004	SW-45804-051810-MB-004	SW-45804-051810-MB-005	SW-45804-110516-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/29/2017	5/18/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	0.635	1219	1219	970	1060	739
Dissolved oxygen (DO), field	mg/L	-	5.57	-	-	12.49	11.64	9.64
Oxidation reduction potential (ORP), field	millivolts	-	136	-	-	-	-	231
pH, field	s.u.	6.5-8.5	7.74	8.02	8.02	7.55	6.97	7.25
Temperature, field	Deg C	-	2.76	24.6	24.6	6.0	5.54	11.18
Turbidity, field	NTU	-	8.6	-	-	-	-	3.6
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	0.0147	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003036

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-111711-TS-005	SW-45804-051412-MB-003	SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	0.00035	-	ND(0.00010)	0.00012	ND(0.00010)
Chromium	mg/L	-	-	ND(0.0010)	-	0.0011	0.0011	ND(0.0010)
Cobalt	mg/L	0.0009	-	0.00085	-	ND(0.00050)	ND(0.00050)	0.00066
Copper	mg/L	0.005	-	0.0019	-	0.0014	0.0018	ND(0.0010)
Iron	mg/L	0.3	0.523	0.471	-	0.521	0.634	0.369
Lead	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.116	0.167	-	0.149	0.0924	0.106
Mercury	mg/L	0.0002	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0064	0.017	-	0.0085	0.0308	0.0122
Nickel	mg/L	0.025	-	0.0049	-	0.0032	0.0028	0.0053
Zinc	mg/L	0.03	0.0043	0.0094	-	0.0045	0.0052	0.0116
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	242	209	-	246	175	239
Ammonia-N	mg/L	-	ND(0.050)	0.122	-	ND(0.050)	0.076	0.126
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	21	-	51	38	38
Chloride	mg/L	-	81.2	94.0	-	120	64.0	110
Color (apparent)	TCU	-	30.3	-	55.2	34.0	53.8 J	27.6
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	7.0	13.0	-	7.8	12.4	9.8
Escherichia coli	cfu/100mL	100	24	-	77	11	126	10
Fecal coliform bacteria	cfu/100mL	4800	10	-	360	12	140	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	0.49	-	0.14	0.19	0.37
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	8.06	-	8.24	8.09	8.11
Phenol	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	0.0050	0.0016
Phosphorus	mg/L	0.01	0.0253	0.0455	-	0.0508	0.101	0.0215
Sulfate	mg/L	-	-	-	-	226	145	226
Total coliform bacteria	cfu/100mL	-	290	-	1000	1500	17000	1000
Total dissolved solids (TDS)	mg/L	-	518	738	-	792	518	758
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.61	-	0.57	0.54	0.46
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	20.8	-	19.2	67.0	4.8
Turbidity	NTU	-	-	-	4.50	1.36	5.35	8.96
Unionized ammonia	mg/L	0.02	ND(0.000071)	-	-	ND(0.000058)	0.0000144	0.000034

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-111711-TS-005	SW-45804-051412-MB-003	SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	799	1200	1520	999	800	1230
Dissolved oxygen (DO), field	mg/L	-	15.93	-	-	13.97	7.75	8.35
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	92	-	-
pH, field	s.u.	6.5-8.5	6.91	7	7.64	6.87	6.87	6.27
Temperature, field	Deg C	-	6.7	16.31	22.78	5.4	19.2	1.6
Turbidity, field	NTU	-	28.2	-	-	46.7	94.7	4.1
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003038

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051616-TS-004	SW-45804-051616-TS-005	SW-45804-111416-TS-005
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/16/2016	5/16/2016	11/14/2016
			Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**							
Metals (Total)									
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00029	0.00043	0.00038	0.00031
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	0.057	0.061	0.032	0.031	0.049
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000030)	0.000012	0.000012	ND(0.000030)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00071	0.00069	0.00071	ND(0.00050)
Cobalt	mg/L	0.0009	0.00051	ND(0.00050)	0.00071	0.00031	0.00035	0.00035	0.00031
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	0.229	0.339	0.85	0.190	0.260	0.272	0.177
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00010	0.00017	0.00016	0.00012
Magnesium	mg/L	-	-	-	-	-	-	-	-
Manganese	mg/L	-	0.110	0.0871	0.227	0.122	0.157	0.154	0.0848
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.157	0.0221	0.0812	0.0207	0.0247	0.0234	0.0512
Nickel	mg/L	0.025	0.0056	0.0031	0.0053	0.0035	0.0031	0.0030	0.00370
Zinc	mg/L	0.03	ND(0.0030)	0.0057	0.0080	0.0054	ND(0.0030)	0.0033	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	-	216	214	235	205	225	230	244
Ammonia-N	mg/L	-	0.071	0.097	0.072	0.067	ND(0.020)	ND(0.020)	0.041
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	21	24	25	18	23	23	18
Chloride	mg/L	-	120	109	161	131	160	153	141
Color (apparent)	TCU	-	30.9	31.2	41.0	22.9	31.2	30.9	22.2
Conductivity	umhos/cm	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.3	9.3	9.5	6.3	8.7	8.9	6.2
Escherichia coli	cfu/100mL	100	40	70	180	30	26	21	29
Fecal coliform bacteria	cfu/100mL	4800	50	80	260	40	70	80	40
Mineral oil and grease	mg/L	-	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.52	0.25	0.61	0.562	0.68	0.29	0.27	0.359
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	0.011	ND(0.050)	ND(0.050)	ND(0.050)	0.015
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.23	8.02	8.18	8.06	8.34	8.34	7.99
Phenol	mg/L	0.005	0.0044	ND(0.0010)	0.0016	0.0024	0.0023	0.0020	0.0035
Phosphorus	mg/L	0.01	0.0219	0.0256	0.0415	0.0151	0.0210	0.0214	0.0155
Sulfate	mg/L	-	305	303	245	625	247	237	332
Total coliform bacteria	cfu/100mL	-	2700	1800	3000	500	1200	1400	2000
Total dissolved solids (TDS)	mg/L	-	875	837	761	1250	791	805	882
Total kjeldahl nitrogen (TKN)	mg/L	-	0.51	0.45	0.91	0.51	0.54	0.54	0.36
Total phosphorus	mg/L	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.8	8.4	14.0	ND(2.0)	6.4	7.4	3.6
Turbidity	NTU	-	3.24	7.27	10.6	2.93	4.81	4.23	2.31
Un-ionized ammonia	mg/L	0.02	0.0045	0.00158	0.0029	0.0112	ND(0.012)	ND(0.012)	0.00029

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110615-TS-005	SW-45804-051616-TS-004	SW-45804-051616-TS-005	SW-45804-111416-TS-005
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/6/2015	5/16/2016	5/16/2016	11/14/2016
			Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**							
Field Parameters									
Conductivity, field	uS/cm	-	1440	582	1.15	1.53	0.671	–	1.07
Dissolved oxygen (DO), field	mg/L	-	10.59	21.46	8.64	8.62	6.86	–	10.41
Oxidation reduction potential (ORP), field	millivolts	-	45	96.1	-	74	169	–	214
pH, field	s.u.	6.5-8.5	8.22	8.13	7.87	8.59	9.07	–	7.86
Temperature, field	Deg C	-	17.62	2.36	21.97	7.7	11.34	–	5.59
Turbidity, field	NTU	-	8.2	-	6.1	0.1	2.5	–	0.9
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	ND(250)	-	-	-
Semi-Volatiles									
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND = Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[_____] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-053017-TS-005	SW-45804-112917-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013	SW-45804-111110-TS-004	SW-45804-051711-MMD-005
Sample Date:			5/30/2017	11/29/2017	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	–	--	ND(0.0010)	ND(0.0010)	-	0.0011
Boron	mg/L	0.2	–	--	-	-	-	-
Cadmium	mg/L	0.0002	–	--	0.00011	ND(0.00010)	-	ND(0.00010)
Chromium	mg/L	-	–	--	-	-	-	-
Cobalt	mg/L	0.0009	–	--	-	-	-	-
Copper	mg/L	0.005	–	--	-	-	-	-
Iron	mg/L	0.3	0.375	0.224	0.271	0.475	-	0.129
Lead	mg/L	0.005	–	--	-	-	-	-
Magnesium	mg/L	-	–	--	-	-	-	-
Manganese	mg/L	-	0.0644	0.165	0.0542	0.0262	-	0.0757
Mercury	mg/L	0.0002	–	--	-	-	-	-
Mercury (dissolved)	mg/L	-	–	--	-	-	-	-
Molybdenum	mg/L	0.04	–	--	0.0598	0.0230	-	0.0163
Nickel	mg/L	0.025	–	--	-	-	-	-
Zinc	mg/L	0.03	–	--	0.0056	ND(0.0030)	-	0.0124
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	161	261	135	116	-	135
Ammonia-N	mg/L	-	0.059	0.438	0.142	0.354	-	0.146
Biochemical oxygen demand (BOD)	mg/L	-	–	--	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	–	--	2.3	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	–	--	-	-	-	-
Chloride	mg/L	-	–	--	108	36.9	-	60.6
Color (apparent)	TCU	-	–	--	21.2	-	43.4	26.7
Conductivity	umhos/cm	-	–	--	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	13.2	7.6	6.8	9.6	-	11.9
Escherichia coli	cfu/100mL	100	320	210	5	-	6	80
Fecal coliform bacteria	cfu/100mL	4800	–	--	2	-	15	140
Mineral oil and grease	mg/L	-	–	--	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.071	0.489	ND(0.10)	ND(0.10)	-	ND(0.30)
Nitrite (as N)	mg/L	0.3	–	--	ND(0.10)	ND(0.10)	-	ND(0.30)
Oil and grease (HEM), total	mg/L	-	–	--	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	–	--	-	-	-	-
pH, lab	s.u.	6.5-8.5	–	--	-	-	-	-
Phenol	mg/L	0.005	–	--	-	-	-	-
Phosphorus	mg/L	0.01	0.0966	0.0173	0.0236	0.0345	-	0.0157
Sulfate	mg/L	-	–	--	-	-	-	-
Total coliform bacteria	cfu/100mL	-	–	--	50	-	90	2900
Total dissolved solids (TDS)	mg/L	-	–	--	936	548	-	792
Total kjeldahl nitrogen (TKN)	mg/L	-	–	--	-	-	-	-
Total phosphorus	mg/L	-	–	--	-	-	-	-
Total suspended solids (TSS)	mg/L	-	–	--	-	-	-	-
Turbidity	NTU	-	–	--	-	-	-	-
Un-ionized ammonia	mg/L	0.02	0.0002	0.0030	0.0029	0.00078	-	0.00101

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-053017-TS-005	SW-45804-112917-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013	SW-45804-111110-TS-004	SW-45804-051711-MMD-005
Sample Date:			5/30/2017	11/29/2017	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	Units	PWQO						
Field Parameters								
Conductivity, field	uS/cm	-	0.559	0.679	1207	910	980	873
Dissolved oxygen (DO), field	mg/L	-	5	7.72	-	12.47	12.91	10.95
Oxidation reduction potential (ORP), field	millivolts	-	–	138	-	-	-	216
pH, field	s.u.	6.5-8.5	7.37	7.81	7.6	7.13	6.6	7.37
Temperature, field	Deg C	-	5.01	3.01	21	5.9	6.66	13.5
Turbidity, field	NTU	-	5	6.1	-	-	-	0
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	–	--	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	–	--	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	–	--	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	–	--	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	–	--	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	–	--	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	–	--	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	–	--	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		–	--	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		–	--	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		–	--	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	–	--	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	–	--	-	-	-	-
2-Methylnaphthalene	µg/L	2	–	--	-	-	-	-
Acenaphthene	µg/L	-	–	--	-	-	-	-
Acenaphthylene	µg/L	-	–	--	-	-	-	-
Acridine	µg/L	-	–	--	-	-	-	-
Anthracene	µg/L	0.0008	–	--	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	–	--	-	-	-	-
Benzo(a)pyrene	µg/L	-	–	--	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	–	--	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	–	--	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	–	--	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	–	--	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	–	--	-	-	-	-
Chrysene	µg/L	0.0001	–	--	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	–	--	-	-	-	-
Fluoranthene	µg/L	0.0008	–	--	-	-	-	-
Fluorene	µg/L	0.2	–	--	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	–	--	-	-	-	-
Naphthalene	µg/L	7	–	--	-	-	-	-
Phenanthrene	µg/L	0.03	–	--	-	-	-	-
Pyrene	µg/L	-	–	--	-	-	-	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4	SW-4	SW-45804-051412-MB-001
Sample Date:			11/10/2011	11/10/2011	3/1/2012	4/1/2012	5/1/2012	5/14/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0012	0.0012	ND(0.0005)	0.0009	0.0027	0.0014
Boron	mg/L	0.2	-	-	0.011	0.039	0.044	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)
Chromium	mg/L	-	-	-	ND(0.002)	0.003	ND(0.002)	ND(0.0010)
Cobalt	mg/L	0.0009	-	-	ND(0.005)	ND(0.005)	ND(0.005)	0.00071
Copper	mg/L	0.005	-	-	0.002	0.004	0.002	0.0015
Iron	mg/L	0.3	0.630	0.585	-	-	-	0.830
Lead	mg/L	0.005	-	-	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.132	0.117	-	-	-	0.443
Mercury	mg/L	0.0002	-	-	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0124	0.0119	-	-	-	0.0087
Nickel	mg/L	0.025	-	-	ND(0.01)	ND(0.01)	ND(0.01)	0.0025
Zinc	mg/L	0.03	0.0033	ND(0.0030)	ND(0.005)	0.011	0.006	0.0041
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	143	138	-	-	-	87
Ammonia-N	mg/L	-	0.056	0.053	0.15	0.76	0.09	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	7	28	6	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	19.5	18.7	-	-	-	9.1
Chemical oxygen demand (COD)	mg/L	-	-	-	33	88	61	78
Chloride	mg/L	-	35.3	36.1	-	-	-	60.3
Color (apparent)	TCU	-	25.8	24.9	-	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.2	10.7	5.6	12.4	11.7	21.2
Escherichia coli	cfu/100mL	100	44	58	ND(10)	ND(2)	4	-
Fecal coliform bacteria	cfu/100mL	4800	70	80	-	-	-	-
Mineral oil and grease	mg/L	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)	-
Nitrate (as N)	mg/L	1.82	ND(0.30)	ND(0.30)	ND(0.1)	0.2	0.1	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.30)	ND(0.30)	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	ND(1.0)	1.8	ND(1.0)	-
Oil and grease, animal and vegetable	mg/L	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)	-
pH, lab	s.u.	6.5-8.5	-	-	7.95	8.14	8.33	8.49
Phenol	mg/L	0.005	-	-	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)
Phosphorus	mg/L	0.01	0.0522	0.112	-	-	-	0.181
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	600 J	300 J	-	-	-	-
Total dissolved solids (TDS)	mg/L	-	474	468	-	-	-	578
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.55	3.46	2.36	2.19
Total phosphorus	mg/L	-	-	-	0.12	0.21	0.21	-
Total suspended solids (TSS)	mg/L	-	-	-	9	40	23	17.2
Turbidity	NTU	-	-	-	-	-	-	-
Unionized ammonia	mg/L	0.02	0.0040	0.0038	-	-	-	-

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4	SW-4	SW-45804-051412-MB-001
Sample Date:			11/10/2011	11/10/2011	3/1/2012	4/1/2012	5/1/2012	5/14/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	877	-	488	1020	1010	1000
Dissolved oxygen (DO), field	mg/L	-	18.38	-	10	10.1	9.4	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	8.52	8.52	-	-	-	7.6
Temperature, field	Deg C	-	7.2	7.2	-	-	-	22.73
Turbidity, field	NTU	-	57	-	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	ND(0.020)	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	ND(0.020)	-	-	-	-
Acenaphthene	µg/L	-	-	ND(0.020)	-	-	-	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	ND(0.020)	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.0060	ND(0.0050)	-	-	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	ND(0.020)	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	ND(0.020)	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	ND(0.020)	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	ND(0.020)	-	-	-	-
Fluoranthene	µg/L	0.0008	-	ND(0.020)	-	-	-	-
Fluorene	µg/L	0.2	-	0.023	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	-	-
Naphthalene	µg/L	7	-	ND(0.020)	-	-	-	-
Phenanthrene	µg/L	0.03	-	ND(0.020)	-	-	-	-
Pyrene	µg/L	-	-	ND(0.020)	-	-	-	-

Notes:

[1] Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J = Estimated concentration.
ND = Non-detect at associated value.
U = Not present at or above the associated value.
R = Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4	SW-4	SW-4
Sample Date:			5/14/2012	5/23/2012	5/23/2012	6/1/2012	7/1/2012	8/1/2012
			Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0014	-	-	0.0024	0.0006	0.0019
Boron	mg/L	0.2	ND(0.050)	-	-	0.041	0.047	0.047
Cadmium	mg/L	0.0002	ND(0.00010)	-	-	ND(0.005)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	ND(0.0010)	-	-	ND(0.002)	ND(0.002)	0.003
Cobalt	mg/L	0.0009	0.00069	-	-	ND(0.005)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.0014	-	-	ND(0.002)	ND(0.002)	ND(0.002)
Iron	mg/L	0.3	0.817	-	-	-	-	-
Lead	mg/L	0.005	ND(0.0010)	-	-	ND(0.02)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.399	-	-	-	-	-
Mercury	mg/L	0.0002	ND(0.00010)	-	-	ND(0.00002)	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0086	-	-	-	-	-
Nickel	mg/L	0.025	0.0024	-	-	ND(0.01)	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	ND(0.0030)	-	-	0.006	0.006	0.008
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	65	-	-	-	-	-
Ammonia-N	mg/L	-	ND(0.050)	-	-	ND(0.01)	ND(0.01)	0.24
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	3	6	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	6.3	-	-	-	-	-
Chemical oxygen demand (COD)	mg/L	-	72	-	-	40	58	52
Chloride	mg/L	-	61.0	-	-	-	-	-
Color (apparent)	TCU	-	-	126	116	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	21.8	-	-	10.3	10.6	10.3
Escherichia coli	cfu/100mL	100	-	158	142	28	240	320
Fecal coliform bacteria	cfu/100mL	4800	-	1860 J	880 J	-	-	-
Mineral oil and grease	mg/L	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	ND(0.10)	-	-	0.1	ND(0.1)	0.1
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	-	ND(0.1)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	-	-	-	ND(1.0)	ND(1.0)	ND(1.0)
pH, lab	s.u.	6.5-8.5	8.27	-	-	8.21	7.76	7.86
Phenol	mg/L	0.005	ND(0.0010)	-	-	ND(0.001)	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.164	-	-	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	420 J	1100 J	-	-	-
Total dissolved solids (TDS)	mg/L	-	596	-	-	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	1.66	-	-	1.73	2.94	1.76
Total phosphorus	mg/L	-	-	-	-	0.11	0.29	0.19
Total suspended solids (TSS)	mg/L	-	16.0	-	-	11	20	11
Turbidity	NTU	-	-	14.5	16.3	-	-	-
Unionized ammonia	mg/L	0.02	-	-	-	-	-	-

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4	SW-4	SW-4
Sample Date:			5/14/2012	5/23/2012	5/23/2012	6/1/2012	7/1/2012	8/1/2012
			Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	1020	-	980	1030	947
Dissolved oxygen (DO), field	mg/L	-	-	-	-	8.5	1.6	2
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	-	7.14	-	-	-	-
Temperature, field	Deg C	-	-	21.02	-	-	-	-
Turbidity, field	NTU	-	-	-	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	-	-	-	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003046

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111212-MB-001	SW-45804-111212-MB-002	SW-4
Sample Date:			9/1/2012	10/1/2012	11/1/2012	11/12/2012	11/12/2012	4/1/2013
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.001	0.0012	0.0008	ND(0.0010)	ND(0.0010)	0.0009
Boron	mg/L	0.2	0.038	0.049	0.057	ND(0.050)	ND(0.050)	0.03
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.005)
Chromium	mg/L	-	0.006	0.076	0.02	0.0013	0.0017	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	0.00074	0.00078	ND(0.005)
Copper	mg/L	0.005	0.003	0.005	0.004	0.0026	0.0027	0.002
Iron	mg/L	0.3	-	-	-	0.745	0.820	-
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	0.346	0.343	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	0.0120	0.0123	-
Nickel	mg/L	0.025	0.02	0.07	0.02	0.0035	0.0035	ND(0.01)
Zinc	mg/L	0.03	ND(0.005)	0.016	0.009	0.0059	0.0061	0.033
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	155	163	-
Ammonia-N	mg/L	-	ND(0.01)	0.31	0.08	0.161	0.171	0.88
Biochemical oxygen demand (BOD)	mg/L	-	3	8	13	-	-	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	14.0	13.5	-
Chemical oxygen demand (COD)	mg/L	-	30	70	52	82	86	34
Chloride	mg/L	-	-	-	-	47.5	48.5	-
Color (apparent)	TCU	-	-	-	-	76.6 J	53.9 J	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.2	9.2	11.5	12.0	11.7	6.2
Escherichia coli	cfu/100mL	100	220	102	100	60	80	22
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	140	210	-
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	ND(1.0)
Nitrate (as N)	mg/L	1.82	ND(0.1)	0.1	ND(0.1)	ND(0.10)	ND(0.10)	0.2
Nitrite (as N)	mg/L	0.3	ND(1.0)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	ND(1.0)	ND(0.1)	-	-	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	ND(1.0)
pH, lab	s.u.	6.5-8.5	7.99	8	8	8.18	8.15	7.72
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	ND(0.0010)	ND(0.001)
Phosphorus	mg/L	0.01	-	-	-	0.319	0.315	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	1000	1100	-
Total dissolved solids (TDS)	mg/L	-	-	-	-	586	586	-
Total kjeldahl nitrogen (TKN)	mg/L	-	1.26	2.62	3.14	2.00	2.01	1.94
Total phosphorus	mg/L	-	0.12	0.32	0.21	-	-	0.13
Total suspended solids (TSS)	mg/L	-	9	69	34	50.0	44.0	7
Turbidity	NTU	-	-	-	-	38.0 J	31.0 J	-
Unionized ammonia	mg/L	0.02	-	-	-	0.0122	0.0094	-

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111212-MB-001	SW-45804-111212-MB-002	SW-4
Sample Date:			9/1/2012	10/1/2012	11/1/2012	11/12/2012	11/12/2012	4/1/2013
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	718	982	810	865	-	837
Dissolved oxygen (DO), field	mg/L	-	8.1	11.1	11.9	18.17	-	5.4
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-126		-
pH, field	s.u.	6.5-8.5	-	-	-	9.09	9.05	-
Temperature, field	Deg C	-	-	-	-	8.1	8.1	-
Turbidity, field	NTU	-	-	-	-	255	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	-	-	-	ND(0.010)	ND(0.010)	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-
Fluorene	µg/L	0.2	-	-	-	ND(0.020)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Naphthalene	µg/L	7	-	-	-	ND(0.020)	ND(0.020)	-
Phenanthrene	µg/L	0.03	-	-	-	0.021	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003048

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-052313-TS-005	SW-4	SW-4	SW-4	SW-4
Sample Date:			5/1/2013	5/23/2013	6/1/2013	7/1/2013	8/1/2013	9/1/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	0.0010	0.0012	0.0015	0.0002	0.0003
Boron	mg/L	0.2	0.038	ND(0.050)	0.023	0.026	0.025	0.007
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	ND(0.002)	ND(0.0010)	ND(0.002)	0.002	ND(0.002)	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.00050)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.002	0.0014	0.002	0.002	ND(0.002)	ND(0.002)
Iron	mg/L	0.3	-	0.152	-	-	-	-
Lead	mg/L	0.005	ND(0.02)	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.203	-	-	-	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0174	-	-	-	-
Nickel	mg/L	0.025	ND(0.01)	0.0025	ND(0.01)	ND(0.01)	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	0.013	ND(0.0030)	ND(0.005)	0.006	ND(0.005)	0.005
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	106	-	-	-	-
Ammonia-N	mg/L	-	0.47	0.797	ND(0.01)	0.02	ND(0.01)	ND(0.01)
Biochemical oxygen demand (BOD)	mg/L	-	ND(3)	-	ND(3)	ND(3)	5	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	2.8	-	-	-	-
Chemical oxygen demand (COD)	mg/L	-	26	27	27	29	33	25
Chloride	mg/L	-	-	90.5	-	-	-	-
Color (apparent)	TCU	-	-	28.2 J	-	-	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	7.2	9.9	8.5	9.2	10.1	8.9
Escherichia coli	cfu/100mL	100	76	ND(10)	3	50	2	18
Fecal coliform bacteria	cfu/100mL	4800	-	40	-	-	-	-
Mineral oil and grease	mg/L	-	ND(1.0)	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.82	0.2	0.11	0.4	0.1	ND(0.1)	0.1
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.10)	0.2	ND(0.1)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	-	3.5	1.5	ND(1.0)	2
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	-	3.5	1.5	ND(1.0)	2
pH, lab	s.u.	6.5-8.5	8.35	8.18	8.09	8.15	8.2	8.55
Phenol	mg/L	0.005	ND(0.001)	0.0039	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	-	0.0625	-	-	-	-
Sulfate	mg/L	-	-	340	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	1000	-	-	-	-
Total dissolved solids (TDS)	mg/L	-	-	718	-	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.06	1.85	1.14	1.92	1.28	0.87
Total phosphorus	mg/L	-	0.08	-	0.05	0.19	0.1	0.04
Total suspended solids (TSS)	mg/L	-	14	4.4	5	48	8	ND(3)
Turbidity	NTU	-	-	2.71	-	-	-	-
Unionized ammonia	mg/L	0.02	-	0.000322	-	-	-	-

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-052313-TS-005	SW-4	SW-4	SW-4	SW-4
Sample Date:			5/1/2013	5/23/2013	6/1/2013	7/1/2013	8/1/2013	9/1/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1080	1160	980	851	775	699
Dissolved oxygen (DO), field	mg/L	-	13.1	8.09	8.9	-	11.1	13.3
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	-	9.93	-	-	-	-
Temperature, field	Deg C	-	-	20.8	-	-	-	-
Turbidity, field	NTU	-	-	115	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	-	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	-	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	-	ND(0.020)	-	-	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003050

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001	SW-45804-052814-MB-002	SW-45804-112814-TS-004
Sample Date:			11/1/2013	11/13/2013	11/13/2013	5/28/2014	5/28/2014	11/26/2014
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0001)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.027	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	ND(0.002)	0.0016 J	0.0028 J	0.0011	0.0012	ND(0.0010)
Iron	mg/L	0.3	-	0.260	0.557	0.226	0.239	0.180
Lead	mg/L	0.005	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.150	0.165	0.0571	0.0546	0.170
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0078	0.0075	0.0124	0.0120	0.0055
Nickel	mg/L	0.025	ND(0.01)	0.0022 J	0.0043 J	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc	mg/L	0.03	0.009	0.0072 J	0.0133 J	ND(0.0030)	ND(0.0030)	0.0046
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	160	170	145	143	176
Ammonia-N	mg/L	-	0.99	0.659	0.696	0.190	0.193	1.68
Biochemical oxygen demand (BOD)	mg/L	-	8	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	3.3	3.9	ND(2.0)	ND(2.0)	4.7
Chemical oxygen demand (COD)	mg/L	-	11	70	72	39	30	43
Chloride	mg/L	-	-	51.4	50.5	64.2	64.5	47.2
Color (apparent)	TCU	-	-	43.5	46.6	32.0	32.4	35.0
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.3	10.6	10.5	9.1	8.8	10.9
Escherichia coli	cfu/100mL	100	96	30	20	1 J	4 J	100
Fecal coliform bacteria	cfu/100mL	4800	-	50	50	3 J	7 J	110
Mineral oil and grease	mg/L	-	ND(1.0)	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	0.2	ND(0.10)	0.14	ND(0.10)	ND(0.10)	0.10
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.03	8.16	8.23	8.20	8.19	7.94
Phenol	mg/L	0.005	ND(0.001)	ND(0.0010)	0.0018	0.0014 J	0.0034 J	ND(0.0010)
Phosphorus	mg/L	0.01	-	0.0546	0.0795	0.0556 J	0.133 J	0.153
Sulfate	mg/L	-	-	163	161	240	241	115
Total coliform bacteria	cfu/100mL	-	-	4000	5000	300 J	500 J	800
Total dissolved solids (TDS)	mg/L	-	-	488	486	636	632	406
Total kjeldahl nitrogen (TKN)	mg/L	-	2.69	2.26	1.71	1.25	1.01	2.94
Total phosphorus	mg/L	-	0.1	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	10	8.8 J	14.0 J	4.4	4.0	9.2
Turbidity	NTU	-	-	6.76	10.0	3.15	2.76	9.18
Unionized ammonia	mg/L	0.02	-	0.000227	0.000240	0.0194	0.0198	0.0468

003051

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001	SW-45804-052814-MB-002	SW-45804-112814-TS-004
Sample Date:			11/1/2013	11/13/2013	11/13/2013	5/28/2014	5/28/2014	11/28/2014
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	765	824	-	1120	-	319
Dissolved oxygen (DO), field	mg/L	-	12.6	14.72	-	1.53	-	16.58
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	5	-	16.5
pH, field	s.u.	6.5-8.5	-	8.38	8.38	8.34	-	8.34
Temperature, field	Deg C	-	-	4.9	4.9	20.6	-	3.16
Turbidity, field	NTU	-	-	7.6	-	7	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	ND(4.0)	ND(4.0)	-
Anthracene	µg/L	0.0008	-	ND(0.020)	ND(0.030)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	-	0.0088 J	0.0118 J	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	ND(0.040)	ND(0.050)	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	ND(0.060)	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	ND(0.020)	-
Fluorene	µg/L	0.2	-	-	-	ND(0.020)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-
Naphthalene	µg/L	7	-	-	-	ND(0.050)	ND(0.050)	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

003052

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002	SW-45804-110915-TS-003	SW-45804-051616-TS-001
Sample Date:			11/26/2014	5/27/2015	5/27/2015	11/9/2015	11/9/2015	5/16/2016
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063	0.00064	0.00057
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	0.023	0.022	0.031
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium	mg/L	-	ND(0.0010)	0.0013	ND(0.0010)	0.00189 J	0.00130 J	0.00067
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00040	0.00031	0.00015
Copper	mg/L	0.005	ND(0.0010)	0.0013	0.0012	0.0013	0.0012	ND(0.0010)
Iron	mg/L	0.3	0.173	0.284	0.248	0.549	0.361	0.059
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00037	0.00029	ND(0.00010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.166	0.0449	0.0503	0.140	0.139	0.0083
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0053	0.0128	0.0130	0.00576	0.00562	0.00785
Nickel	mg/L	0.025	ND(0.0020)	0.0021	ND(0.0020)	0.0018	0.0016	0.0017
Zinc	mg/L	0.03	0.0042	0.0066 J	0.0030 J	0.0075	0.0086	ND(0.0030)
General Chemistry								
Alkalinity, total (as $CaCO_3$)	mg/L	-	162	115	113	163	162	194
Ammonia-N	mg/L	-	1.93	0.084	0.128	ND(0.050)	0.051	0.026
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	4.1	2.4	2.0	16.2	16.9	2.9
Chemical oxygen demand (COD)	mg/L	-	41	36	29	130	114	61
Chloride	mg/L	-	46.9	87.5	87.5	50.7	51.0	96.6
Color (apparent)	TCU	-	38.5	35.5	35.0	80.9	103	39.0
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.2	12.7	12.0	15.9	16.4	12.6
Escherichia coli	cfu/100mL	100	90	190	220	60	80	9
Fecal coliform bacteria	cfu/100mL	4800	100	190	240	100	100	40
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.82	ND(0.10)	ND(0.020)	ND(0.020)	0.028	0.022	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.95	8.62	8.60	8.43	8.37	8.24
Phenol	mg/L	0.005	ND(0.0010)	0.00145 J	0.00365 J	0.00129 J	0.0013 J	0.00033
Phosphorus	mg/L	0.01	0.171	0.0593	0.0777	0.347	0.422	0.0827
Sulfate	mg/L	-	114	96.4	96.1	82.9	83.5	280
Total coliform bacteria	cfu/100mL	-	900	1000	2000	26000	31000	700
Total dissolved solids (TDS)	mg/L	-	404	384	405	390	386	760
Total kjeldahl nitrogen (TKN)	mg/L	-	2.29	1.35	1.30	1.05 J	4.27 J	1.40
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.8	7.5	5.8	35.0	41.0	6.5
Turbidity	NTU	-	8.17	3.34	4.16	17.8	17.1	4.55
Un-ionized ammonia	mg/L	0.02	0.0037	0.0029	0.0048	ND(0.038)	0.039	0.0075

003053

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002	SW-45804-110915-TS-003	SW-45804-051616-TS-001
Sample Date:			11/26/2014	5/27/2015	5/27/2015	11/9/2015	11/9/2015	5/16/2016
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	0.453	0.453	0.462	0.462	0.772
Dissolved oxygen (DO), field	mg/L	-	-	8.12	8.12	8.76	8.76	8.87
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	49	49	159
pH, field	s.u.	6.5-8.5	8.34	8.99	8.88	9.87	9.07	9.11
Temperature, field	Deg C	-	3.2	23.84	23.84	9.6	9.6	13.38
Turbidity, field	NTU	-	-	0	0	2.2	2.2	2.9
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	110	130	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	520	370	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	250	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	880	500	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	110	130	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	520	370	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	250	ND(250)	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW-4	SW-4	SW-4	SW-4
Sample ID:			SW-45804-111416-TS-001	SW-45804-111416-TS-002	SW-45804-053017-TS-001	SW-45804-053017-TS-002	SW-45804-112917-TS-001	SW-45804-112917-TS-002
Sample Date:			11/14/2016	11/14/2016	5/30/2017	5/30/2017	11/29/2017	11/29/2017
			Original	Duplicate	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.00070	0.00075	–	–	–	–
Boron	mg/L	0.2	0.030	0.031	–	–	–	–
Cadmium	mg/L	0.0002	ND(0.000010)	ND(0.000010)	–	–	–	–
Chromium	mg/L	–	0.00150	0.00158	–	–	–	–
Cobalt	mg/L	0.0009	0.00053	0.00056	–	–	–	–
Copper	mg/L	0.005	0.0015	0.0015	–	–	–	–
Iron	mg/L	0.3	0.649	0.710	0.261	0.261	0.140	0.134
Lead	mg/L	0.005	0.00036	0.00036	–	–	–	–
Magnesium	mg/L	–	–	–	–	–	–	–
Manganese	mg/L	–	0.291	0.322	0.710	0.719	0.152	0.197
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)	–	–	–	–
Mercury (dissolved)	mg/L	–	–	–	–	–	–	–
Molybdenum	mg/L	0.04	0.00388	0.00409	–	–	–	–
Nickel	mg/L	0.025	0.00212	0.00216	–	–	–	–
Zinc	mg/L	0.03	0.0036	0.0036	–	–	–	–
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	–	176	174	191	192	161	162
Ammonia-N	mg/L	–	1.26	1.25	0.757	0.75	2.24	2.41
Biochemical oxygen demand (BOD)	mg/L	–	–	–	–	–	–	–
Biochemical oxygen demand (carbonaceous)	mg/L	–	10.6	10.1	–	–	–	–
Chemical oxygen demand (COD)	mg/L	–	67	71	–	–	–	–
Chloride	mg/L	–	57.3	57.6	–	–	–	–
Color (apparent)	TCU	–	98.4	91.9	–	–	–	–
Conductivity	umhos/cm	–	–	–	–	–	–	–
Dissolved organic carbon (DOC)	mg/L	–	12.6	14.1	11.4	11.9	12.6	12.2
Escherichia coli	cfu/100mL	100	20	30	12 J	8 J	1	0
Fecal coliform bacteria	cfu/100mL	4800	60	90	–	–	–	–
Mineral oil and grease	mg/L	–	–	–	–	–	–	–
Nitrate (as N)	mg/L	1.82	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.362 J	0.648 J
Nitrite (as N)	mg/L	0.3	0.023	0.023	–	–	–	–
Oil and grease (HEM), total	mg/L	–	–	–	–	–	–	–
Oil and grease, animal and vegetable	mg/L	–	–	–	–	–	–	–
pH, lab	s.u.	6.5-8.5	8.12	8.08	–	–	–	–
Phenol	mg/L	0.005	0.0054	0.0067	–	–	–	–
Phosphorus	mg/L	0.01	0.215	0.334	0.283	0.301	0.439	0.312
Sulfate	mg/L	–	148	149	–	–	–	–
Total coliform bacteria	cfu/100mL	–	2000	1000	–	–	–	–
Total dissolved solids (TDS)	mg/L	–	507	424	–	–	–	–
Total kjeldahl nitrogen (TKN)	mg/L	–	4.52	3.76	–	–	–	–
Total phosphorus	mg/L	–	–	–	–	–	–	–
Total suspended solids (TSS)	mg/L	–	24.6	33.3	–	–	–	–
Turbidity	NTU	–	19.4	20.9	–	–	–	–
Un-ionized ammonia	mg/L	0.02	0.00659	0.00650	0.0093	0.0092	0.0165	0.0178

003055

Table E.4.4

Surface Water Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW-4	SW-4	SW-4	SW-4
Sample ID:			SW-45804-111416-TS-001	SW-45804-111416-TS-002	SW-45804-053017-TS-001	SW-45804-053017-TS-002	SW-45804-112917-TS-001	SW-45804-112917-TS-002
Sample Date:			11/14/2016	11/14/2016	5/30/2017	5/30/2017	11/29/2017	11/29/2017
			Original	Duplicate	Original	Duplicate	Original	Duplicate
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	0.643	–	0.773	–	0.395	–
Dissolved oxygen (DO), field	mg/L	-	6.24	–	1.02	–	6.79	–
Oxidation reduction potential (ORP), field	millivolts	-	224	–	-	–	175	–
pH, field	s.u.	6.5-8.5	7.43	–	7.5	–	7.81	–
Temperature, field	Deg C	-	8.1	-	19.67	-	4.07	-
Turbidity, field	NTU	-	33.1	–	0	–	4.7	–
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	–	–	–	–
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	–	–	–	–
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	–	–	-	–	–	–
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	–	–	-	–	–	–
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	–	–	–	–
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		–	–	-	–	–	–
Total Petroleum Hydrocarbons (C34-C50)	µg/L		–	–	-	–	–	–
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	–	–	-	–	–	–
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	–	–	-	–	–	–
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	–	–	-	–	–	–
Acenaphthylene	µg/L	-	–	–	-	–	–	–
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	-	–	–	–
Benzo(a)anthracene	µg/L	0.0004	–	–	-	–	–	–
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	–	–	-	–	–	–
Benzo(g,h,i)perylene	µg/L	0.00002	–	–	-	–	–	–
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	–	–	-	–	–	–
Chrysene	µg/L	0.0001	–	–	-	–	–	–
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	–	–	-	–	–	–
Fluorene	µg/L	0.2	–	–	-	–	–	–
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	–	–	-	–	–	–
Phenanthrene	µg/L	0.03	–	–	-	–	–	–
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
-- Not analyzed.
[ ] - Exceedence of the PWQO

003096

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental and construction services to private and public sector clients.

Ben Kempel
Ben.kempel@ghd.com
519.340.4119

Ron Cherkewski
Ron.Cherkewski@ghd.com
519.340.3687

www.ghd.com

about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental and construction services to private and public sector clients.

Ben Kempel
Ben.kempel@ghd.com
519.340.4119

Ron Cherkewski
Ron.Cherkewski@ghd.com
519.340.3687

www.ghd.com

Client Sample ID				W-45804-032819-TS-002	W-45804-041219-BK-01	W-45804-041219-BK-02	W-45804-041219-BK-03	W-45804-032819-TS-003	GW-45804-042519-04
Date Sampled				28-Mar-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019	28-Mar-2019	25-Apr-2019
Parameter	**Lowest Detection Limit**	**Units**	**PWQO**	**Raw Water**	**AmmEL**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**	**Raw Water**	**AmmEL**
Physical Tests (Water)				**MW105-13 & MW101-13**					**MW**
Conductivity	3.0	umhos/cm		2170	2100	542	315	2020	1980
Hardness (as CaCO3)	0.50	mg/L		--	--	--	--	--	935
pH	0.10	pH units	6.5-8.5	7.34	7.77	7.14	6.93	7.29	8.08
Total Dissolved Solids	20	mg/L		1460	1420	340	193	1350	1420
Anions and Nutrients (Water)									
Alkalinity, Total (as CaCO3)	10	mg/L	**	583	563	109	68	538	525
Ammonia, Total (as N)	0.010	mg/L	0.02*	**14.1**	**0.046**	**0.016**	**<0.010**	**16.4**	**0.213**
Chloride (Cl)	0.50	mg/L		148	146	18.2	14.5	115	111
Fluoride (F)	0.020	mg/L		0.18	0.2	0.047	0.031	0.23	0.15
Nitrate (as N)	0.020	mg/L	10	<0.10	<0.10	<0.020	<0.020	<0.10	<0.10
Nitrite (as N)	0.010	mg/L	1	<0.050	<0.050	<0.010	<0.010	<0.050	0.156
Total Kjeldahl Nitrogen	0.15	mg/L		15.3	0.7	0.47	0.42	18.7	0.66
Phosphorus, Total	0.0030	mg/L	0.01-0.03	0.115	0.0899	0.0347	0.0219	0.146	0.0049
Sulfate (SO4)	0.30	mg/L		491	472	134	63.5	578	510
Organic / Inorganic Carbon (Water)									
Dissolved Carbon Filtration Location		-		FIELD	LAB	LAB	LAB	FIELD	LAB
Dissolved Organic Carbon	0.50	mg/L		12.80	7.35	5.86	4.60	7.5	6.27
Total Organic Carbon	0.50	mg/L		9.70	8.27	6.25	4.86	6.7	6.78
Dissolved Metals (Water)									
Dissolved Metals Filtration Location		-		FIELD	LAB	LAB	LAB	FIELD	LAB
Aluminum (Al)-Dissolved	0.0050	mg/L	0.075	<0.50	<0.0050	<0.0050	0.0059	<0.50	<0.0050
Arsenic (As)-Dissolved	0.00010	mg/L	0.1	<0.010	0.00155	0.00132	0.00111	<0.010	0.00034
Barium (Ba)-Dissolved	0.00010	mg/L		0.07600	0.00386	0.00097	0.00071	0.131	0.00744
Boron (B)-Dissolved	0.010	mg/L	0.2	<1.0	0.058	0.052	0.047	<1.0	0.062
Cadmium (Cd)-Dissolved	0.000010	mg/L	0.0002	<0.00050	0.000011	0.000011	0.000010	<0.00050	0.000021
Calcium (Ca)-Dissolved	0.050	mg/L		247	229	33.7	20.5	241	242
Chromium (Cr)-Dissolved	0.00050	mg/L	0.0089	<0.050	<0.00050	<0.00050	<0.00050	<0.050	<0.00050
Cobalt (Co)-Dissolved	0.00010	mg/L	0.0009	<0.010	0.00064	0.00027	0.00020	<0.010	0.00024
Copper (Cu)-Dissolved	0.00020	mg/L	0.005	<0.020	0.00022	0.00104	0.00119	<0.020	0.0019
Iron (Fe)-Dissolved	0.010	mg/L	0.3	<1.0	0.050	0.035	0.029	5.9	<0.010
Lead (Pb)-Dissolved	0.000050	mg/L	0.025	<0.0050	<0.000050	0.000053	0.000065	<0.0050	0.000188
Magnesium (Mg)-Dissolved	0.050	mg/L		81.2	78.1	12.7	7.61	80.3	80.2
Manganese (Mn)-Dissolved	0.00050	mg/L		0.512	0.517	0.0845	0.0537	2.09	1.96
Molybdenum (Mo)-Dissolved	0.000050	mg/L	0.04	<0.0050	0.0192	0.00374	0.00172	0.0064	0.00746
Nickel (Ni)-Dissolved	0.00050	mg/L	0.025	<0.050	0.00288	0.00260	0.00219	<0.050	0.00202

Client Sample ID			GW-45804-042519-05	GW-45804-042519-06	W-45804-032819-TS-001	GW-45804-042519-07	GW-45804-042519-08	GW-45804-042519-09
Date Sampled			25-Apr-2019	25-Apr-2019	28-Mar-2019	25-Apr-2019	25-Apr-2019	25-Apr-2019
Parameter	**Lowest Detection Limit**	**Units**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**	**Raw Water**	**AmmEL**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**
Physical Tests (Water)			**5-09**			**EW107-15**		
Conductivity	3.0	umhos/cm	564	92.8	2930	2750	1200	417
Hardness (as CaCO3)	0.50	mg/L	136	17.7		1060	315	63
pH	0.10	pH units	7.46	6.36	7.23	8.04	7.96	7.51
Total Dissolved Solids	20	mg/L	373	75	1780	1950	828	306
Anions and Nutrients (Water)								
Alkalinity, Total (as CaCO3)	10	mg/L	85	<10	970	1130	417	113
Ammonia, Total (as N)	0.010	mg/L	**0.059**	**0.012**	**68.7**	**0.066**	**0.03**	**<0.010**
Chloride (Cl)	0.50	mg/L	9.25	2.14	195	216	32	4.93
Fluoride (F)	0.020	mg/L	0.034	<0.020	<0.20	<0.10	<0.10	<0.020
Nitrate (as N)	0.020	mg/L	<0.020	<0.020	<0.20	<0.10	<0.10	<0.020
Nitrite (as N)	0.010	mg/L	0.012	<0.010	<0.10	<0.050	<0.050	<0.010
Total Kjeldahl Nitrogen	0.15	mg/L	0.3	<0.15	66.1	4.4	2.88	2.5
Phosphorus, Total	0.0030	mg/L	0.0156	0.011	2.27	1.8	1.18	0.735
Sulfate (SO4)	0.30	mg/L	179	28.2	175	272	177	86.4
Organic / Inorganic Carbon (Water)								
Dissolved Carbon Filtration Location		-	LAB	LAB	FIELD	LAB	LAB	LAB
Dissolved Organic Carbon	0.50	mg/L	4.99	3.67	212	154.00	65.80	36.10
Total Organic Carbon	0.50	mg/L	5.31	3.78	202	161.00	69.50	35.00
Dissolved Metals (Water)								
Dissolved Metals Filtration Location		-	LAB	LAB	FIELD	LAB	LAB	LAB
Aluminum (Al)-Dissolved	0.0050	mg/L	0.0075	0.0093	<0.50	<0.050	0.0267	0.0257
Arsenic (As)-Dissolved	0.00010	mg/L	0.00023	0.00016	<0.010	0.00300	0.00246	0.00191
Barium (Ba)-Dissolved	0.00010	mg/L	0.00154	0.00038	0.166	0.01230	0.00395	0.0017
Boron (B)-Dissolved	0.010	mg/L	0.054	0.048	<1.0	<0.10	0.078	0.073
Cadmium (Cd)-Dissolved	0.000010	mg/L	<0.000010	<0.000010	<0.00050	<0.000050	<0.000010	<0.000010
Calcium (Ca)-Dissolved	0.050	mg/L	33	4	300	275.0	79.0	17.3
Chromium (Cr)-Dissolved	0.00050	mg/L	<0.00050	<0.00050	<0.050	<0.0050	0.00306	0.00236
Cobalt (Co)-Dissolved	0.00010	mg/L	0.00014	<0.00010	<0.010	<0.0010	0.00048	0.00035
Copper (Cu)-Dissolved	0.00020	mg/L	0.00451	0.00442	<0.020	<0.0020	0.00126	0.00148
Iron (Fe)-Dissolved	0.010	mg/L	0.013	0.017	<1.0	<0.10	0.100	0.079
Lead (Pb)-Dissolved	0.000050	mg/L	0.000182	0.000444	<0.0050	<0.00050	0.000478	0.00046
Magnesium (Mg)-Dissolved	0.050	mg/L	13.2	1.7	91.7	90.6	28.60	4.82
Manganese (Mn)-Dissolved	0.00050	mg/L	0.313	0.040	0.561	0.8200	0.2910	0.0768
Molybdenum (Mo)-Dissolved	0.000050	mg/L	0.00166	0.0004	<0.0050	0.02190	0.00890	0.00461
Nickel (Ni)-Dissolved	0.00050	mg/L	0.00188	0.00120	<0.050	<0.0050	0.00290	0.00257

Client Sample ID				W-45804-032819-TS-002	W-45804-041219-BK-01	W-45804-041219-BK-02	W-45804-041219-BK-03	W-45804-032819-TS-003	GW-45804-042519-04
Date Sampled				28-Mar-2019	12-Apr-2019	12-Apr-2019	12-Apr-2019	28-Mar-2019	25-Apr-2019
Parameter	**Lowest Detection Limit**	**Units**	**PWQO**	**Raw Water**	**AmmEL**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**	**Raw Water**	**AmmEL**
Potassium (K)-Dissolved	0.050	mg/L		30.90	6.23	1.30	0.693	22.8	8.1
Selenium (Se)-Dissolved	0.000050	mg/L	0.1	<0.0050	0.000070	<0.000050	<0.000050	<0.0050	0.000051
Sodium (Na)-Dissolved	0.50	mg/L		80.3	153	57.6	29.7	63.6	133
Zinc (Zn)-Dissolved	0.0010	mg/L	0.02	<0.10	0.0027	0.0059	0.0054	<0.10	0.0096
Aggregate Organics (Water)									
Phenols (4AAP)	0.0010	mg/L	0.001	0.0021	<0.0010	<0.0010	<0.0010	0.0013	0.0044

Notes:
* - PWQO is for Unionized Ammonia fraction. Lab results are for Total Ammonia.
** - alkalinity should not be decreased by more than 25% of the natural concentration
 - Reported concentration exceeds PWQO

Client Sample ID			GW-45804-042519-05	GW-45804-042519-06	W-45804-032819-TS-001	GW-45804-042519-07	GW-45804-042519-08	GW-45804-042519-09
Date Sampled			25-Apr-2019	25-Apr-2019	28-Mar-2019	25-Apr-2019	25-Apr-2019	25-Apr-2019
Parameter	**Lowest Detection Limit**	**Units**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**	**Raw Water**	**AmmEL**	**AmmEL + ESD x 1**	**AmmEL + ESD x 2**
Potassium (K)-Dissolved	0.050	mg/L	2.30	0.25	75.3	17.20	7.960	2.19
Selenium (Se)-Dissolved	0.000050	mg/L	<0.000050	<0.000050	<0.20	0.00944	0.000166	0.00013
Sodium (Na)-Dissolved	0.50	mg/L	65.3	9	109	291.0	172.0	66.9
Zinc (Zn)-Dissolved	0.0010	mg/L	0.0080	0.0046	<0.10	<0.010	0.0049	0.0059
Aggregate Organics (Water)								
Phenols (4AAP)	0.0010	mg/L	<0.0010	<0.0010	0.168	0.181	0.0718	0.0459

Notes:
* - PWQO is for Unionized Ammonia fraction. Lab results are for Total Ammonia.
** - alkalinity should not be decreased by more than 25% of the natural concentra
- Reported concentration exceeds PW

INDUSTRIAL SEWAGE WORKS ECA #2844-9YNGZC
2019 ANNUAL REPORT

ORGANICS COMPOSTING FACILITY
5123 HAWTHORNE ROAD
OTTAWA, ONTARIO



Prepared By:

David Veinot
Convertus Canada Ltd.

March 26, 2020

Introduction

The facility commenced operation on January 28th 2010. This annual report was prepared to comply with Condition 10(2) of the Facility's Amended Certificate of Approval Industrial Sewage Works Number 2844-9YNGZC issued February 1, 2017.

This report will cover the following points:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works*;
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time;

1.0 Background

The facility is located on a 10.14 hectare parcel of leased land at 5123 Hawthorne Road in an area zoned heavy industrial.

A total of 80,847 tonnes of material was received from the City of Ottawa's curbside residential program and a further 2,043 tonnes was from the IC&I sector, for a total incoming receipt of 82,890 tonnes in 2019. This is a 5% increase from the 78,762 tonnes processed by the facility in 2018. The facility is permitted by the MECP to process up to 150,000 tonnes per year.

The incoming organic material underwent conversion into two main end-use products in 2019. Convertus Ottawa shipped 5,876 tonnes of processed organic material under approved NASM (Non-Agricultural Source Material) plans issued by OMAFRA (Ontario Ministry of Agriculture, Food and Rural Affairs). A further 15,343 tonnes was shipped as animal bedding in 2019 to dairy (non-milking) and beef cattle farms for use in their box stalls.

In 2018, Convertus entered into a new disposal contract with Englobe Corporation of Quebec to use Mid-Fraction organic materials (SSO that has undergone the shredding and composting operation and has been screened at least once to remove contaminants) for use in several of their contaminated soil remediation and organic composting operations in Quebec. In 2019 Englobe processed 6,616 tonnes of Mids from Convertus Ottawa.

In 2019, Convertus entered into a new disposal contract with 6608604 (Uteau) owned by Maurice Charlebois, and headquartered in Cantley, Quebec. This firm will use a portion of the

Mid-Fraction organic materials at their screening line in Portage-du-Fort, QC to separate the organics fraction from the Overs (residual) fraction. The organic fraction will be marketed to farmers in Quebec as a soil supplement. The receiving site is licenced by the Province of Quebec for the receipt and processing of such wastes. In 2019 Uteau processed 2,570 tonnes of Mids, primarily during the peak leaf and yard seasons.

2.0 Operating Problems

Convertus Ottawa did not encounter any problems with the operation of the *Sewage Works* in 2019.

The system worked as designed, and because the facility is not connected to a municipal fresh water supply, the pond provided all of the process make-up water the facility required until July 2019.

Usage of this process make-up water within the facility included:

1) Ensuring the fire suppression water tank is full at all times
2) Providing clean water to moisten the biofilters
3) Providing clean water to supply the bioscrubber and the ammonia scrubbers
4) Spray in the composting tunnels during periods of water deficit in the warmer months

In July 2019, the plumbing system was modified so that the process make-up water was obtained directly from the EW107-15 extraction well instead of the stormwater retention pond. This change was done to allow the extraction well to pump as much impacted groundwater from beneath the facility as possible, improving its efficiency as a contaminant control/remediation device. The plumbing system to the pond was left in place in case of a back-up water source becoming necessary.

There were no operating problems with the Process Water Recirculation System beyond regular maintenance activities.

The earthen berm was inspected several times during 2019. No remediation work was deemed to be required as the berm was found to be in good shape.

3.0 Maintenance Work

The storm water management pond had a total of 6 aerators installed to improve the water quality by agitating and oxygenating the pond water. The aerators also allow the pond to be sampled during the cold winter months when the majority of the pond's surface is iced over. The first aerator was installed on July 10, 2018, and an additional five aerators were installed on November 28, 2018. Except for some unplanned downtime for a few of the aerators as a result of the units freezing in the winter, the aerators worked as intended in 2019.

The Armtec 20-10C cast iron sluice gate valve was examined for leakage by Convertus maintenance personnel following the April 2019 discharge period when the pond water level was low enough to allow safe entry into the concrete chamber containing the valve and PVC piping. The valve was found to be sealing properly.

No other maintenance activities were carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works* in 2019.

4.0 Effluent monitoring results

ECA #2844-9YNGZC requires in Condition 4(1) that Convertus must take grab samples of pond water from the Storm Water Management Pond at a monthly frequency and analyzed for the parameters listed in Table 1.

"Convertus Ottawa 2019 Storm Water Pond Analysis Summary" contains analytical results for the storm water pond sampling carried out in 2019 and is contained in this report as Attachment 1.

Pond water samples were taken in all twelve months in 2019, largely in part to the successful operation of the pond aerators which ensured an area of open water during the winter months allowing a water sample to be obtained.

ECA #2844-9YNGZC requires in Condition 5(5) that prior to any discharge of the SWM Pond to the natural environment, Convertus shall collect grab samples and analyze for the appropriate parameters using the analytical protocols listed in Condition 4(2). Convertus shall compare the monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of storm water prior to allowing any discharge from the SWM Pond.

The SWM Pond was discharged once in 2019 during the month of April. A description of pond water sampling and discharge timing is provided in this report as Attachment 2. As a comparison, the SWM Pond was discharged twice in 2018.

5.0 Summary of Leachate Contaminated Sewage Hauled Off Site

There was no leachate-contaminated sewage in the storm water pond. No pond water was transferred off-site for waste disposal in 2019.

6.0 Calibration and Maintenance of Effluent Monitoring Equipment

There is no effluent monitoring of the storm water pond per se. The pond has a level reading device installed in an adjacent catch basin which does not require calibration after initial set-up. The unit is an Endress+Hauser 4-20mA level transmitter. All other analyses required for the storm water pond is performed at a certified laboratory.

7.0 Groundwater Monitoring Results

The MECP requires that Convertus carries out a groundwater monitoring program in accordance with the requirements described in Condition 9 of our ECA (Sewage) 2844-9YNGZC. All analytical results and water level elevations obtained from the ground water monitoring program are included in an annual *Groundwater and Surface Water Monitoring Report* provided to the MECP each Spring.

Attachment 1

Convertus Ottawa 2019 Storm Water Pond Analysis Summary

	Field Tests	Physical Tests				Anions and Nutrients (mg/L)						Organic Carbons	Bacteriological Tests	
Sampling Date	Field Temp. °C	PH	D.O.	TSS	Conductivity	Unionized Ammonia	Total Ammonia (N)	Nitrite	Nitrate	Total K. Nitrogen	Total Phosphorus	D.O.C.	E. Coli	
29-Jan-19	1	8.15	9.49	3.60	1120.0	0.00284	0.1870	0.0110	1.4900	1.4200	0.0766	8.6	6	
11-Feb-19	1	8.04	12.20	3.50	1210.0	0.00389	0.3290	0.0110	1.4700	1.4700	0.0791	8.5	0	
14-Mar-19	2	8.07	11.30	3.10	1230.0	0.00302	0.2200	<0.050	1.2300	1.1200	0.0887	8.3	15	
03-Apr-19	2	7.84	9.29	3.70	874.0	0.00590	0.7300	<0.050	0.7000	1.6300	0.0535	7.6	1	POND DISCHARGED
22-May-19	11	8.26	8.17	3.80	1010.0	0.00642	0.1500	<0.010	<0.020	1.5700	0.0844	8.8	1	
06-Jun-19	19	8.33	9.00	4.70	1020.0	<0.70	<10	<0.010	<0.020	1.2000	0.0705	10.1	0	
09-Jul-19	18	8.21	8.61	3.20	862.0	0.00830	0.1300	<0.050	<0.10	1.3800	0.1220	12.2	81	
07-Aug-19	25	7.86	7.70	5.90	910.0	0.01770	0.3690	<0.050	<0.10	1.6200	0.2240	11.7	16	
10-Sep-19	19	8.52	7.88	8.70	915.0	0.00280	0.0210	<0.010	<0.020	1.8700	0.3570	13.5	9	
21-Oct-19	9	7.95	8.67	3.90	823.0	0.00303	0.1660	0.0140	0.1690	1.3700	0.0993	11.6	200	
22-Nov-19	1	7.89	10.80	5.10	981.0	0.00333	0.3900	<0.010	0.3530	1.8100	0.0993	10.2	8	
17-Dec-19	1	7.99	9.28	2.40	1060.0	0.01340	1.2700	<0.050	0.3000	2.2700	0.1140	9.8	200	
Table 2 Trigger Parameters:	23°C max	6.5-8.5		15 mg/L		0.05 mg/L			2.93 mg/L		0.4 mg/L		CFU/ 100 ml	

	Total Metals										Aggregate Organics					
Sampling Date	Arsenic	Boron	Cadmium	Chromium	Cobalt	Copper	Lead	Mercury	Nickel	Zinc	B.O.D.	C.B.O.D.5	C.O.D.	Oil and Grease	Phenols	
29-Jan-19	0.00061	0.03500	<0.000010	0.00060	0.00024	0.00100	0.00016	<0.000010	0.00210	0.00920	<3.0	<3.0	27	<5.0	<0.0010	
11-Feb-19	0.00061	0.03600	<0.000010	<0.00050	0.00026	<0.0010	0.00014	<0.000010	0.00213	0.01020	<2.0	<2.0	17	<2.0	<0.0010	
14-Mar-19	0.00065	0.03600	<0.000010	0.00068	0.00031	0.00100	0.00019	<0.000010	0.00236	0.00980	<3.0	<3.0	28	<1.0*	<0.0010	
03-Apr-19	0.00054	0.02600	0.000011	<0.00050	0.00064	0.00120	0.00021	<0.000010	0.00255	0.01420	<2.0	<2.0	32	<2.0	<0.0010	POND DISCHARGED
22-May-19	0.00074	0.03700	<0.000010	<0.00050	0.00028	<0.0010	<0.000050	<0.000010	0.00231	0.00370	2.4	2	-	<2.0	0.0015	
06-Jun-19	0.00079	0.03900	0.00001	<0.00050	0.00031	<0.0010	<0.000050	<0.000010	0.00203	<0.0030	3.5	2.8	39	<2.0	0.0023	
09-Jul-19	0.00100	0.04700	<0.0000050	<0.00050	0.00016	<0.0010	<0.000050	<0.000010	0.00154	<0.0030	<3.0	<3.0	35	<2.0	0.0063	
07-Aug-19	0.00096	0.05400	<0.0000050	0.00055	0.00017	<0.0010	<0.000050	<0.0000050	0.00160	<0.0030	2.3	<2.0	40	<2.0	0.0028	
10-Sep-19	0.00104	0.06000	<0.0000050	0.00152	0.00026	<0.0010	0.00008	<0.0000050	0.00154	<0.0030	2.3	2.3	52	<2.0	<0.0010	
21-Oct-19	0.00061	0.06500	<0.0000050	0.00185	0.00015	<0.0010	0.000066	<0.0000050	0.00176	<0.0030	<2.0	<2.0	36	<2.0	<0.0010	
22-Nov-19	0.00053	0.04700	<0.0000050	0.00173	0.00023	<0.0010	0.000073	<0.0000050	0.00191	<0.0030	3.8	4	32	<2.0	0.0111	
17-Dec-19	0.00067	0.05400	0.00001	0.00060	0.00030	0.00140	0.00009	<0.0000050	0.00204	0.00590	<3.0	<3.0	27	<5.0	0.0042	
Table 2 Trigger Parameters:												15 mg/L				

*Reported as Animal/Veg Oil & Grease in laboratory report.

003069

Attachment 2

Convertus Ottawa Sewage Report 2019 Timeline

Convertus Ottawa SWM Pond Sampling/Discharge Report 2019

Timeline:

January 29, 2019	Storm water pond sampled in accordance with ECA requirements.
February 11, 2019	Storm water pond sampled in accordance with ECA requirements.
March 14, 2019	Storm water pond sampled in accordance with ECA requirements.
April 03, 2019	Storm water pond sampled in accordance with ECA requirements to determine if water is OK to discharge. Laboratory analysis indicated that sample is within prescribed parameters in Table 2 "Trigger Parameters" in ECA 2844-9YNGZC. Sluice gate opened 2" on April 15th, and pond water was allowed to discharge until April 30th when the valve was closed. No sign of blockages or backups. Pond was discharged to allow inspection of the seals in the sluice gate – which were found to be in good condition. Valve condition checked again on May 1st, 2019 and there was no leakage observed.
May 22, 2019	Storm water pond sampled in accordance with ECA requirements. A value for COD was not provided in the laboratory analysis. COD is not a regulated compound for discharge.
June 06, 2019	Storm water pond sampled in accordance with ECA requirements.
July 09, 2019	Storm water pond sampled in accordance with ECA requirements.
August 07, 2019	Storm water pond sampled in accordance with ECA requirements. Permit level for temperature exceeded.
September 10, 2019	Storm water pond sampled in accordance with ECA requirements. Permit level for pH exceeded.
October 21, 2109	Storm water pond sampled in accordance with ECA requirements. Permit value for E.coli exceeded.
November 22, 2019	Storm water pond sampled in accordance with ECA requirements.
December 17, 2019	Storm water pond sampled in accordance with ECA requirements. Permit level for E.coli exceeded.

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Ministry of the Environment
and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action
en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

January 3, 2017

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

MINISTRY OF THE ENVIRONMENT
JAN 11 2017
OTTAWA

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
2015 Groundwater and Surface Water Monitoring Report
Trigger Level Program
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the above noted report signed by Conestoga Rovers & Associates March 31, 2016 describing groundwater impacts related to the Orgaworld Organics Facility in Ottawa. The report also provides the Trigger Level Program (TLP) to protect groundwater from the impact of this new facility.

The consultant provides an assessment of the physical hydrogeology of the site. A shallow aquifer exists at the bedrock overburden interface. Water level monitoring has confirmed the inferred groundwater flow direction in the upper unconfined aquifer is to the east with some level of limited discharge to ditches located along the north site boundary. The Surface Water Unit should review this report as groundwater that does not meet Provincial Water Quality Objectives for ammonia may at times discharge to these ditches.

A deep aquifer exists in sandstone. Based on in-situ hydraulic testing the consultant has deemed there is no hydraulic connection between the deep aquifer and the unconfined shallow aquifer. Inferred groundwater flow in the deep aquifer is to the west. Contaminants of concerns identified are ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater quality mapping of ammonia, DOC, iron and manganese confirm that a plume extends in the shallow aquifer northeastward, originating in and around the northeast corner of the Organic Composting Facility. Some impacts have been detected in the deep aquifer.

A TLP has been proposed recognizing that past site activities and up gradient water quality issues exist and that an alternative method has been developed to assess the net impact of this new facility, bearing in mind that groundwater impairment must not occur. I have reviewed the proposed TLP and find it is acceptable to me.

I find the monitoring program rationalization acceptable to me.

In general, I agree with the conclusion and recommendations made by the consultant. Current remediation efforts must continue to improve groundwater quality at all down gradient monitoring wells relative to facility start up and any additional work as per the TLP. If a Tier III trigger is reached I should be consulted.

Robert W. Holland, P.Geo.
RWH/dv

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

ISO 9001

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

	Field Test Parameters			*Laboratory Test Parameters*							
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3,4]	*PAHs* [5]	*Expanded PAHs* [6]	*PHC (F1 - F4)*	*Bacteriological Components* [7]	*Collection Method*
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4[8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

003084

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3/4]	*Bacteriological Components* [5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

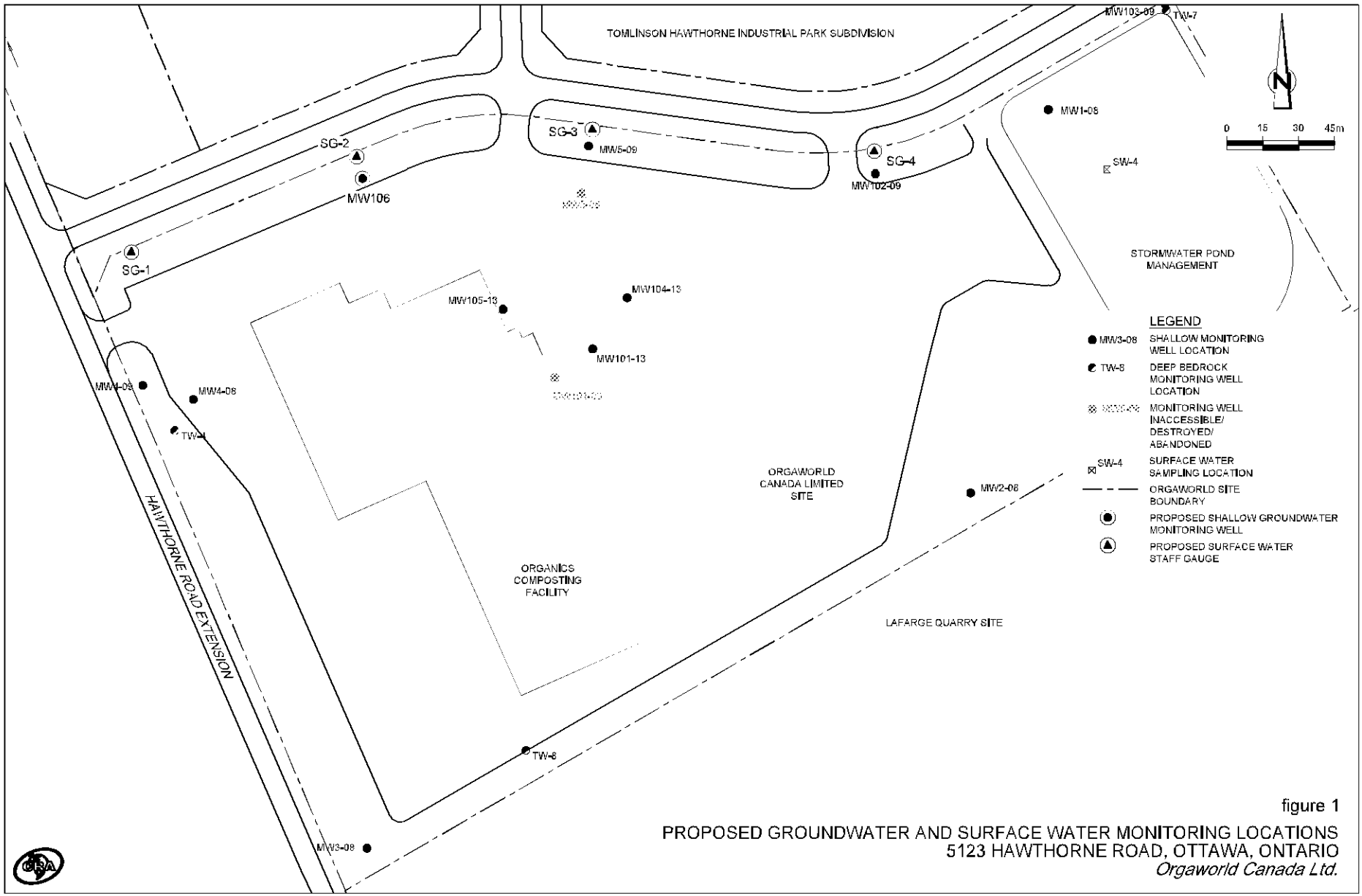


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

003091

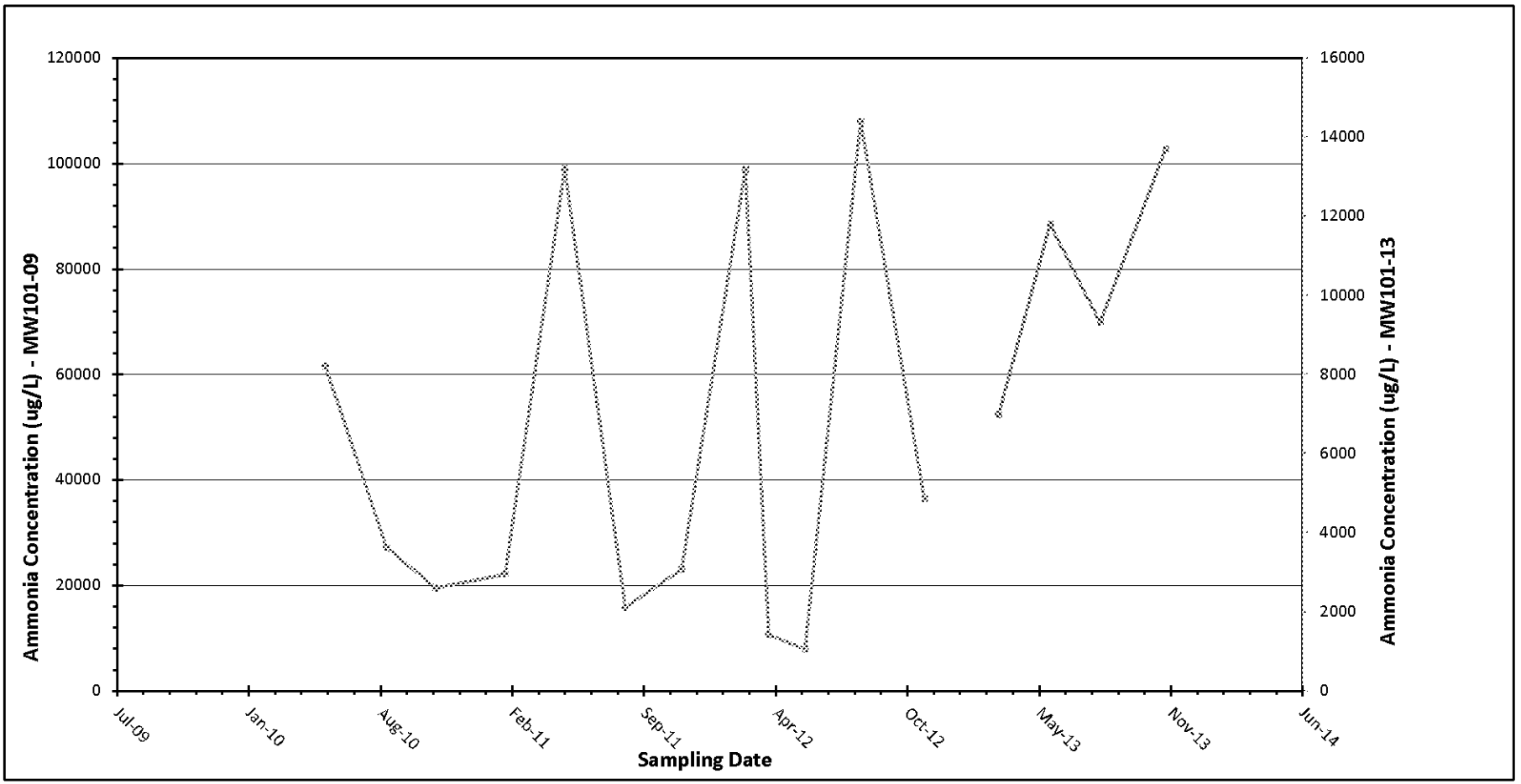


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

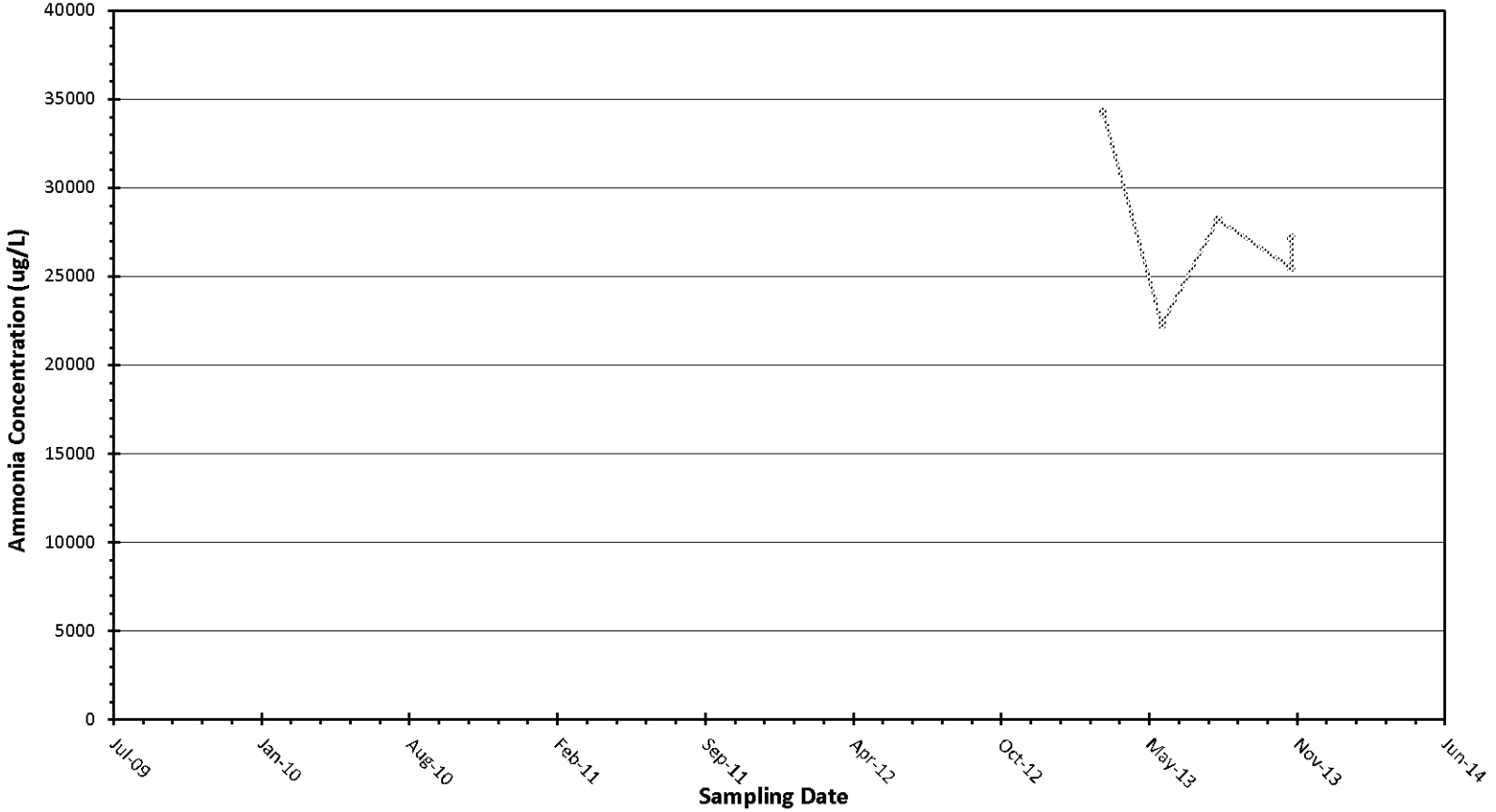


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

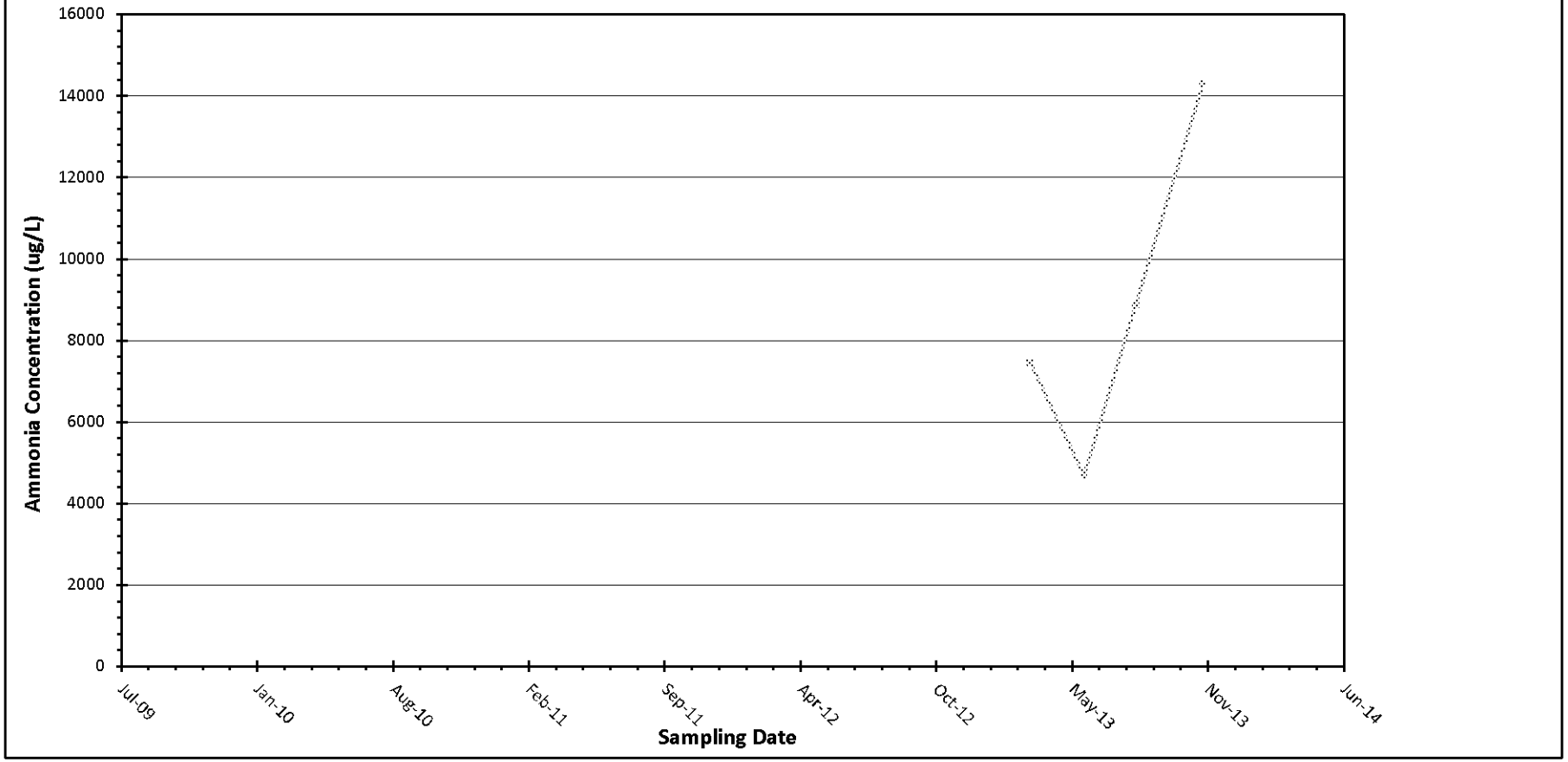


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

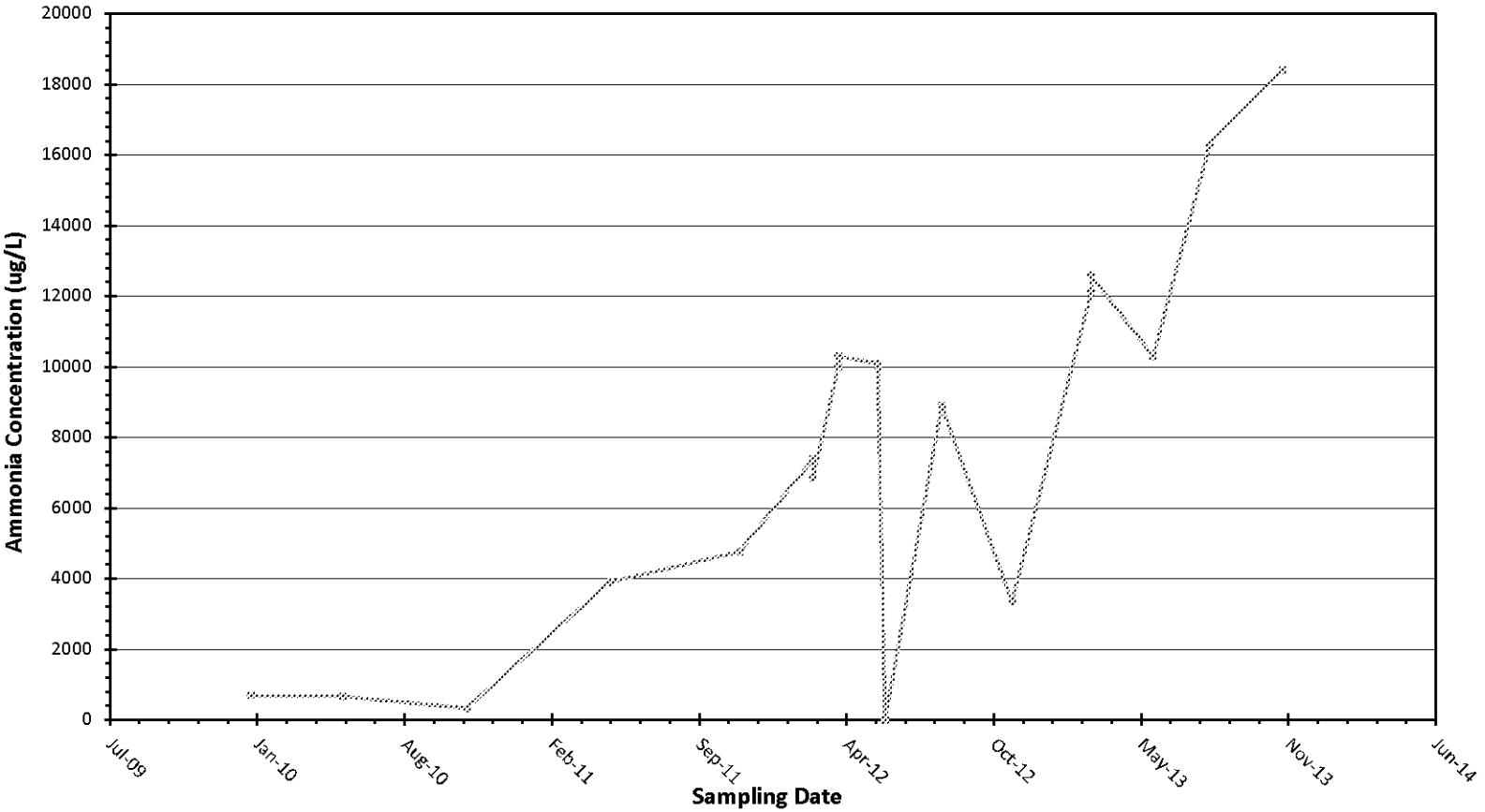


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

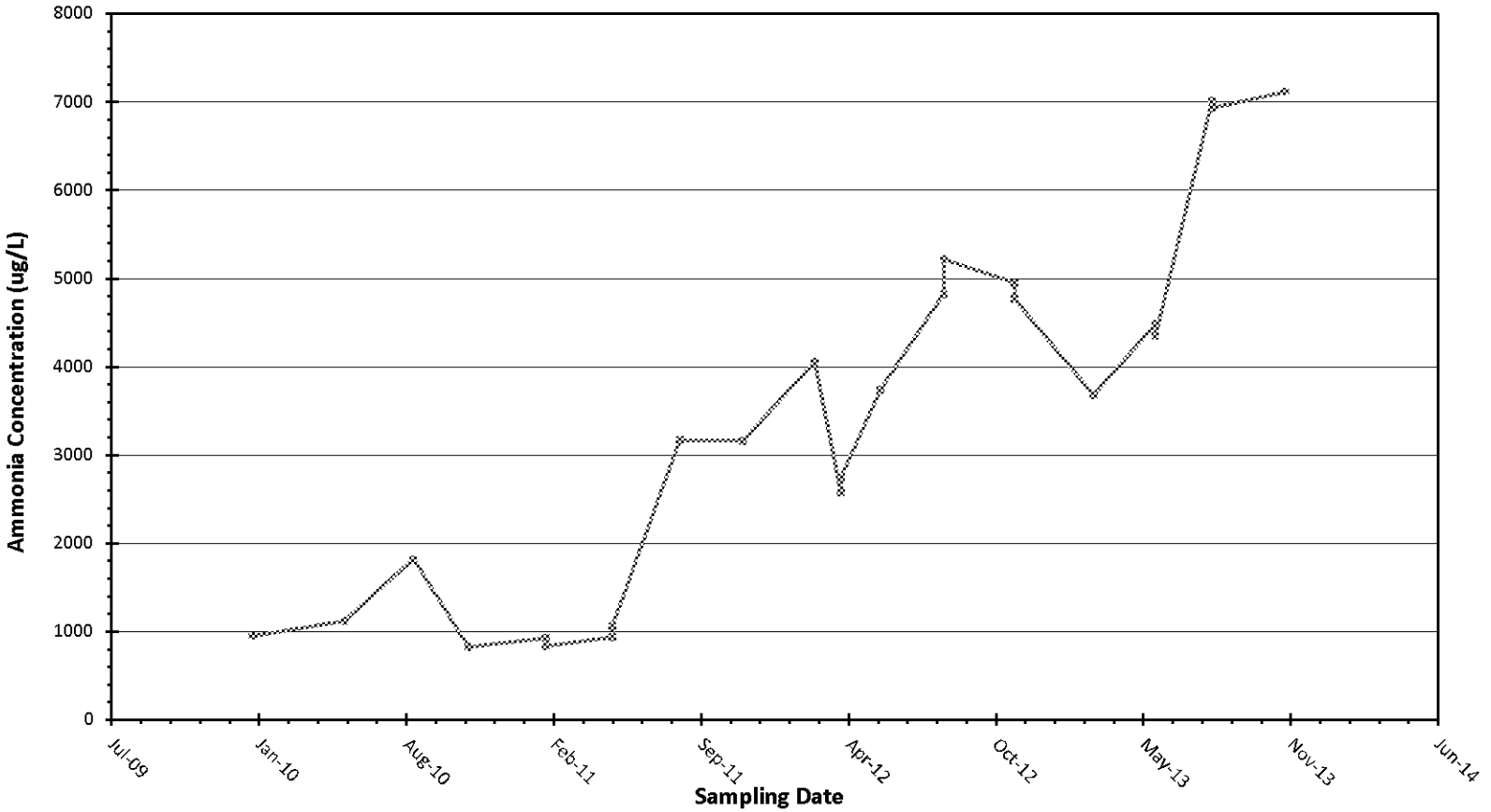


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

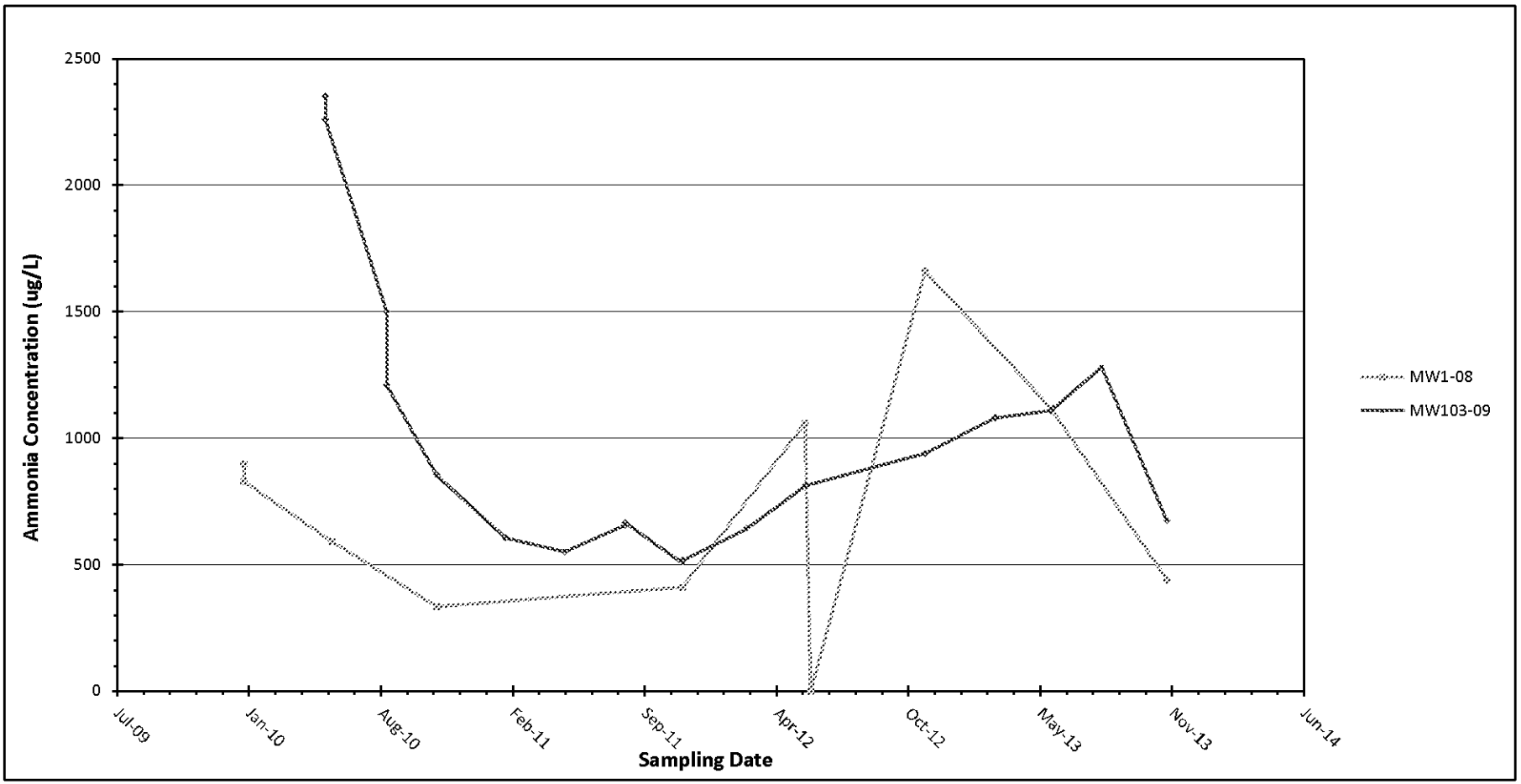


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

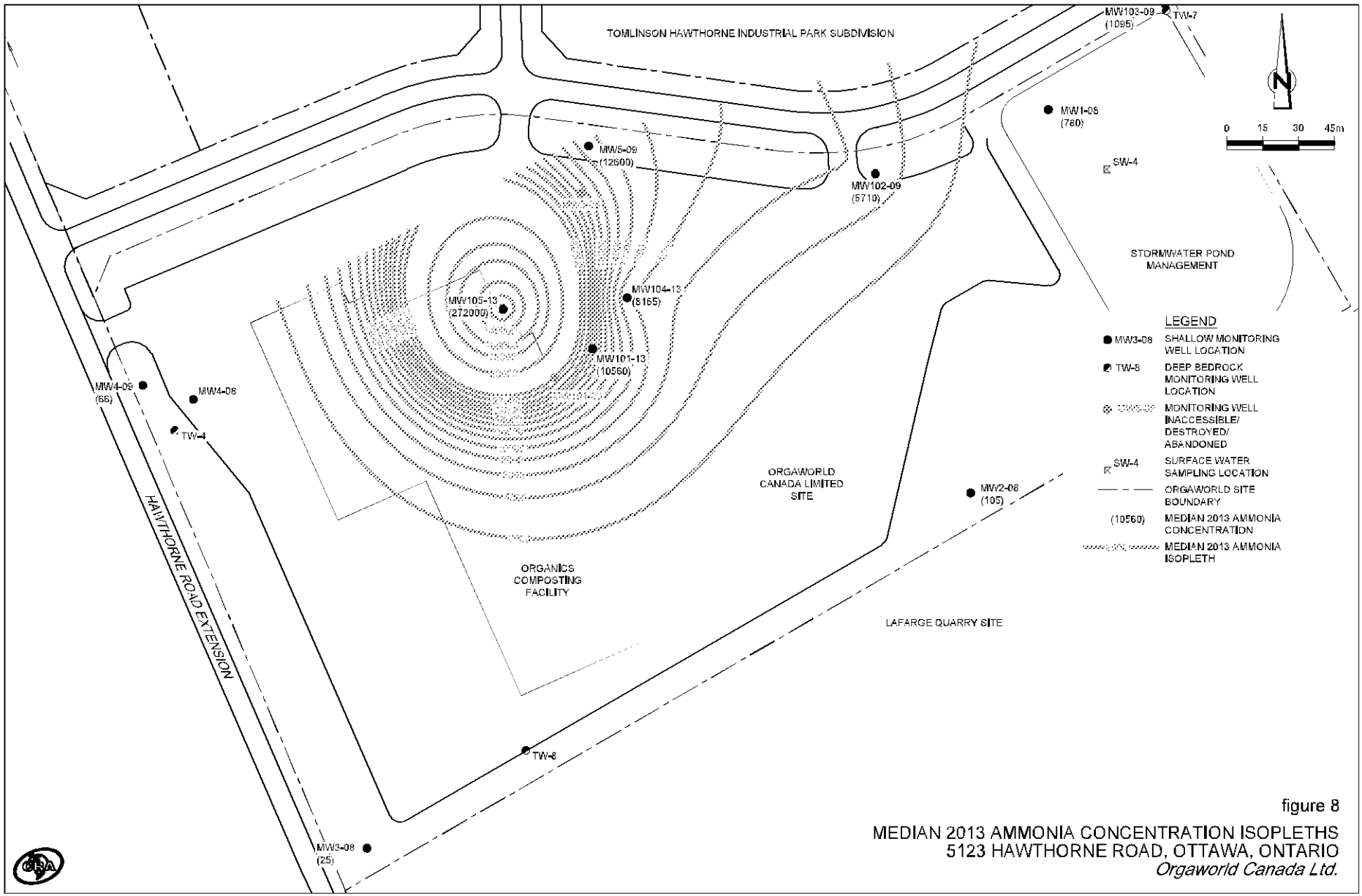


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

860098

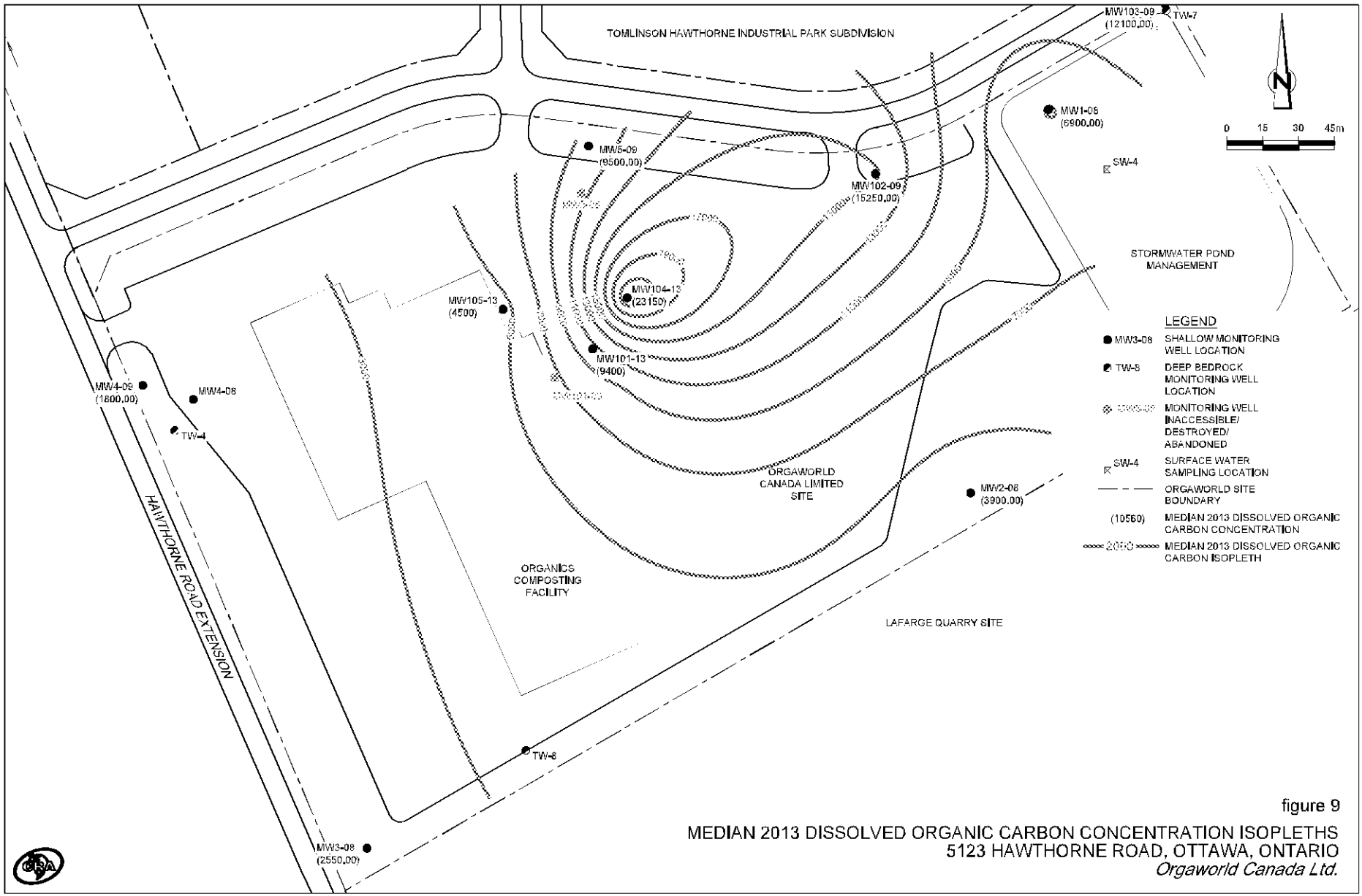


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

003099

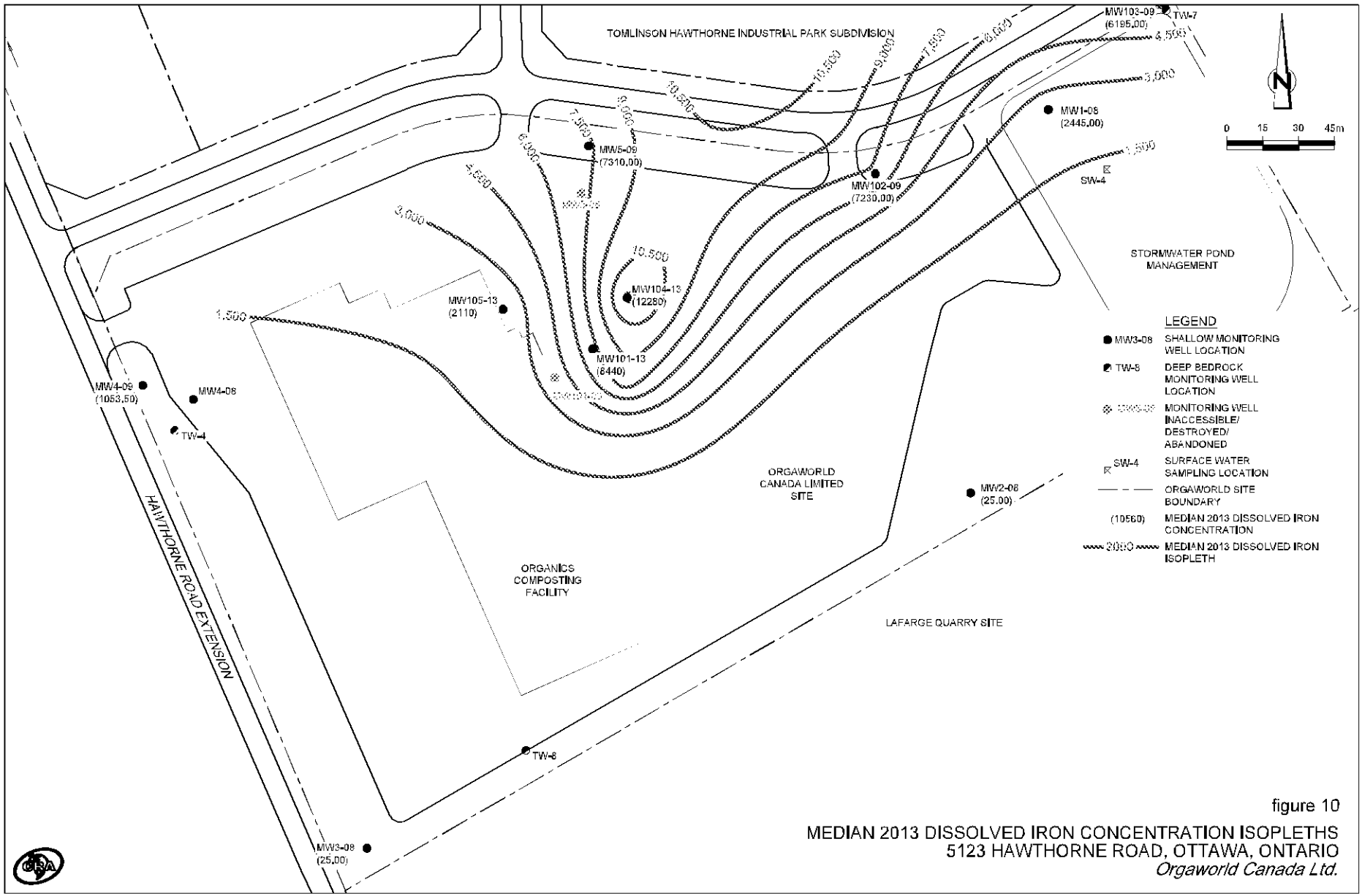


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

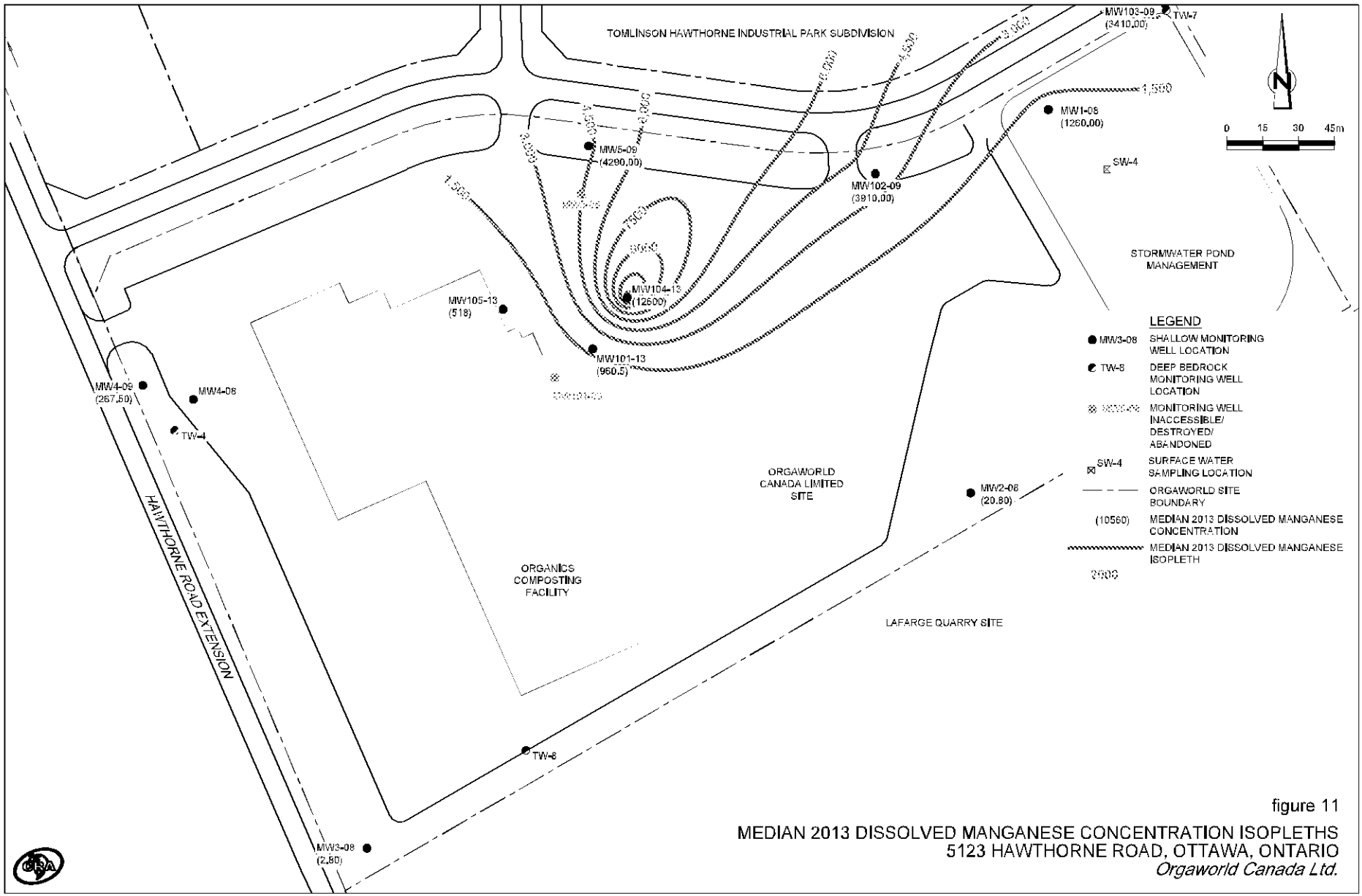


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 93.06 TOP OF RISER 93.00 GROUND SURFACE 91.89							
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug					
	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS1		35		0.0
1				SS2		27		0.0
2			Well Screen					
3	END OF BOREHOLE @ 2.97m BGS	88.92						
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

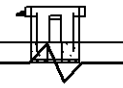
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17					
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40	WELL DETAILS Screened interval: 92.54 to 90.40m 0.63 to 2.77m BGS Length: 2.13m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.02 to 92.71m 0.15 to 0.46m BGS Material: Bentonite Sand Pack: 92.71 to 90.40m 0.46 to 2.77m BGS Material: Silica Sand			
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

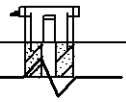
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1
2
3
4
5
6
7
8
9
10
11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug				
	BEDROCK - fractured limestone						
1							
2							
3							
4							
5							
6							
7							
8							
9			Filter Sand				
10			Well Screen				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
12							
13							
14							
15							
16							
17							
	END OF BOREHOLE @ 17.37m BGS	86.18					
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand				
19							
20							
21							
22							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
2	SILTY SAND TILL, with gravel, dense, brown, moist - becoming very dense at 1.68m BGS FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth	93.84 93.28	Bentonite Hole Plug Filter Sand Well Screen	RC1	93	63
3	END OF BOREHOLE @ 2.84m BGS	92.22	WELL DETAILS Screened interval: 93.44 to 92.22m 1.63 to 2.84m BGS Length: 1.22m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 94.45 to 93.59m 0.61 to 1.47m BGS Material: Bentonite Sand Pack: 93.59 to 92.22m 1.47 to 2.84m BGS Material: Silica Sand			
4						
5						
6						
7						
8						
9						
10						
11						
12						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	97.54 97.45 96.58						
0	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist		BENTONITE SAND	1SS		33		0.
0.5								
1.0			5.08cm PVC WELL CASING	2SS		33	11	10.0
1.5	- coarse sand, wood pieces, roots at 1.12m BGS		15.24cm BOREHOLE					
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS		BENTONITE	3SS		54	86	0.1
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29		4SS		67	55	0.2
3.0								
3.5	- REFUSAL at 3.50m BGS BEDROCK	93.07	5.08cm PVC WELL SCREEN	5SS		8		0.1
4.0			SAND PACK					
	END OF BOREHOLE @ 4.11m BGS	92.46						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.99 to 92.46m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack:
94.29 to 92.46m
2.29 to 4.11m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug	SS1		54	13
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS2		83	74
2			Filter Sand Well Screen	SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4			WELL DETAILS Screened interval: 93.12 to 91.59m 1.24 to 2.77m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 94.06 to 93.42m 0.30 to 0.94m BGS Material: Bentonite Sand Pack: 93.42 to 91.59m 0.94 to 2.77m BGS Material: Silica Sand				
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

003111

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 94.57 TOP OF RISER 94.50 GROUND SURFACE 93.36							
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay		BENTONITE SAND 5.08cm PVC WELL CASING 15.24cm BOREHOLE	1SS		54	14	0.0
0.5								
1.0				2SS		54	12	0.1
1.5	- red silty sand (or covered brick) at 1.68m BGS - spoon wet at 1.83m BGS			3SS		29	13	0.0
2.0								
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92	BENTONITE	4SS		71	25	0.1
3.0								
3.5	- increasing clay, becoming wet at 3.51m BGS		5.08cm PVC WELL SCREEN	5SS		25	8	0.0
4.0								
4.5	- cobble, rootmat, black at 4.24m BGS END OF BOREHOLE @ 4.42m BGS	88.94	SAND PACK	6SS		29	6	0.0
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.98 93.83						
0	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist							
1	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07	Bentonite Hole Plug	SS1		83	43	13.1
2				SS2		86		17.1
3				SS3		75	29	21.3
4			Filter Sand	SS4		33	16	23.9
5	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	89.26	Well Screen	SS5		17	7	2.3
6	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.89		SS6		100	20	0.0
7				SS7		83	26	0.0
8	END OF BOREHOLE @ 7.62m BGS	86.21		SS8		57		0.0
9								
10								
11								

WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

003113

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	94.82						
	GROUND SURFACE	93.81						
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist		Bentonite Hole Plug	SS1		50	38	0.0
1				SS2		35		4.6
2				SS3		50	13	0.0
3				SS4		25	15	4.3
4	- becoming wet at 3.65m BGS		Filter Sand / Well Screen	SS5		100		
5				SS6		42	54	0.0
6	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32		SS7		50	15	0.0
7	END OF BOREHOLE @ 6.98m BGS	86.83		SS8		100		1.5
8				SS9		100		0.0
9								
10								
11								

WELL DETAILS
Screened interval:
90.75 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
5	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.96						
	GROUND SURFACE	82.94						
	TOPSOIL	82.79	Bentonite Hole Plug					
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft			SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand					
2			Well Screen	SS2		100	3	0.0
				SS3		100		0.0
3								
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	84.00						
	GROUND SURFACE	83.10						
	TOPSOIL	82.95						
1	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS		Bentonite Hole Plug	SS1		83	15	0.0
		81.42						
2	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS		Filter Sand Well Screen	SS2		50	25	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20		SS3		100	27	0.0
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS3)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.23 96.15 95.67						
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE	1SS		58	7	0.1
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND					
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE					
2.0			BENTONITE	3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0			WELL DETAILS Screened interval: 93.54 to 92.01m 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 0.010 Material: PVC Seal: 94.15 to 93.84m 1.52 to 1.83m BGS Material: BENTONITE Sand Pack: 93.84 to 92.01m 1.83 to 3.66m BGS Material: #2 SAND					
4.5								
5.0								
5.5								
6.0								
6.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.90 93.79 92.99						
0.5	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick) - increasing sand at 0.66m BGS		BENTONITE SAND	1SS		25		0.0
1.0			5.08cm PVC WELL CASING	2SS		75	24	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0	- 0.43m coarse beige sand at 1.98m BGS - wet at 2.29m BGS			3SS		67	19	0.1
2.5	- ~2.54cm root mat at 2.74m BGS			4SS		83	24	0.1
3.0	CL/ML-SILTY CLAY, soft, grey, wet	90.09	5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		63	4	0.2
4.0	END OF BOREHOLE @ 3.66m BGS	89.33						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.45m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.15 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.42 93.33 92.38						
0	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist		BENTONITE 5.08cm PVC WELL CASING SAND	1SS		29	6	0.1
0.5								
1.0			BENTONITE	2SS		38	16	0.1
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29						
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01	15.24cm BOREHOLE	3SS		83	26	0.0
2.0								
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS		5.08cm PVC WELL SCREEN	4SS		50		0.2
3.0	- REFUSAL at 3.05m BGS	89.33	SAND PACK					
	END OF BOREHOLE @ 3.05m BGS			5SS		4		0.1
3.5								
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

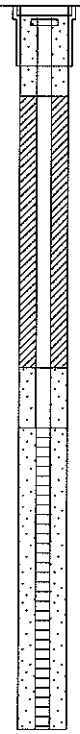
OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.63					
	TOP OF RISER	94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0							
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							



WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0							
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.92 to 91.40m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.23 to 94.60m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.23 to 91.40m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

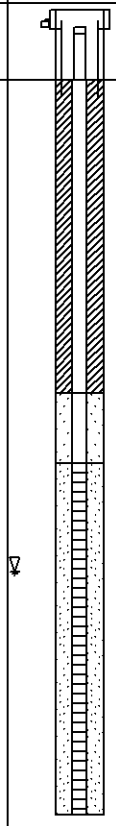
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOP OF RISER	-0.46
	TOP OF CASING	-0.61
0	GRASS AND TOPSOIL	0.05
	FILL - concrete, red brick, ashphalt, sand, gravel, moist	
1		
2		
3		
4	- wet at 4.27m BGS	
5	- concrete at 4.95m BGS	
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18
6		
	END OF BOREHOLE @ 6.38m BGS	6.38
7		
8		
9		
10		
11		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE
1		12	
2		10	64
3		15	13
4		4	
5		13	38
6		13	59
7		12	
8		14	26
9		6	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-GT006.GPJ CRA_CORP.GDT 3/10/15

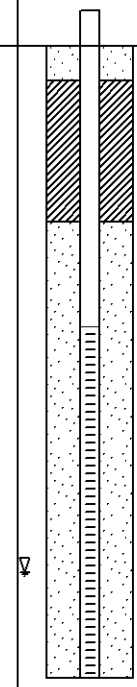
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOPSOIL - sandy, medium brown, dry	
1	rock fragments	1.07
	SILTY SAND - medium brown	1.22
	CLEARSTONE - dry	1.37
2	rock fragments	1.68
	LIMESTONE - grey	2.13
3		
4		
5	- highly fractured at 5.18m BGS	
	END OF BOREHOLE @ 5.49m BGS	5.49
6		
7		
8		
9		
10		
11		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

SAMPLE				
NUMBER	INTERVAL	REC (%)	'N' VALUE	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-OT006.GPJ CRA_CORP.GDT 2/23/16

OCT 07 '93 08:09 BEAVER ROAD BUILDERS

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

SURVEY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
Ottawa Carleton	Gloucester	6		26

OWNER'S SURNAME FIRST	ADDRESS	DATE COMPLETED
ver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DAY 19 MO. 4 YR. 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
y	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	DEPTH - FEET FROM	TO
FRESH / SALTY / SULPHUR / MINERAL / GAS		
FRESH / SALTY / SULPHUR / MINERAL / GAS		
FRESH / SALTY / SULPHUR / MINERAL / GAS		
FRESH / SALTY / SULPHUR / MINERAL / GAS		
FRESH / SALTY / SULPHUR / MINERAL / GAS		

CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	TO
6 1/4	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC	.188	0	31
6 1/8	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC		31	75
6	STEEL / GALVANIZED / CONCRETE / OPEN HOLE / PLASTIC		75	135

SCREEN

TYPE OF SCREEN (FACTORY MADE)	DIAMETER (INCHES)	SLOTS (FEET)
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN (FEET)	

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, CLAY, PACKER, ETC.)
31	0	Grouted - Cement (18)

METHOD OF CONSTRUCTION	WATER USE	STATUS OF WELL
CABLE TOOL / ROTARY (CONVENTIONAL) / ROTARY (REVERSE) / ROTARY (AIR) / AIR PERCUSSION / BORING / DIAMOND / JETTING / DRIVING / DIGGING / OTHER	DOMESTIC / STOCK / IRRIGATION / INDUSTRIAL / OTHER / COMMERCIAL / MUNICIPAL / PUBLIC SUPPLY / COOLING OR AIR CONDITIONING / NOT USED	WATER SUPPLY / OBSERVATION WELL / TEST HOLE / RECHARGE WELL / ABANDONED, INSUFFICIENT SUPPLY / ABANDONED, POOR QUALITY / UNFINISHED / DEWATERING

TEST OF WELL YIELD	PUMPING RATE	DURATION OF PUMPING
PUMP / BAILER	15-20 GPM	1 HOURS MINUTES

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING	10 MINUTES	20 MINUTES	30 MINUTES	40 MINUTES
31 FEET	130 FEET	PUMPING / RECOVERY	40 FEET	33 FEET	31 FEET	31 FEET

IF FLOWING GIVE RATE	WATER AT END OF TEST	
GPM	FEET	CLEAR / CLOUDY

DRAW DOWN AT END OF TEST	ALLOWANCE DOWN SPECIFIED	RECOMMENDED PUMPING RATE
SHALLOW / DEEP	125 FEET	5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.

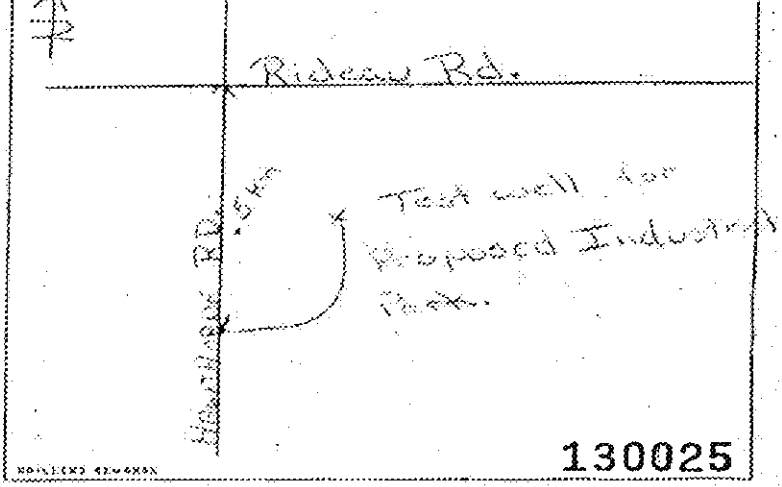


DIAGRAM REMARKS

130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1556
ADDRESS	
P.O. Box 450 Stittsville, Ontario K2S 1A5	
NAME OF WELL TECHNICIAN (PLEASE PRINT)	WELL TECHNICIAN'S LICENCE NUMBER
S. Miller	10087
SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
	DAY 20 MO. 7 YR. 93

OFFICE USE ONLY

R'S COPY

FORM NO. 0506 (11/86) FORM 9

003126

Ministry of the Environment
Ontario

WATER WELL RECORD

The Ontario Water Resources Act

TEST WELL TW-2

County or District: Ottawa Carleton	Municipality: Gloucester	Lot: 6	Con: 26
Name of Owner: Beaver Road Builders	Address: P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2	Date Completed: 16 / 8 / 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General Colour	Most common material	Other materials	General Description	Depth From	Depth To
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

Kind of Water: NOT TESTED

CASING & OPEN HOLE RECORD

Inside Diameter	Material	Wall Thickness	Depth From	Depth To
6 1/4	Steel	.188	0	39
5 15/16	Steel		39	100

SCREEN

PLUGGING & SEALING RECORD

Depth Set at From	To	Material and Type
37.5	0	Cement - Grouted

Static Level	Water Level on Completion	Pumping Test Method	Pumping Rate	Duration of Pumping
7'6"	14'6"	Pumping	20	1

Final Water Level	Recommended Pump Setting	Recommended Pump Rate	Well Production
14'4"	50	5	14'6"

Disinfected? Yes

USE OF WELL

Water Supply; Domestic; Irrigation; Industrial; Other

METHOD OF CONSTRUCTION

Air Percussion

LOCATION OF WELL

Overburden and Bedrock Materials Penetrated

Beaver Rd.

390 metres

150 metres

Tank Farm

135946

NAME OF WELL CONTRACTOR

Capital Water Supply Ltd.

490 Russellville, Ontario K2B 1A6

Well Contractor's Licence Number: 1558

Name of Well Technician: Miller/T. Harrison

Well Technician's Licence Number: T0097/T2251

Date: Oct 22 / 93

OFFICE USE ONLY

OWNER'S COPY

FORM NO. 0506 (11/87) FORM 6

003127

Ministry of the Environment

Ontario

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton	Gloucester	6	26
Beaver Road Builders	P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2	Oct 16 / 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Gray & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: FRESH / UNKNOWN / SALTY / SULPHUR / MINERAL / GAS

NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	STEEL / PLASTIC / CONCRETE / OPEN HOLE	.188	0	22
6 1/16	STEEL / PLASTIC / CONCRETE / OPEN HOLE		22	100

SCREEN

PLUGGING & SEALING RECORD

DIAMETER	DEPTH FROM	MATERIAL AND TYPE
20'8"	0	Grouted cement (3)

PUMPING TEST METHOD: PUMP / BAILER

PUMPING RATE	DURATION OF PUMPING	STATIC LEVEL	PUMPING LEVEL	PUMPING LEVEL	PUMPING LEVEL
15-20	3 hrs	21'6"	24'4"	23'6"	24
				24'4"	24'4"

PUMP INTAKE SET AT: 40

RECOMMENDED PUMP SETTING: 50

FINAL STATUS OF WELL: WATER SUPPLY

WATER USE: DOMESTIC

METHOD OF CONSTRUCTION: AIR PERCUSSION

LOCATION OF WELL

Rideau Road

Hawthorne Road

250 meters

135944

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd.

WELL CONTRACTOR'S LICENCE NUMBER: 1550

ADDRESS OF WELL CONTRACTOR: Box 490 Stittsville, Ontario K2S 1A6

NAME OF WELL TECHNICIAN: S. Miller/T. Harrison

WELL TECHNICIAN'S LICENCE NUMBER: 10097/T2251

SIGNATURE OF TECHNICIAN/CONTRACTOR:

DATE: Oct 18 / 93

OFFICE USE ONLY

FORM NO. 0506 (11/93) FORM 7

CONTRACTOR'S COPY

003128

Ontario Ministry of the Environment

Well Record
Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: A068332

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/0 651 Colby Drive	Waterloo	Ontario	N2V1C2	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☒ Rotary (Reverse Air) ☐ Driving ☐ Boring ☐ Digging ☒ Air percussion ☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used ☒ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Industrial ☐ Other, specify: Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	13.10

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
26.51	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

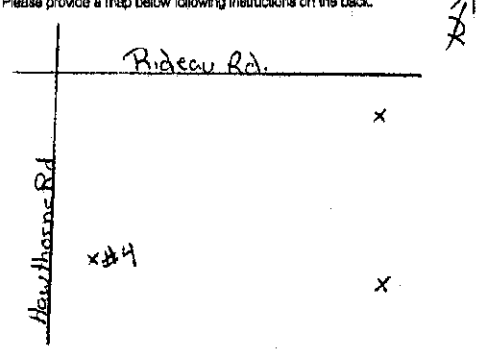
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15			
1	15.97	1	16.76	
2	16.98	2	15.74	
3	17.30	3	15.20	
4	17.43	4	15.	
5	17.50	5	14.91	
10	17.88	10	14.71	
15		15		
20	18.16	20	14.54	
25	18.23	25	14.51	
30	18.26	30	14.47	
40	18.34	40	14.41	
50	18.39	50	14.38	
60	18.41	60	14.35	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2008 09 08

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only
Audit No. 8041 11
Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

003129

Ontario Ministry of the Environment

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below) A068335 **A 068336**

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K 2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457043	5016848		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m^3/ft^3)
12.80	0	Grouted Cement	.525m^3

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
27.12 (m/ft) [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify			
(m/ft) [ ] Gas	Kind of Water: [ ] Fresh [ ] Untested [ ] Other, specify	0	12.80	15.7
(m/ft) [ ] Gas	Kind of Water: [ ] Fresh [ ] Untested [ ] Other, specify	12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was: [X] Clear and sand free [ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

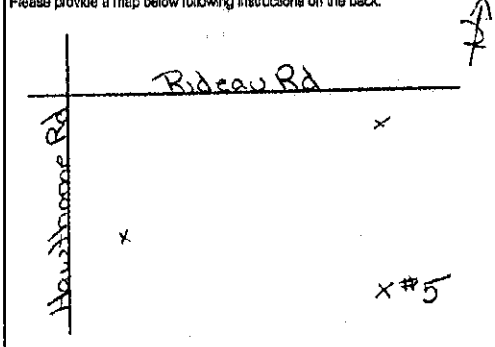
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

	Drew Down Time (min)	Drew Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		6.85		
1		8.03	1	8.97
2		8.35	2	8.69
3		8.60	3	8.55
4		8.76	4	8.46
5		8.88	5	8.40
10		9.20	10	8.23
15			15	
20		9.49	20	8.04
25		9.62	25	7.99
30		9.68	30	7.93
40		9.82	40	7.84
50		9.91	50	7.77
60		9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361766	Miller, Stephon

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008 10 20

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
[ ] Yes [X] No	2008 10 20	Audit No. Z 844130
	Date Work Completed: 2008 08 26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

Ontario | Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Seneca Drive	Kanata	Ontario	K2K2A6	613 592 6600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	83	18457102	5017600		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium-Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) Air ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☒ Industrial
☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Well Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.60	17.67

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

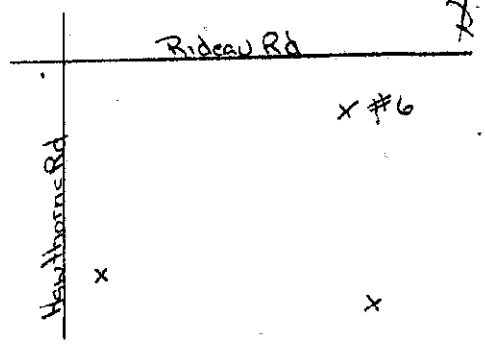
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	3.18		
1	3.24	1	
2	4.23	2	
3	5.19	3	
4		4	
5	6.53	5	
10	8.06	10	
15	9.99	15	22.80
20	11.53	20	19.40
25	12.92	25	17.12
30	14.08	30	15.13
40		40	11.82
50		50	9.47
60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361765	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008/09/26

Well owner's information package delivered	Date Package Delivered	Minister's Work
☐ Yes ☒ No	2008/09/26	Audit No. Z 084110
	Date Work Completed: 2008/09/26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
0	FILL, sand and gravel, packed, brown		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
1.52	SANDSTONE, very hard, grey and white	90.94					
29.87	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
0	LIMESTONE, grey, broken rock						
1.48	SANDSTONE, very hard, grey and white	92.94	18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
29.87	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Memorandum

February 22, 2018

To:	Ben Kempel, Trevor Saunders, Airesse MacPhee	Ref. No.:	045804-58
From:	Pascal Renella/al/9		514-339-0758

Subject: Data Quality Assessment and Validation

Laboratory:	ALS Canada Ltd	Date(s) Sampled:	May 30 – November 30, 2017
Lab Job No.:	L1933863, L1935461, L1936074, L1984427, L2029238, L2029244, L2029749		
Sampled By:	Trevor Saunders		
Media Sampled:	Groundwater, Surface Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☒	☐	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☐	☒	☐	☐
Lab QA/QC	Within standard recoveries	☒	☐	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: PR			

The following results are qualified due to high temperature (13.4°C) upon arrival at the laboratory the day after sampling:

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-001	Alkalinity, total (as CaCO3)	543	J	mg/L
L1984427	GW-45804-083017-TS-002	Alkalinity, total (as CaCO3)	554	J	mg/L
L1984427	GW-45804-083017-TS-003	Alkalinity, total (as CaCO3)	536	J	mg/L
L1984427	GW-45804-083017-TS-004	Alkalinity, total (as CaCO3)	620	J	mg/L
L1984427	GW-45804-083017-TS-005	Alkalinity, total (as CaCO3)	10	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Alkalinity, total (as CaCO3)	791	J	mg/L
L1984427	GW-45804-083017-TS-007	Alkalinity, total (as CaCO3)	511	J	mg/L
L1984427	GW-45804-083017-TS-008	Alkalinity, total (as CaCO3)	1280	J	mg/L
L1984427	GW-45804-083017-TS-009	Alkalinity, total (as CaCO3)	1250	J	mg/L
L1984427	GW-45804-083017-TS-001	Ammonia-N	3.89	J	mg/L
L1984427	GW-45804-083017-TS-002	Ammonia-N	6.96	J	mg/L
L1984427	GW-45804-083017-TS-003	Ammonia-N	2.57	J	mg/L

ghd
4600, boul. de la Côte-Vertu, Montréal, Québec, H4S 1C7, Canada
T 514 333 5151 F 514 333 46744 W www.ghd.com
SMQ ISO 9001:2008

Lab Sample ID	Client Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-004	Ammonia-N	9.89	J	mg/L
L1984427	GW-45804-083017-TS-005	Ammonia-N	0.056	J	mg/L
L1984427	GW-45804-083017-TS-006	Ammonia-N	34.5	J	mg/L
L1984427	GW-45804-083017-TS-007	Ammonia-N	15.9	J	mg/L
L1984427	GW-45804-083017-TS-008	Ammonia-N	91.1	J	mg/L
L1984427	GW-45804-083017-TS-009	Ammonia-N	88.0	J	mg/L
L1984427	GW-45804-083017-TS-001	Dissolved organic carbon (DOC)	7.8	J	mg/L
L1984427	GW-45804-083017-TS-002	Dissolved organic carbon (DOC)	13.6	J	mg/L
L1984427	GW-45804-083017-TS-003	Dissolved organic carbon (DOC)	11.7	J	mg/L
L1984427	GW-45804-083017-TS-004	Dissolved organic carbon (DOC)	13.0	J	mg/L
L1984427	GW-45804-083017-TS-005	Dissolved organic carbon (DOC)	1.0	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Dissolved organic carbon (DOC)	16.0	J	mg/L
L1984427	GW-45804-083017-TS-007	Dissolved organic carbon (DOC)	11.2	J	mg/L
L1984427	GW-45804-083017-TS-008	Dissolved organic carbon (DOC)	33.4	J	mg/L
L1984427	GW-45804-083017-TS-009	Dissolved organic carbon (DOC)	33.8	J	mg/L
L1984427	GW-45804-083017-TS-001	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-002	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-003	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-004	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-005	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-006	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-007	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-008	Escherichia coli	0	J	cfu/100 mL
L1984427	GW-45804-083017-TS-009	Escherichia coli	1	J	cfu/100 mL
L1984427	GW-45804-083017-TS-001	Iron (dissolved)	2.24	J	mg/L
L1984427	GW-45804-083017-TS-002	Iron (dissolved)	3.65	J	mg/L
L1984427	GW-45804-083017-TS-003	Iron (dissolved)	4.24	J	mg/L
L1984427	GW-45804-083017-TS-004	Iron (dissolved)	3.38	J	mg/L
L1984427	GW-45804-083017-TS-005	Iron (dissolved)	0.010	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Iron (dissolved)	1.41	J	mg/L
L1984427	GW-45804-083017-TS-007	Iron (dissolved)	0.157	J	mg/L
L1984427	GW-45804-083017-TS-008	Iron (dissolved)	0.10	UJ	mg/L

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1984427	GW-45804-083017-TS-009	Iron (dissolved)	0.10	UJ	mg/L
L1984427	GW-45804-083017-TS-001	Manganese (dissolved)	1.99	J	mg/L
L1984427	GW-45804-083017-TS-002	Manganese (dissolved)	2.33	J	mg/L
L1984427	GW-45804-083017-TS-003	Manganese (dissolved)	1.19	J	mg/L
L1984427	GW-45804-083017-TS-004	Manganese (dissolved)	1.89	J	mg/L
L1984427	GW-45804-083017-TS-005	Manganese (dissolved)	0.00050	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Manganese (dissolved)	0.145	J	mg/L
L1984427	GW-45804-083017-TS-007	Manganese (dissolved)	0.760	J	mg/L
L1984427	GW-45804-083017-TS-008	Manganese (dissolved)	0.189	J	mg/L
L1984427	GW-45804-083017-TS-009	Manganese (dissolved)	0.191	J	mg/L
L1984427	GW-45804-083017-TS-001	Nitrate (as N)	0.109	J	mg/L
L1984427	GW-45804-083017-TS-002	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-003	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-004	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-005	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-007	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-008	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-009	Nitrate (as N)	0.020	UJ	mg/L
L1984427	GW-45804-083017-TS-001	Phosphorus	0.0141	J	mg/L
L1984427	GW-45804-083017-TS-002	Phosphorus	0.104	J	mg/L
L1984427	GW-45804-083017-TS-003	Phosphorus	0.100	J	mg/L
L1984427	GW-45804-083017-TS-004	Phosphorus	0.209	J	mg/L
L1984427	GW-45804-083017-TS-005	Phosphorus	0.0030	UJ	mg/L
L1984427	GW-45804-083017-TS-006	Phosphorus	0.0481	J	mg/L
L1984427	GW-45804-083017-TS-007	Phosphorus	0.0365	J	mg/L
L1984427	GW-45804-083017-TS-008	Phosphorus	0.567	J	mg/L
L1984427	GW-45804-083017-TS-009	Phosphorus	0.584	J	mg/L

The following results are qualified based on field blank detections:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1936074	GW-45804-060217-TS-010	Ammonia-N	0.038	U	mg/L
L1936074	GW-45804-060217-TS-015	Ammonia-N	0.111	U	mg/L
L2029749	GW-45804-113017-TS-010	Ammonia-N	0.161	U	mg/L
L2029749	GW-45804-113017-TS-011	Ammonia-N	0.550	U	mg/L
L2029749	GW-45804-113017-TS-012	Ammonia-N	0.264	U	mg/L
L2029749	GW-45804-113017-TS-010	Dissolved organic carbon (DOC)	6.4	U	mg/L

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L2029749	GW-45804-113017-TS-011	Dissolved organic carbon (DOC)	2.6	U	mg/L
L2029749	GW-45804-113017-TS-012	Dissolved organic carbon (DOC)	3.0	U	mg/L
L2029749	GW-45804-113017-TS-013	Dissolved organic carbon (DOC)	6.4	U	mg/L

The following results are qualified based on field duplicate variability:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1933863	SW-45804-053017-TS-001	Escherichia coli	12	J	cfu/100 mL
L1933863	SW-45804-053017-TS-002	Escherichia coli	8	J	cfu/100 mL
L1935461	GW-45804-060117-TS-001	Phosphorus	0.0542	J	mg/L
L1935461	GW-45804-060117-TS-002	Phosphorus	0.0211	J	mg/L
L2029238	GW-45804-112917-TS-002	Phosphorus	0.0121	J	mg/L
L2029238	GW-45804-112917-TS-003	Phosphorus	0.0079	J	mg/L
L2029244	SW-45804-112917-TS-001	Nitrate (as N)	0.362	J	mg/L
L2029244	SW-45804-112917-TS-002	Nitrate (as N)	0.648	J	mg/L

Notes:

J - Estimated concentration
U - Not Detected
UJ - Non-detect with an Estimated Report Limit
N - Nitrogen
CFU – Colony Forming Units

[illegible]

[illegible]

Sample Location			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sample ID			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Depth (ft)			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Date Collected			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Parameter	Units	RL																
Metals																		
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Preliminary Analysis of Water Quality Data
at 3 Groundwater Monitoring Wells Near Abandoned Uranium Mine Site
Riverside Mining Area
October, 2023

Sample ID		GW-101	GW-102	GW-103	GW-104	GW-105	GW-106	GW-107	GW-108	GW-109	GW-110	GW-111	GW-112	GW-113	GW-114	GW-115	GW-116
Sample Date		14-Mar-23	14-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	15-Mar-23	16-Mar-23	16-Mar-23	16-Mar-23	16-Mar-23
Sample Type		Original	Duplicate	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameter	**Units**																
Metals																	
Aluminum, dissolved	mg/L	0.012	0.011	0.018	0.009	0.014	0.010	0.016	0.013	0.011	0.015	0.010	0.012	0.017	0.013	0.009	0.011
Arsenic, dissolved	mg/L	0.0021	0.0020	0.0024	0.0018	0.0022	0.0019	0.0023	0.0021	0.0020	0.0022	0.0019	0.0021	0.0023	0.0020	0.0018	0.0020
Cadmium, dissolved	mg/L	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium, dissolved	mg/L	0.0008	0.0007	0.0009	0.0006	0.0008	0.0007	0.0009	0.0008	0.0007	0.0008	0.0007	0.0008	0.0009	0.0007	0.0006	0.0007
Cobalt, dissolved	mg/L	0.0014	0.0013	0.0016	0.0011	0.0015	0.0012	0.0016	0.0014	0.0013	0.0015	0.0012	0.0014	0.0016	0.0013	0.0011	0.0013
Copper, dissolved	mg/L	0.0031	0.0029	0.0034	0.0026	0.0032	0.0027	0.0033	0.0030	0.0028	0.0032	0.0027	0.0030	0.0033	0.0028	0.0026	0.0028
Iron, dissolved	mg/L	0.041	<0.030	0.052	0.034	0.046	0.038	0.049	0.043	0.039	0.045	0.036	0.041	0.048	0.040	0.033	0.038
Lead, dissolved	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Manganese, dissolved	mg/L	0.184	0.176	0.201	0.158	0.192	0.165	0.196	0.181	0.169	0.189	0.161	0.178	0.194	0.172	0.149	0.166
Molybdenum, dissolved	mg/L	0.0042	0.0040	0.0045	0.0037	0.0043	0.0038	0.0044	0.0041	0.0039	0.0043	0.0038	0.0041	0.0044	0.0039	0.0037	0.0039
Nickel, dissolved	mg/L	0.0058	0.0055	0.0063	0.0049	0.0060	0.0052	0.0062	0.0057	0.0054	0.0060	0.0052	0.0057	0.0062	0.0054	0.0049	0.0053
Selenium, dissolved	mg/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Uranium, dissolved	mg/L	0.00312	0.00305	0.00328	0.00291	0.00317	0.00298	0.00322	0.00309	0.00301	0.00315	0.00296	0.00308	0.00320	0.00303	0.00289	0.00299
Zinc, dissolved	mg/L	0.0072	0.0069	0.0078	0.0061	0.0074	0.0065	0.0076	0.0071	0.0067	0.0074	0.0064	0.0070	0.0076	0.0067	0.0060	0.0066
General Chemistry																	
Alkalinity, total (as CaCO3)	mg/L	142	139	151	128	146	133	148	144	136	147	131	140	149	137	124	134
Ammonia-N	mg/L	0.21	0.19	0.24	0.17	0.22	0.18	0.23	0.21	0.19	0.22	0.18	0.20	0.23	0.19	0.16	0.18
Bicarbonate (as HCO3)	mg/L	173	169	184	156	178	162	180	175	166	179	160	171	182	167	151	163
Carbonate (as CO3)	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Chloride	mg/L	4.8	4.6	5.1	4.2	4.9	4.4	5.0	4.8	4.5	4.9	4.3	4.7	5.0	4.5	4.1	4.4
Color, true	CU	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Color, visual	CU	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Conductivity	µS/cm	312	305	331	286	320	292	326	315	298	323	289	309	328	301	276	294
Dissolved organic carbon (DOC)	mg/L	2.1	2.0	2.3	1.9	2.2	1.9	2.3	2.1	2.0	2.2	1.9	2.1	2.3	2.0	1.8	1.9
Fluoride	mg/L	0.18	0.17	0.19	0.16	0.18	0.16	0.19	0.18	0.17	0.18	0.16	0.17	0.19	0.17	0.15	0.16
Hardness (as CaCO3)	mg/L	168	164	179	151	173	157	175	170	161	174	155	166	177	162	146	158
Hydroxide	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate-N	mg/L	0.42	0.40	0.45	0.37	0.43	0.38	0.44	0.41	0.39	0.43	0.37	0.40	0.44	0.39	0.35	0.38
Nitrite-N	mg/L	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nitrogen, total Kjeldahl	mg/L	0.31	0.29	0.34	0.26	0.32	0.27	0.33	0.31	0.28	0.32	0.27	0.30	0.33	0.28	0.25	0.27
pH	pH units	7.84	7.81	7.88	7.76	7.86	7.79	7.87	7.85	7.80	7.86	7.78	7.83	7.87	7.81	7.74	7.80
Phosphorus, total	mg/L	0.024	0.022	0.027	0.019	0.025	0.020	0.026	0.024	0.021	0.025	0.020	0.023	0.026	0.021	0.018	0.020
Sulfate	mg/L	18.6	17.9	20.1	16.4	19.2	16.9	19.5	18.8	17.4	19.0	16.7	18.1	19.4	17.6	15.8	17.0
Total dissolved solids	mg/L	198	192	209	181	203	185	206	200	189	204	183	195	207	191	175	186
Turbidity	NTU	0.62	0.58	0.71	0.49	0.66	0.52	0.68	0.63	0.55	0.67	0.51	0.60	0.69	0.56	0.46	0.53
Petroleum Hydrocarbons																	
Benzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	µg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Petroleum Hydrocarbons																	
F1 (C6-C10)	µg/L	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
F2 (C10-C16)	µg/L	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F3 (C16-C34)	µg/L	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
F4 (C34-C50)	µg/L	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250
Surrogates																	
Toluene-d8	%	98	97	99	96	98	97	99	98	97	98	96	97	99	97	95	96
4-Bromofluorobenzene	%	101	100	102	99	101	100	102	101	100	101	99	100	102	100	98	99
Dibromofluoromethane	%	96	95	97	94	96	95	97	96	95	96	94	95	97	95	93	94

Table 5.4.2

Uncommon Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Cripps and Canada Ltd.
Ottawa, Ontario

Sample Location		ERA-MW20-02	ERA-MW20-03	ERA-MW20-04	ERA-MW20-05	ERA-MW20-06	ERA-MW20-07	ERA-MW20-08	ERA-MW20-09	ERA-MW20-10	ERA-MW20-11	ERA-MW20-12	ERA-MW20-13	ERA-MW20-14	ERA-MW20-15
Sample ID		GW-MW20-02-20170	GW-MW20-03-20170	GW-MW20-04-20170	GW-MW20-05-20170	GW-MW20-06-20170	GW-MW20-07-20170	GW-MW20-08-20170	GW-MW20-09-20170	GW-MW20-10-20170	GW-MW20-11-20170	GW-MW20-12-20170	GW-MW20-13-20170	GW-MW20-14-20170	GW-MW20-15-20170
Sample Date		5/15/2017	5/17/2017	5/17/2017	5/16/2017	5/16/2017	5/16/2017	5/16/2017	5/16/2017	5/16/2017	5/16/2017	5/16/2017	5/17/2017	5/16/2017	5/16/2017
		Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters	Units														
Metals															
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	0.052	-	0.072	0.096	0.058	0.052	0.052	0.065	ND(0.10)	0.054	ND(0.10)
Cadmium (dissolved)	mg/L	0.000127	0.00003	0.00010	0.000012	-	ND(0.000010)	0.000020	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000058	ND(0.000010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	0.00068	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	0.00122	-	0.00373	0.00056	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	0.00021	ND(0.00010)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0014	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00046	0.0017
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	0.330	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)
Lead (dissolved)	mg/L	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	1.10	0.451	0.415	0.484	-	0.330	0.416	0.220	0.276	0.0891	0.167	0.164	0.261	0.160
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0293	0.0180	0.0235	0.0192	-	0.0461	0.0254	0.0193	0.0201	0.0235	0.0139	0.0242	0.0138	0.0211
Nickel (dissolved)	mg/L	-	-	-	0.0010	-	0.0023	0.0023	0.0063	0.0031	0.0024	0.0053	0.0032	0.0015	0.0061
Zinc (dissolved)	mg/L	0.0051	0.0131	0.0026	ND(0.0030)	-	0.0023	0.0103	0.0041	ND(0.0020)	0.0027	ND(0.0030)	ND(0.010)	0.0017	ND(0.010)
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	397	416	378	388	-	337	403	372	360	333	343	349	338	342
Ammonia-N	mg/L	0.56	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.067)	ND(0.050)	ND(0.050)	ND(0.050)	0.030	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)	-	23	13	20	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	10
Chloride	mg/L	94.8	73.8	70.4	91.3	-	72.3	78	69.2	69.1	63	77.8	82.6	76.8	69.9
Color (apparent)	color unit	-	-	-	-	-	-	-	-	17.2	10.8	-	-	ND(1.0)	ND(2.0)
Color (apparent)	TCU	203	38.5	17.5	-	91.7	39.4	29.7	61.7	-	2.4	1.5	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.8	2.4	3.7	2.8	-	1.7	1.8	2.8	ND(1.0)	1.3	1.9	2.3	3.5	1.1
Escherichia coli	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(1)	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-	0	ND(2)	0	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.20)	ND(0.20)	ND(0.10)	-	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)	0.32	0.78	0.18	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.20)	ND(0.20)	ND(0.10)	-	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	-	-	7.34	-	7.87	7.60	7.53	7.40	7.85	7.77	7.83	7.73	7.82
Phenol	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	0.0029	ND(0.0010)	0.0020
Phosphorus	mg/L	0.138	0.038	0.479	0.169	-	0.238	0.038	0.169	ND(0.020)	0.032	ND(0.020)	ND(0.020)	ND(0.020)	0.028
Sulfate	mg/L	-	-	-	-	-	937	731	931	921	953	915	735	920	915
Total coliform bacteria	cfu/100mL	0	45	2	-	19	2	ND(1)	ND(1)	0	0	0	1	1	0
Total dissolved solids (TDS)	mg/L	1930	1330	1490	1530	-	1340	1490	1370	1370	1390	1360	1390	1900	1820
Total Kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21	-	ND(0.10)	ND(0.10)	0.13	ND(0.21)	ND(0.10)	ND(0.10)	0.26	ND(0.10)	0.15
Total suspended solids (TSS)	mg/L	-	-	-	24.0	-	1370	1100	391	7.2	16.0	8.9	2.4	ND(2.0)	ND(2.0)
Turbidity	NTU	-	-	-	-	22.8	1400	1100	8.36	0.27	4.22	ND(0.40)	0.69	0.16	1.31
Un-ionized ammonia	mg/L	0.00043	ND(0.00009034)	ND(0.00012)	-	-	ND(0.00043)	ND(0.00009023)	ND(0.00009)	0.00024	ND(0.00012)	ND(0.00010)	ND(0.00016)	0.00023	0.00034
Field Parameters															
Conductivity, field	mS/cm	0.255	2.19	2.25	2.06	2.03	1.79	1.99	0.96	2.04	-	1.42	1.4	1.22	1.89
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	4.28	6.26	7.73	9.68	-	2.21	6	9.67	6
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	78	47	-	99	-	131	-7	106	77
pH, field	s.u.	7.44	8.26	7.66	8.43	8.27	7.97	8.26	8.26	7.11	7.87	9.53	8.75	7.58	7.24
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.91	12.8	13.4	15.4	12.62	8.8	13.83	10.14	11.88	10.39
Turbidity, field	NTU	-	4.53	3.89	-	-	3.56	3.84	36	3.7	-	0	0.8	1	2
Petroleum Products															
Petroleum Hydrocarbons F1 (C6-C10)	ug/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum Hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum Hydrocarbons F2 minus Naphthalene	ug/L	-	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Petroleum Hydrocarbons F3 (C16-C34)	ug/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum Hydrocarbons F3 minus Polycyclic Aromatic Hydrocarbons	ug/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-	-	-	-
Petroleum Hydrocarbons F4 (C34-C50)	ug/L	ND(250)	320	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum Hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	-	-	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	ND(100)	-	-	-	-	ND(100)	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	-	-	-	-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	ND(250)	660	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(330)	ND(330)	ND(330)	ND(330)	ND(330)	ND(330)
Semi-Volatiles															
1-Methylnaphthalene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	-	-	ND(0.020)	-	-	-	-	-	-	-	-
2-Methylnaphthalene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Acenaphthene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Acenaphthylene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Acridine	ug/L	-	-	-	-	-	-	ND(0.5)	-	-	-	-	-	-	-
Anthracene	ug/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Benzo(a)pyrene	ug/L	0.0187	ND(0.00810)	ND(0.00810)	ND(0.00810)	-	ND(0.010)	ND(0.00810)	0.0061	ND(0.00810)	ND(0.00810)	ND(0.00810)	ND(0.00810)	ND(0.00810)	ND(0.00810)
Benzo(b)fluoranthene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Benzo(b,j)fluoranthene	ug/L	-	-	-	-	-	-	ND(0.020)	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Benzo(k)fluoranthene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Carcinogenic potency equivalent	ug/L	-	-	-	-	-	-	ND(0.0810)	-	-	-	-	-	-	-
Chrysene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Fluoranthene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Fluorene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Naphthalene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Phenanthrene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-	-	-	-	-

Table 8.8a.

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Organic Soil Remediation Site
Ottawa, Ontario

Sample Location: Sample ID: Sample Date:	Units	DH2-07 0424-5010-0511134-EB07 5/10/2017 Original	DH2-09 0424-5010-0511131-ER-11 5/10/2017 Original	DH2-07 0424-5010-0511717-MB-EB07 11/7/2017 Original	BH3-09 0424-5010-0511154-EB03 11/9/2017 Original	DH2-9 0424-5010-0511518-EB-N 5/10/2017 Original	DH2-07 0424-5010-0511154-EB03 11/9/2017 Original	DH2-07 0424-5010-0511518-EB-N 5/10/2017 Original	DH2-07 0424-5010-0511154-EB03 11/9/2017 Original	DH2-09 0424-5010-0511518-EB-N 5/10/2017 Original	DH2-07 0424-5010-0511154-EB03 11/9/2017 Original	DH2-09 0424-5010-0511518-EB-N 5/10/2017 Original	DH2-03 0424-5010-0511154-EB03 11/9/2017 Original	DH2-03 0424-5010-0511154-EB03 11/9/2017 Original	BH3-04-S 0424-5010-0511154-EB07 11/9/2017 Original
Parameters	**Units**														
Metals															
Arsenic, dissolved	mg/L	0.0027	0.0027	0.0015	0.0015	<0.0010	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0017
Barium, dissolved	mg/L	0.0	0.0	0.0	0.0	0.013	-	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Beryllium, dissolved	mg/L	0.00017	0.00011	0.00011	0.00011	0.00010	-	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00011
Chromium, dissolved	mg/L	-	-	-	-	<0.0010	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Cobalt, dissolved	mg/L	-	-	-	-	0.00013	-	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Copper, dissolved	mg/L	-	-	-	-	0.0010	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Iron, dissolved	mg/L	0.097	0.097	0.077	0.071	0.091	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12
Lead, dissolved	mg/L	-	-	-	-	<0.00010	-	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Manganese, dissolved	mg/L	0.021	0.024	0.020	0.021	0.013	-	0.012	0.011	0.010	0.010	0.010	0.010	0.010	0.011
Mercury, dissolved	mg/L	-	-	-	-	<0.00010	-	<0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Molybdenum, dissolved	mg/L	0.0067	0.0074	0.0077	0.0081	0.0091	-	0.0084	0.0081	0.0081	0.0081	0.0077	0.0081	0.0081	0.0089
Nickel, dissolved	mg/L	-	-	-	-	0.0012	-	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Zinc, dissolved	mg/L	0.004	0.0012	0.0004	0.0012	<0.0010	-	0.0013	0.0010	0.0010	0.0010	0.0011	0.0010	0.0010	<0.0005
General Chemistry															
Alkalinity, total (as CaCO3)	mg/L	410	410	310	280	310	-	290	280	280	280	280	290	290	370
Ammonia	mg/L	0.07	0.04	0.02	0.02	0.03	-	0.02	0.03	<0.02	0.02	0.02	0.02	0.02	0.02
Biochemical oxygen demand [BOD]	mg/L	0.7	<1.0	0.7	0.7	<1.0	-	0.7	0.7	0.7	0.7	<1.0	0.7	0.7	<0.5
Chemical oxygen demand [COD]	mg/L	10	10	10	10	10	-	10	10	10	10	10	10	10	10
Chloride	mg/L	0.4	0.3	0.2	0.2	0.3	-	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Colour, true	colour units	-	-	-	-	-	-	-	-	5.0	5.0	-	-	5.0	7.0
Dissolved organic carbon	mg/L	17	17	16	16	17	17	17	17	-	-	17	17	-	-
Dissolved organic carbon (DOC), filtered	mg/L	5.0	5.0	5.0	5.0	5.0	-	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Escherichia coli	cfu/100ml	-	1	0	<1	1	0	<1	1	0	0	0	0	1	1
Fecal coliform bacteria	cfu/100mL	-	1	0	<1	1	0	<1	1	0	0	0	0	1	1
Nitrate (as N)	mg/L	<0.05	<0.05	<0.05	<0.05	0.13	-	<0.05	<0.05	<0.05	0.24	<0.05	<0.05	<0.05	<0.05
Nitrite (as N)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
pH	pH	-	-	-	-	7.77	-	7.77	7.78	7.78	7.77	7.77	7.77	7.77	7.78
Phenols	mg/L	-	-	-	-	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Phosphate	mg/L	0.078	0.07	0.02	0.09	0.072	-	0.059	0.036	0.05	0.05	0.057	0.047	0.051	0.053
Sulfate	mg/L	1	1	1	1	1	-	1	1	1	1	1	1	1	1
Total coliform bacteria	cfu/100ml	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Total dissolved solids [TDS]	mg/L	1000	1000	1100	1100	1100	-	1100	1100	1100	1100	1100	1100	1100	1100
Total Kjeldahl nitrogen [TKN]	mg/L	-	-	-	-	0.23	-	<0.20	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20
Total organic carbon [TOC]	mg/L	-	-	-	-	0.67	-	0.59	0.70	0.70	0.68	0.63	0.63	0.71	0.8
Turbidity	NTU	-	-	-	-	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Conductivity, as made	mS/cm	0.0955	0.0955	0.0733	0.0733	-	-	0.0733	0.0733	0.0733	0.0733	0.0733	0.0733	0.0733	0.0733
Field Parameters															
Conductivity, field	mS/cm	1.01	0.73	0.95	0.95	0.73	0.9	0.81	0.81	0.7	-	0.859	0.89	0.83	0.96
Oxidation-reduction potential, field	mV	-	0.68	-	-	-	-	0.4	0.4	0.49	0.49	0.48	0.8	0.6	0.58
Sulphide - Direct Reagent Field - Low	mg/L	-	0	-	-	0	-	<1	<1	1	1	1	1	<1	<1
pH, field	N/A	7.46	6.97	7.2	7.46	6.67	7.67	7.2	7.47	7.2	7.47	7.29	7.41	7.65	7.69
Temperature, field	deg C	7.9	7.9	7.08	7.7	10.1	11.23	11.3	11.3	11.3	11.3	11.3	11.23	11.26	11.26
Turbidity, field	NTU	-	-	-	0	-	-	0.4	0	0.8	0.8	-	-	0.47	0.4	0.6	0.4
Petroleum Products															
Petroleum hydrocarbons F1 (C6-C10)	µg/L	MDT0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	-	<0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	<0.2	MDT0.2	MDT0.2
Petroleum hydrocarbons F2 (>C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-	MDT0.1	<0.1	MDT0.1	MDT0.1
Petroleum hydrocarbons F2 minus naphthalene	µg/L	-	-	-	-	-	-	-	MDT0.1	MDT0.1	MDT0.1	MDT0.1	MDT0.1	-	-	-
Petroleum hydrocarbons F3 (>C16-C34)	µg/L	0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	-	<0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	0.5	MDT0.5	<0.5	MDT0.5
Petroleum hydrocarbons F3 minus PAH-creosote hydrocarbons	µg/L	0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	-	<0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	0.5	-	-	-
Petroleum hydrocarbons F4 (>C34-C50)	µg/L	0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	-	<0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	0.5	MDT0.5	<0.5	MDT0.5
Petroleum hydrocarbons F4 gravimetric, silica gel treated	µg/L	250	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total petroleum hydrocarbons (C6-C50)	µg/L	MDT0.5	MDT0.5	-	-	-	-	<0.5	-	-	-	-	-	<0.5	-	-
Total petroleum hydrocarbons (C6-C50)	µg/L	0.5	MDT0.5	MDT0.5	MDT0.5	MDT0.5	-	<0.5	MDT0.5	MDT0.5	MDT0.5	0.5	MDT0.5	<0.5	MDT0.5	MDT0.5
Benzenes															
Benzene	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Benzene plus ethylbenzene	µg/L	-	-	-	-	-	-	MDT0.2	-	-	-	-	-	-	-	-
Ethylbenzene	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Toluene	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Xylenes	µg/L	-	-	-	-	-	-	MDT0.2	-	-	-	-	-	-	-	-
m,p-Xylene	µg/L	-	-	-	-	-	-	-	<0.2	-	-	-	-	-	-	-
o-Xylene	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Xylenes, total	µg/L	0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	-	<0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	MDT0.2	<0.2	MDT0.2	MDT0.2
Phenols															
2,4-Dichlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
2-Chlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
3,4-Dichlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
3,4-Dimethylphenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
4-Nitrophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Dichlorophenol, total	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Nonylphenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Pentachlorophenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-
Phenol	µg/L	-	-	-	-	-	-	MDT0.2	<0.2	-	-	-	-	-	-	-

Table E-4.2

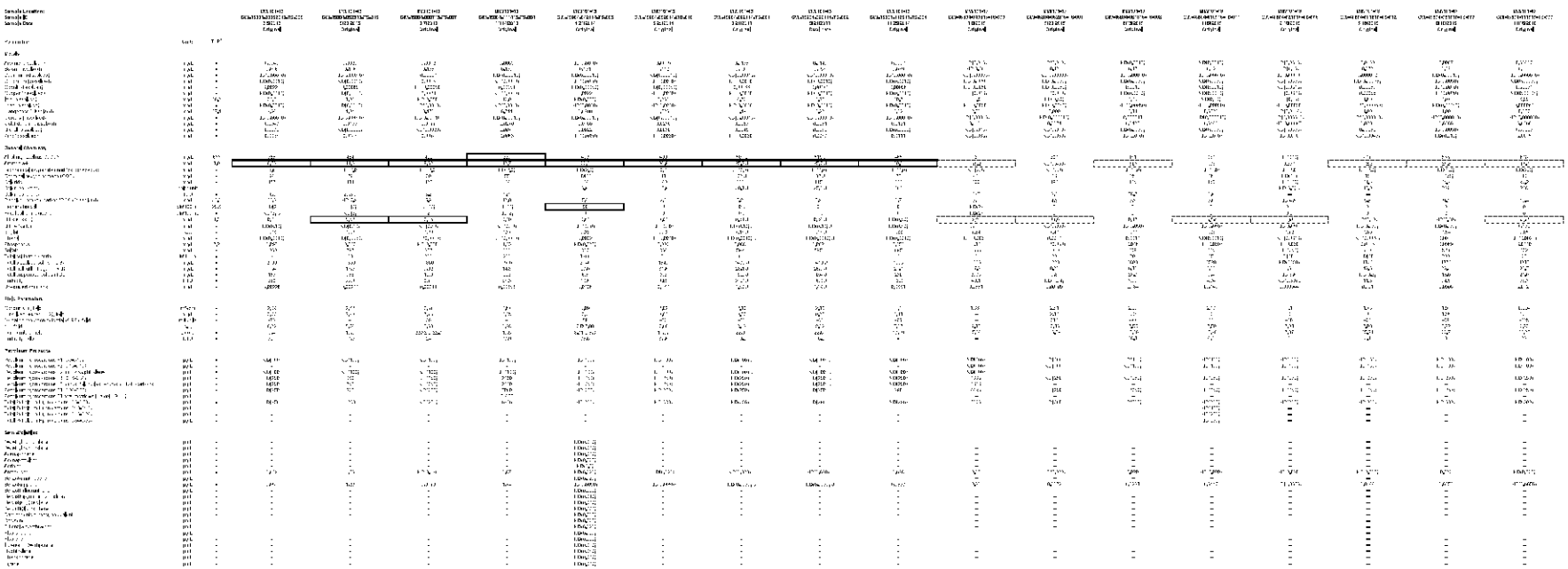
Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Oxygen Hill Condo Lots
Ottawa, Ontario

Sample Location:		MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08	MW101-08
Sample ID:		GW-4E8064-111410-MW-011	GW-4E8064-151810-MW-011	GW-4E8064-191910-MW-011	GW-4E8064-192010-MW-011-D	GW-4E8064-112210-TS-004	GW-4E8064-125211-MW-004	GW-4E8064-051711-MW-008	GW-4E8064-061011-TS-004	GW-4E8064-111011-TS-004	GW-4E8064-021512-MW-002	GW-4E8064-032112-MW-001	GW-4E8064-032112-MW-002	GW-4E8064-032112-MW-003	GW-4E8064-051612-MW-012	GW-4E8064-090612-MW-004	GW-4E8064-111312-MW-011
Sample Date:		11/4/2010	5/18/2010	8/19/2010	8/19/2010	11/22/2010	2/15/2011	5/17/2011	6/10/2011	11/10/2011	2/15/2012	3/21/2012	3/21/2012	3/21/2012	5/16/2012	9/6/2012	11/13/2012
		Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**																
Metals																	
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0047	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00021	-
Arsenic (dissolved)	mg/L	0.0013	0.0017	0.0022	0.0022	0.0017	0.0019	0.0015	0.0015	0.0024	0.0023	-	-	-	<0.0010	0.0010	0.0015
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.11	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0010	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0010	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	0.050	-	-	-	0.064	<0.050	0.069
Cadmium (dissolved)	mg/L	0.00027	<0.00010	0.00010	0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	-	-	-	0.00012	<0.00010	<0.00010
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	0.0046	-	-	-	<0.0010	<0.0010	<0.0010
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	0.00030	-	-	-	0.00047	<0.00010	<0.00010
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	<0.0010	-	-	-	<0.0010	<0.0010	<0.0010
Iron (dissolved)	mg/L	0.066	<0.0050	0.019	0.019	<0.0050	0.068	0.28	0.074	<0.0050	<0.0050	-	-	-	1.4	<0.050	0.24
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	<0.0010	-	-	-	<0.0010	<0.0010	<0.00010
Magnesium (dissolved)	mg/L	95.1	-	-	-	-	-	-	-	-	-	-	-	-	-	55.9	-
Manganese (dissolved)	mg/L	0.067	0.010	0.054	0.057	0.057	0.20	0.58	0.11	0.038	-	-	-	-	0.27	0.10	0.17
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	<0.0010	-	-	-	-	<0.0010	<0.00010	<0.00010
Molybdenum (dissolved)	mg/L	0.0033	0.00020	0.00012	<0.00010	<0.00010	0.00011	<0.00010	<0.00010	0.00021	-	-	-	-	0.00132	<0.00010	0.00159
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	0.00041	-	-	-	-	0.00135	<0.00050	<0.00050
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.050	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0050	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.9	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00010	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.6	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.00030	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0050	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00256	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0010	-
Zinc (dissolved)	mg/L	0.0150	0.00174	0.00541	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	-	-	-	0.00137	<0.0010	<0.0010
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.0020	-
General Chemistry																	
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	440	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<10	-
Alkalinity, total as CaCO3	mg/L	378	331	462	510	466	503	482	477	547	525	525	525	524	446	440	436
Ammonia-N	mg/L	NDC0.050	0.16	0.22	0.23	0.22	0.24	0.24	0.25	0.24	0.23	0.24	0.24	0.24	0.23	0.25	0.24
Biochemical oxygen demand (BOD)	mg/L	<DT2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<20	-
Chloride	mg/L	29.7	29.0	29.4	29.5	29.7	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4	29.4
Colour (apparent)	TCU	5.1	19.1	39.2	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7	39.7
Conductivity	umhos/cm	1930	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	8.0	2.6	6.0	6.0	12.7	12.0	9.9	7.7	10.1	9.0	7.8	7.8	7.8	6.2	6.7	6.6
Escherichia coli	cfu/100 mL	3	25	27	1700	17	185	1	2	2970	26	11	1	1	35	35	12
Hydrocarbon odour	cfu/100 ml	3	25	50	3000	50	100	20	10	>10000	400.1	400.1	400.1	1	35	35	20
Nitrate as N	mg/L	<DWL10	NDC1.0	NDC0.10	0.20, 10	<DWL50	0.20, 10	0.27	NDC1.0	NDC1.0	NDC1.0	NDC1.0	NDC1.0	0.20, 10	0.20, 10	<DWL10	NDC1.0
Nitrite as N	mg/L	NDC0.10	NDC0.50	0.20, 10	0.20, 10	<DWL50	0.20, 10	0.20, 10	NDC0.50	NDC1.0	NDC1.0	NDC0.50	0.20, 10	0.20, 10	0.20, 10	<DWL10	NDC1.0
Nitrite plus Nitrate	mg/L	-	-	-	-	-	-	-	-	-	NDC2.0	-	-	-	0.20, 20	-	-
Petroleum hydrocarbons	mg/L	0.80	-	-	-	-	-	-	-	-	0.95	0.31	0.24	-	0.6	0.79	0.97
Phenol	mg/L	-	-	-	-	-	-	-	-	-	0.00050	-	-	-	<0.00050	0.00050	0.00060
Phosphorus	mg/L	NDC0.0010	0.072	0.057	0.047	0.050	0.073	0.127	0.127	0.24	0.26	0.195	0.193	0.207	0.210	0.228	0.228
Xylenes	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.010
Total coliform bacteria	cfu/100 mL	3	50	250	>8000	13700	>8000	2360	2420	>8000	>8000	>8000	61	61	710	710	710
Total dissolved solids (TDS)	mg/L	1720	1900	1700	>8000	1370	2580	1665	1510	1965	>8000	>8000	>8000	1760	1760	2240	2240
Total petroleum hydrocarbons	mg/L	-	-	-	-	-	-	-	-	0.21	-	-	-	0.24	0.10	0.26	0.26
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	10.1	-	-	-	9.4	2.0	1.0	1.0
Turbidity	NTU	1.24	-	-	-	-	-	-	-	2.03	7.03	5.83	5.83	10.0	2.00	5.00	5.00
Volatile organic compounds	mg/L	<DWL0.0010	0.012	0.0224	0.0274	0.0163	0.0618	0.0622	0.0958	-	0.000767	0.000765	-	-	-	-	0.868
Field Parameters																	
Conductivity, field	mS/cm	1.17	0.37	0.73	0.1	0.105	0.19	0.21	0.42	0.89	0.71	0.71	0.71	0.71	0.76	0.42	
Dissolved oxygen (DO), field	mg/L	1.72	23.6	0	0	-	-	0	0.46	-	-	-	-	1.6	3.59	0.03	
Oxidation reduction potential (ORP), field	millivolts	22	241	209	209	170	170	209	209	-	-	-	-	103	127	246	
pH, field	pH	6.90	7.21	6.98	6.98	6.77	6.23	6.68	6.77	6.5	6.53	6.53	6.53	6.8	6.5	7.10	
Temperature, field	Deg C	8.8	14.01	22.3	22.3	11.3	11.29	21.1	11.5	11.87	10.3	10.3	10.3	10.19	24.2	10.5	
Turbidity, field	NTU	188	-	-	-	-	-	168	150	80.3	169	169	169	95.9	4.6	3	
Petroleum Products																	
Petroleum hydrocarbons F1 (C6-C10)	ug/L	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	78	<DL100	<DL100	<DL100	<DL100	<DL125	<DL100
Petroleum hydrocarbons F2 (C10-C16)	ug/L	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100	110	<DL100	<DL100	<DL100	<DL100	<DL100	<DL100
Petroleum hydrocarbons F3 (C16-C34)	ug/L	<DL250	<DL250	270	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250
Petroleum hydrocarbons F4 (C34-C50)	ug/L	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250
Total petroleum hydrocarbons (C6-C50) - gas chromatograph	ug/L	<DL100	<DL100	<DL100							110						
Total petroleum hydrocarbons (C6-C50)	ug/L	<DL250	<DL250	270	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250	<DL250
Semivolatiles																	
1-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
1-Methylphenanthrene (2+3+4+9 isomers)	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
2-Methylnaphthalene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Acenaphthene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Acenaphthylene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Anthracene	ug/L	<DL0.0010	<DL0.0010	<DL0.0010	<DL0.0010	<DL0.0010	<DL0.010	<DL0.010	<DL0.0010	<DL0.0010	<DL0.010	-	-	-	<DL0.010	<DL0.050	<DL0.0010
Benzo(a)anthracene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Benzo(a)pyrene	ug/L	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.00050	<DL0.010	-	-	-	<DL0.050	<DL0.050	<DL0.00050
Benzo(b)fluoranthene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Benzo(ghi)perylene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Benzo(k)fluoranthene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Chrysene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Dibenz(a,h)anthracene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Fluoranthene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Fluorene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Naphthalene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Phenanthrene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-
Pyrene	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<DL0.050	-

Table 1.1.2

Descriptive statistics for continuous variables (Part 1)

Q1 Q3 = Interquartile range; IQR = Q3 − Q1; SD = Standard deviation; SE = Standard error; CI = Confidence interval



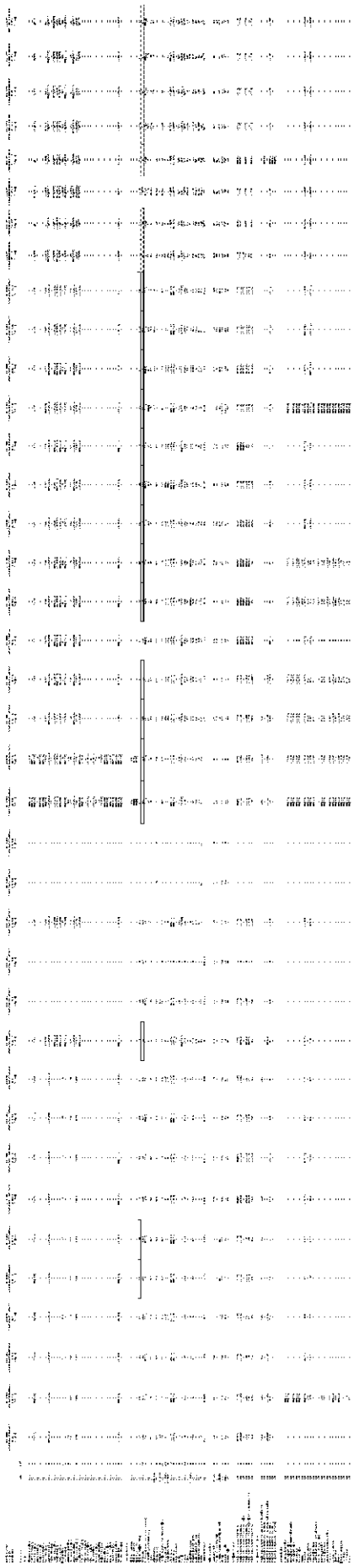


Table 6-A2

Unconfirmed Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Dynamic Consolidated Inc.
Chemtrade Corvette

Sample Location:			GW-1608-03	GW-1608-04	GW-1608-05	GW-1608-06	GW-1608-07	GW-1608-08	GW-1608-09	GW-1608-10	GW-1608-11	GW-1608-12	GW-1608-13	GW-1608-14	GW-1608-15	GW-1608-16	GW-1608-17	GW-1608-18	GW-1608-19	GW-1608-20
Sample ID:			GW-1608-0407-T2-2015-T4-0407	GW-1608-0402-T2-2015-T4-0402	GW-1608-0402-T2-2016-T4-0402	GW-1608-0407-T2-2016-T4-0407	GW-1608-0411-T2-2015-T4-0411	GW-1608-0401-T2-2015-T4-0401	GW-1608-0405-T2-2015-T4-0405	GW-1608-0403-T2-2015-T4-0403	GW-1608-0411-T2-2016-T4-0411	GW-1608-0402-T2-2016-T4-0402	GW-1608-0407-T2-2015-T4-0407	GW-1608-0411-T2-2015-T4-0411	GW-1608-0405-T2-2016-T4-0405	GW-1608-0403-T2-2016-T4-0403	GW-1608-0407-T2-2016-T4-0407	GW-1608-0411-T2-2016-T4-0411	GW-1608-0403-T2-2015-T4-0403	GW-1608-0405-T2-2015-T4-0405
Sample Date:			7/9/2015	6/29/2016	6/7/2016	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	11/4/2015	7/5/2016	9/28/2016	2/17/2016	11/8/2016	2/17/2016	6/16/2016	8/16/2016	11/16/2016
			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters	Units	TLP[1]																		
Metals																				
Arsenic (dissolved)	mg/L	*	0.0032	<0.00010	0.0002	0.0001	0.0014	<0.00010	0.00010	0.00010	0.00010	0.00010	<0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Boron (dissolved)	mg/L	*	0.0035	0.0010	0.0010	0.001	0.0035	0.0010	0.0010	0.0010	0.0055	0.0010	0.001	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Cadmium (dissolved)	mg/L	*	<0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	<0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500	0.00000500
Chromium (dissolved)	mg/L	*	<0.00050	0.00050	0.00050	0.00050	<0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	<0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050	0.00050
Cobalt (dissolved)	mg/L	*	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	<0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020	0.00020
Copper (dissolved)	mg/L	*	0.0037	<0.00200	0.00200	0.00200	0.0022	<0.00200	0.00200	0.00200	0.00200	0.00200	0.0064	0.0017	0.00200	0.00200	0.00200	0.00200	0.00200	0.00200
Iron (dissolved)	mg/L	46.5	0.057	0.2	0.2	0.06	0.05	0.2	0.2	0.2	0.74	0.2	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Lead (dissolved)	mg/L	*	<0.00010	0.00010	0.00010	0.00010	<0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	<0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Manganese (dissolved)	mg/L	11.3	0.07	0.2	0.2	0.01	0.08	0.2	0.2	0.2	0.2	0.2	0.03	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Mercury (dissolved)	mg/L	*	<0.00010	0.00010	0.00010	0.00010	<0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00025	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010
Molybdenum (dissolved)	mg/L	*	0.0015	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0012	0.0012	0.0012	0.0012	0.0010	0.0010	0.0010	0.0010
Nickel (dissolved)	mg/L	*	0.0021	0.0010	0.0010	0.0010	0.0021	0.0010	0.0010	0.0010	0.0010	0.0010	0.0023	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010	0.0010
Thallium (dissolved)	mg/L	*	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
General Chemistry																				
Alkalinity, Total (as CaCO3)	mg/L	933	268	209	252	248	224	215	215	215	215	215	381	380	347	380	380	345	345	381
Ammonia-N	mg/L	4.9	0.24	0.60	0.47	0.42	0.60	0.13	0.12	0.12	0.12	0.12	0.61	1.00	0.28	0.28	0.28	0.28	0.41	0.43
Bicarbonate (as CaCO3)	mg/L	*	268	209	252	248	224	215	215	215	215	215	381	380	347	380	380	345	345	381
Chemical oxygen demand (COD)	mg/L	*	99	37	62	46	74	74	74	74	74	74	29	31	31	31	31	31	31	25
Chloride	mg/L	*	116	116	116	147	116	116	116	116	116	116	116	116	116	116	116	116	116	116
Cyanide (total)	ug/L	4.6	-	-	-	-	1.5	1.5	1.5	1.5	2.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Cyanide (weak)	ug/L	*	82.9	172.0	260	76.7	-	-	-	-	196	66.9	76.0	149	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	94.8	95.1	77.2	74.7	74.7	77.1	77.1	74.7	74.7	74.7	74.7	8.8	8.4	8.2	8.2	8.2	8.2	8.2	7.9
Electrical conductivity	dS/m	25.6	0	4	ND(2)	ND(2)	0	0	0	0	0	ND(2)	0	0	0	0	0	0	0	0
Fecal coliform bacteria	CFU/100mL	*	<10	0	10	ND(2)	0	0	0	0	0	ND(2)	0	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	7.3	0.10	<0.050	ND(0.10)	ND(0.10)	0.05	<0.050	0.050	ND(0.10)	ND(0.10)	ND(0.10)	0.07	0.07	0.07	0.05	0.05	ND(0.10)	0.06	0.06
Nitrite (as N)	mg/L	*	0.017	<0.010	ND(0.10)	ND(0.10)	<0.010	<0.010	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.031	0.023	ND(0.10)	0.011	ND(0.10)	0.011	ND(0.10)	0.012
pH (lab)	pH	-	7.58	7.71	7.80	7.87	7.78	7.84	7.80	7.80	7.80	7.80	7.71	7.69	7.69	7.71	7.69	7.69	7.69	7.73
Phenol	mg/L	*	0.0015	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0015	0.0017	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0057	0.0050	0.0050	0.0050	0.0050	0.0050	0.0050	ND(0.0050)
Phosphorus	mg/L	7.2	0.053	0.032	0.075	0.045	0.066	0.051	0.052	0.052	0.045	0.045	0.047	0.041	0.038	ND(0.050)	0.041	0.043	0.040	0.038
Sulfide	mg/L	*	0.05	0.1	0.05	0.10	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	ND(0.05)	0.05	ND(0.05)	0.05	0.05
Total coliform bacteria	CFU/100mL	*	100	1700	1600	10	1	0	0	0	0	0	0	40	0	0	ND(10)	ND(10)	100	0
Total dissolved solids (TDS)	mg/L	*	1700	1300	1500	1600	1700	1600	1600	1600	1700	1600	1520	1700	1700	1700	1700	1700	1500	1700
Total kjeldahl nitrogen (TKN)	mg/L	*	0.26	0.26	0.26	0.26	0.27	0.26	0.26	0.26	0.26	0.26	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Total oxygen demand (TOD)	mg/L	*	79.0	70.0	106	89.4	91.6	91.6	91.6	91.6	91.6	91.6	99.6	97.4	97.4	97.4	97.4	97.4	97.4	99.6
Turbidity	NTU	*	6.0	6.0	40.6	75.6	5.40	7.32	37.4.0	1.94	7.32	37.4.0	2.07	2.07	64.7	5.20.0	5.20.0	77.5	19.5	67.3
Unionized ammonia	mg/L	*	0.0195	0.0292	0.0214	0.0270	0.0281	0.0181	0.0165	0.0165	0.0181	0.0165	0.0031.44	0.0170	0.0169	0.0169	0.0169	0.0169	0.0205	0.0170
Field Parameter																				
Conductivity, field	mS/cm	*	9.15	9.77	9.88	9.8	9.41	9.88	9.88	9.882	-	9.72	9.46	9.29	9.79	9.44	9.47	9.41		
Dissolved oxygen (DO), field	mg/L	*	3.61	2.67	7.26	7.24	6.62	8	6.28	5.16	-	6.61	7.67	7.54	7.75	6	8.73	7.01		
Oxidation reduction potential (ORP), field	mV rel to H	*	4.18	-	4.22	-	4.18	4.18	4.154	4.93	-	4.62	4.62	4.62	4.62	0.1	4.5	4.84	35	
pH, field	pH	-	7.17	7.29	7.65	7.12	7.29 (1) - 7.19 (2)	7.3	6.79	7.15	5.85	7.35	7.59	6.78	6.77	7.2	7.12	7.89		
Temperature, field	Deg C	*	6.7	11.2	12.5 (1) - 12.4 (2)	10.1	25.1 (1) - 19.8 (2)	11.09	10.67	11.21	7.1	10.75	7.19	7.68	11.65	12.1	21.57	9.23		
Turbidity, field	NTU	*	76.4	9.6	9.6	1.94	1.65	4.84	2	-	-	1.32	2.07	1.9	2.04	2.51	3	1.24		
Petroleum Products																				
Petroleum hydrocarbons F1 (C6-C10)	ug/L	*	<0.0100	<0.0100	ND(0.100)	ND(0.100)	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	*	<0.0100	<0.0100	ND(0.100)	ND(0.100)	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)
Petroleum hydrocarbons F3 across Naphthalene	ug/L	*	<0.0100	<0.0100	ND(0.100)	ND(0.100)	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	ug/L	*	<0.0100	<0.0100	0.100	0.100	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	0.100	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)
Petroleum hydrocarbons F3 across Polycyclic Aromatic Hydrocarbons	ug/L	*	<0.0100	<0.0100	0.100	0.100	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	ug/L	*	<0.0100	<0.0100	0.100	0.100	<0.0100	ND(0.100)	ND(0.100)	ND(0.100)	0.100	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	0.100	ND(0.100)
Petroleum hydrocarbons F4 gravimetric silica gel (C6-C50)	ug/L	*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	*	<0.0100	<0.0100	0.100	0.100	<0.0100	ND(0.100)	0.100	ND(0.100)	0.100	ND(0.100)	0.100	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)	ND(0.100)
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Semi-volatiles																				
Acenaphthene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	ug/L	-	<0.0020	<0.0020	ND(0.020)	ND(0.020)	0.010	<0.0020	-	-	-	-	<0.0020	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b&j)fluoranthene	ug/L	-	0.024	ND(0.0050)	0.0059	0.0051	0.017	0.0055	0.0058	0.0065	0.011	0.0053	0.0079	0.0098	0.0057	0.0057	0.0064	0.0061	0.0060	ND(0.0050)
Benzo(b)fluoranthene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(ghi)perylene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(j)fluoranthene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene (B[a]P) equivalent	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	ug/L	-	-	-	-	-	0.010	-	-	-	-	-	-	-	-	-	-	-	-	-

Table

Unconfirmed Status Encounter Weight and Trends

Diff Case Assess Nurse Subsequent Mental Any Record
Through Left Hand Lung
Classic Control

Row Descriptor	Units	Diff	1127 Mar 09 GC-HBB-20220309-0054 Original	1128 Mar 09 GC-HBB-20220309-0054-DUP Duplicate	1201 Mar 09 GC-HBB-20220309-0055 Original	1202 Mar 09 GC-HBB-20220309-0055-DUP Duplicate	1203 Mar 09 GC-HBB-20220309-0056 Original	1204 Mar 09 GC-HBB-20220309-0056-DUP Duplicate	1205 Mar 09 GC-HBB-20220309-0057 Original	1206 Mar 09 GC-HBB-20220309-0058 Original	1207 Mar 09 GC-HBB-20220309-0059 Original	1208 Mar 09 GC-HBB-20220309-0060 Original	1209 Mar 09 GC-HBB-20220309-0061 Original	1210 Mar 09 GC-HBB-20220309-0062 Original	1211 Mar 09 GC-HBB-20220309-0063 Original	1212 Mar 09 GC-HBB-20220309-0064 Original	1213 Mar 09 GC-HBB-20220309-0065 Original	1214 Mar 09 GC-HBB-20220309-0066 Original	1215 Mar 09 GC-HBB-20220309-0067 Duplicate	1216 Mar 09 GC-HBB-20220309-0067-DUP Original
Parameter	Units	Diff																			
Vitals																					
Vitals, Blood, Left	mg/dL	-	148 (+)	142 (+)	151 (+)	147 (+)	144 (+)	138 (+)	146 (+)	140 (+)	149 (+)	143 (+)	145 (+)	139 (+)	152 (+)	147 (+)	150 (+)	144 (+)	148 (+)	142 (+)	151 (+)
Vitals, Blood, Right	mg/dL	-	151	145	154	149	147	141	149	143	152	146	148	142	155	150	153	147	151	145	154
Vitals, Blood, Mean	mg/dL	-	149.5 (+)	143.5 (+)	152.5 (+)	148 (+)	145.5 (+)	139.5 (+)	147.5 (+)	141.5 (+)	150.5 (+)	144.5 (+)	146.5 (+)	140.5 (+)	153.5 (+)	148.5 (+)	151.5 (+)	145.5 (+)	149.5 (+)	143.5 (+)	152.5 (+)
Vitals, Blood, Δ	mg/dL	+	3 (+)	3 (+)	3 (+)	2 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)
Vitals, Blood, σ	mg/dL	+	2.1 (+)	2.1 (+)	2.1 (+)	1.4 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)	2.1 (+)
Vitals, Blood, n	mg/dL	+	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)	2 (+)
Vitals, Blood, Δ	mg/dL	+	3 (+)	3 (+)	3 (+)	2 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3 (+)	3

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014	GW-45804-021616-TS-009	GW-45804-051816-TS-011	GW-45804-081616-TS-008	GW-45804-111616-TS-013	
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	
Sample Type:			Original	Original	Original	Duplicate	Original	Original	Original	Original	
Parameters	**Units**	**TLP[1]**									
Metals											
Arsenic (dissolved)	mg/L	-	0.0011	0.00189	0.0012	0.0011	ND(0.0010)	0.00107	0.00074	0.00082	
Boron (dissolved)	mg/L	-	0.095	0.165	0.18	0.18	ND(0.13)	0.129	0.160	0.198	
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000018	
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00068)	ND(0.00050)	ND(0.00050)	
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025	0.00039	0.00099	
Copper (dissolved)	mg/L	-	ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.00056)	ND(0.00069)	
Iron (dissolved)	mg/L	48.3	2.54	1.50	3.09	3.20	3.60	4.66	0.838	2.19	
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0000E0)	ND(0.00050)	ND(0.000E0)	ND(0.00050)	ND(0.000050)	ND(0.000050)	ND(0.0000E0)	
Manganese (dissolved)	mg/L	17.1	2.44	1.35	1.59	1.62	1.94	1.96	1.06	2.62	
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)	ND(0.000010)	ND(0.000010)	
Molybdenum (dissolved)	mg/L	-	0.0102	0.0164	0.0125	0.0127	ND(0.0121)	0.0108	0.0170	0.0180	
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.00205	ND(0.0050)	ND(0.00E0)	ND(0.00E0)	0.00124	0.00222	0.00174	
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0013)	0.0037	0.0023	
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	633	423	449	461	469	ND(474)	443	467	497	
Ammonia-N	mg/L	4.0	3.2	2.93	2.90	3.86	4.75	3.34	3.26	1.91	
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	-	27	34	36	41	ND(36)	36	ND(38)	48	
Chloride	mg/L	-	153	112	114	119	ND(109)	101	107	112	
Color (apparent)	TCU	-	95.7	71.6	162	143	150 J	132	63.1	114	
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	6.0	9.9	12.7	10.7	ND(10.1)	9.9	12.7	13.0	
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0	0	
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	15	0	
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.24	ND(0.020)	
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.0E0)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	
pH, lab	s.u.	-	7.92	7.94	7.68	7.68	7.88	7.89	7.69	7.26	
Phenol	mg/L	-	0.0060	ND(0.0017)	0.0024	0.0033	ND(0.0010)	ND(0.0010)	0.0039	ND(0.0053)	
Phosphorus	mg/L	7.2	0.068	0.057	0.060	0.074	0.055	0.101	0.0684	0.0341	
Sulfate	mg/L	-	709	423	444	479	ND(485)	542	503	387	
Total coliform bacteria	cfu/100mL	-	0	ND(1)	0	0	0	0	200	0	
Total dissolved solids (TDS)	mg/L	-	1370	1100	1170	1180	ND(1350)	1390	1370	1230	
Total kjeldahl nitrogen (TKN)	mg/L	-	11.9	3.30	3.38	3.91	4.48	4.12	3.43	2.27	
Total suspended solids (TSS)	mg/L	-	6.8	11.5	7.3	7.8	21.0	30.0	22.3	4.6	
Turbidity	NTU	-	25.0	14.1	60.2	47.7	89.0 J	84.5	30.5	34.5	
Unionized ammonia	mg/L	-	0.171	0.0616	0.0823	0.109	0.0176	0.159	0.0190	0.00827	
Field Parameters											
Conductivity, field	mS/cm	-	2.07	3.92	1.32	1.32	1.04	1.52	1.57	1.83	
Dissolved oxygen (DO), field	mg/L	-	1.98	0.51	3.12	3.12	0	1.42	0	0.33	
Oxidation reduction potential (ORP), field	millivolts	-	43	-122	-134	-134	-114	-97	-69	-13	
pH, field	s.u.	-	7.76	7.35	8.01	8.01	7.25	8.22	7.26	7.14	
Temperature, field	Deg C	-	13.75	17.5	12.9	12.9	6.88	10.83	14.6	14.3	
Turbidity, field	NTU	-	0	149	13.8	13.8	212	41.2	0	6.7	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	540	420	400	280	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	540	420	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	540	420	400	ND(380)	ND(380)	ND(380)	
Semi-Volatiles											
Anthracene	µg/L	-	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	

003150

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original		
Parameters	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	0.0140	0.0138	ND(0.0010)	0.00018	ND(0.0010)
Boron (dissolved)	mg/L	-	0.23	0.24	0.11	0.070	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.0321	0.0330	ND(0.0050)	ND(0.00089)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00020	ND(0.0020)
Iron (dissolved)	mg/L	48.3	0.45	0.40	0.19	0.022	2.56
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	4.52	4.57	1.04	--	--
Mercury (dissolved)	mg/L	-	0.000038 J	0.000018 J	ND(0.000010)	0.0650	1.01
Molybdenum (dissolved)	mg/L	-	0.00268	0.00206	0.00068	ND(0.000010)	ND(0.000010)
Nickel (dissolved)	mg/L	-	0.0075	0.0075	ND(0.0050)	0.0150	0.00507
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	0.00084	ND(0.0050)
						ND(0.0013)	0.168
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	1810	1820	436	153	354
Ammonia-N	mg/L	4.0	61.0	60.7	0.01	0.123	14.1
Biochemical oxygen demand (carbonaceous)	mg/L	-	1340	1380	4.3	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	2480	2640	38	16	23
Chloride	mg/L	-	462	460	162	45.3	111
Color (apparent)	TCU	-	1100	1110	119	27.3	102
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	985	1030	10.7	3.2	6.3
Escherichia coli	cfu/100mL	25.6	1000 J	4000 J	0	4	0
Fecal coliform bacteria	cfu/100mL	-	4000	4000	0	5	0
Nitrate (as N)	mg/L	1.3	ND(0.20)	ND(0.20)	ND(0.10)	0.112	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.050)	0.015	ND(0.050)
pH, lab	s.u.	-	7.11	7.15	7.52	8.34	6.92
Phenol	mg/L	-	1.07	1.07	0.0029	ND(0.0020)	ND(0.0033)
Phosphorus	mg/L	7.2	1.88	1.59	0.281	0.0099	0.118
Sulfate	mg/L	-	399	391	848	304	945
Total coliform bacteria	cfu/100mL	-	100000	130000	40	50	1
Total dissolved solids (TDS)	mg/L	-	3800	3820	1630	673	1680
Total kjeldahl nitrogen (TKN)	mg/L	-	85.7	86.1	7.98	0.26	14.0
Total suspended solids (TSS)	mg/L	-	12.3	15.6	64.1	27.0	5.1
Turbidity	NTU	-	463	418	81.3	47.9	36.1
Un-ionized ammonia	mg/L	-	0.108	--	0.292	0.0223	0.0412
Field Parameters							
Conductivity, field	mS/cm	-	5.44	5.44	2.48	0.789	2.14
Dissolved oxygen (DO), field	mg/L	-	1.37	1.37	3.33	1.56	4.41
Oxidation reduction potential (ORP), field	millivolts	-	-362	-362	-215	-113	-63
pH, field	s.u.	-	6.59	6.59	7.99	8.65	6.84
Temperature, field	Deg C	-	21.6	21.6	16.66	19.61	16.26
Turbidity, field	NTU	-	162	162	243	7.2	30.1
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	--	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	-	--	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			8/13/2015	8/13/2015	11/10/2015	5/18/2016	11/16/2016
Sample Type:			Original	Duplicate	Original		
Parameters	**Units**	**TLP[1]**					
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	µg/L	-	ND(0.035)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

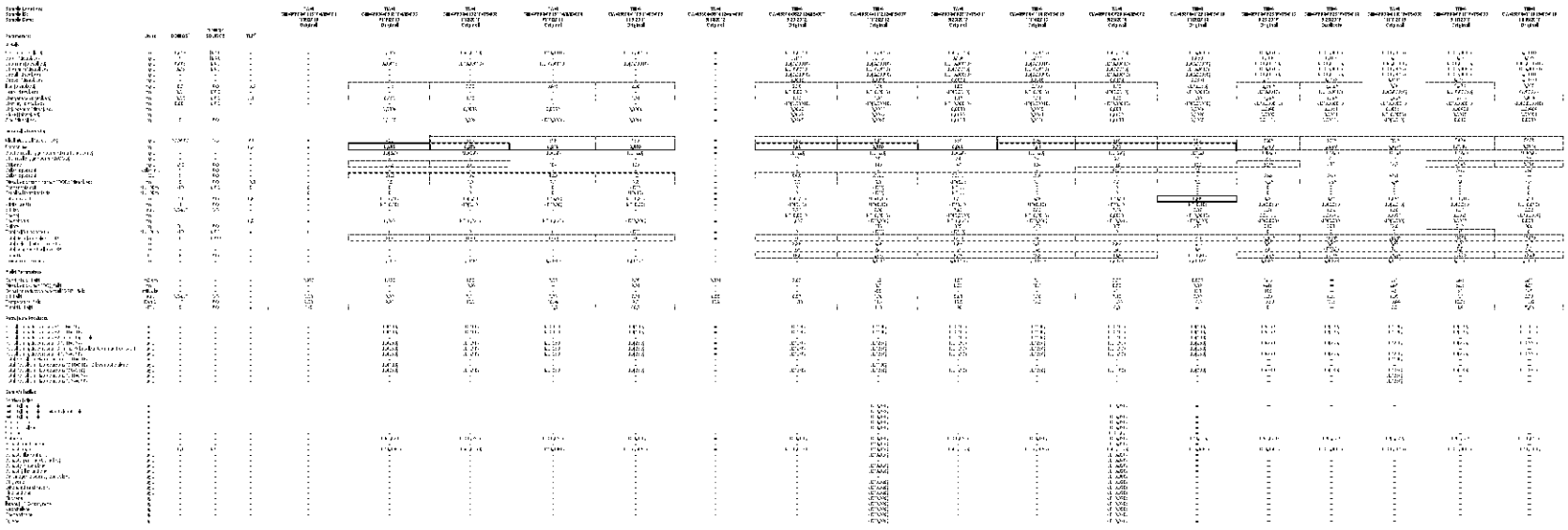
Table E.4.2

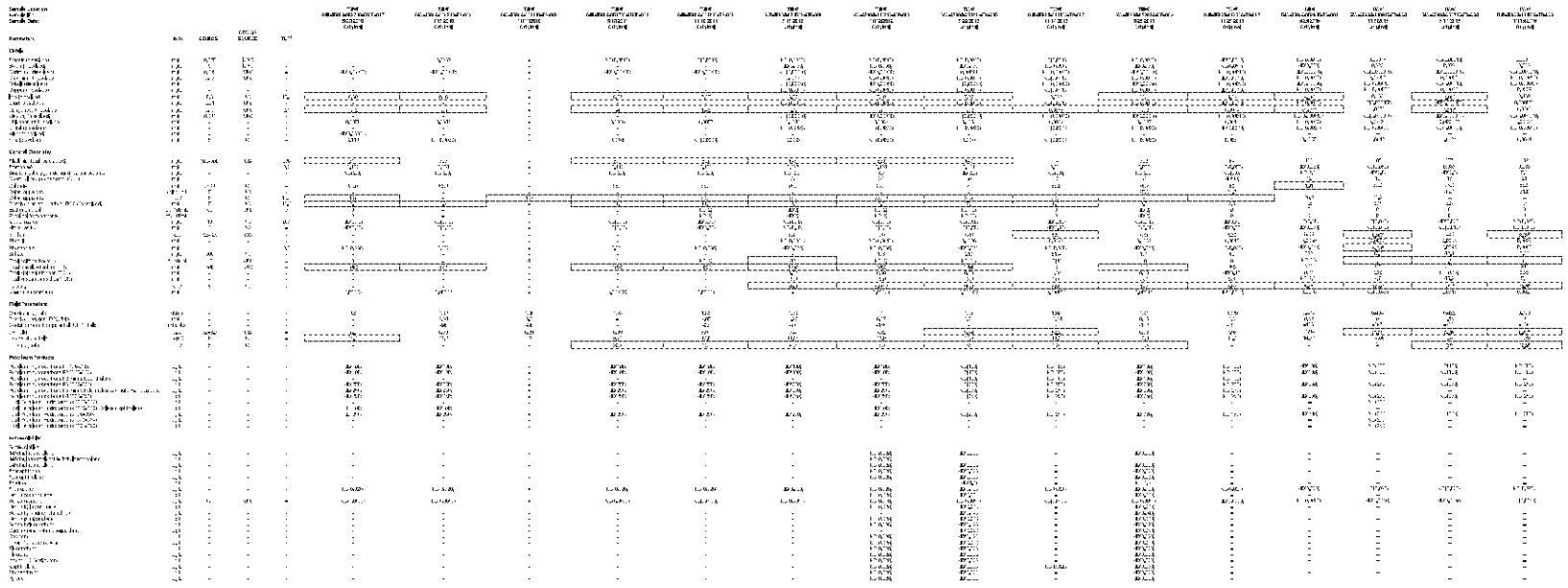
Unconfined Shallow Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP = Trigger Level Program Concentration (CRA, 2015)
J = Estimated concentration.
ND = Non-detect at associated value.
U = Not present at or above the associated value.
R = Rejected.
-- Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

003153





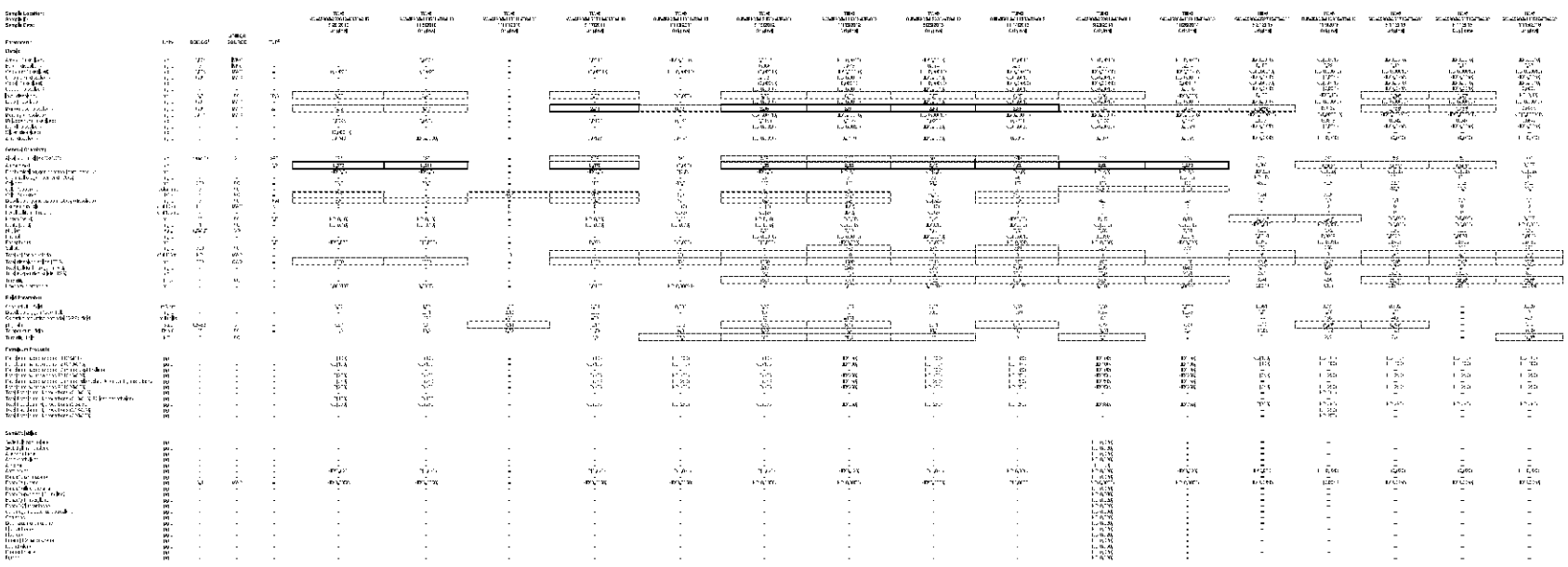


Table E.4.3

Deep Bedrock Groundwater Analytical Results
2017 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

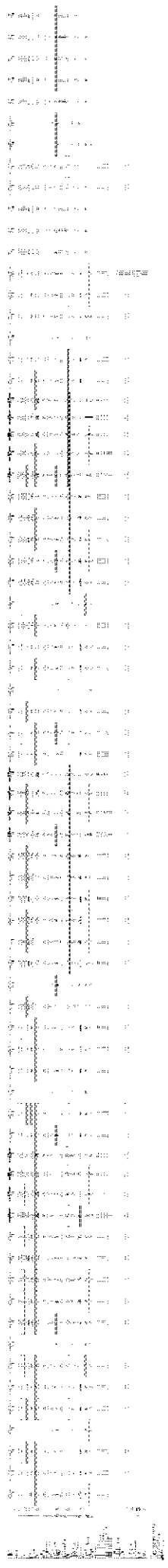
Notes:

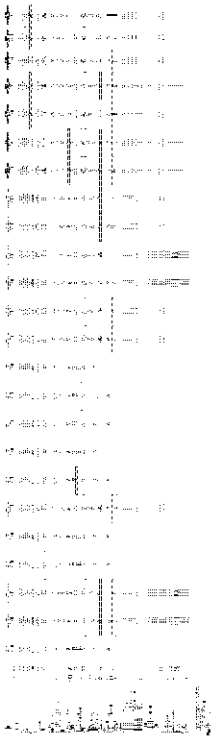
1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.

- Exceedence of the Tier I Trigger Level
- Exceedence of the ODWQS

003157





CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

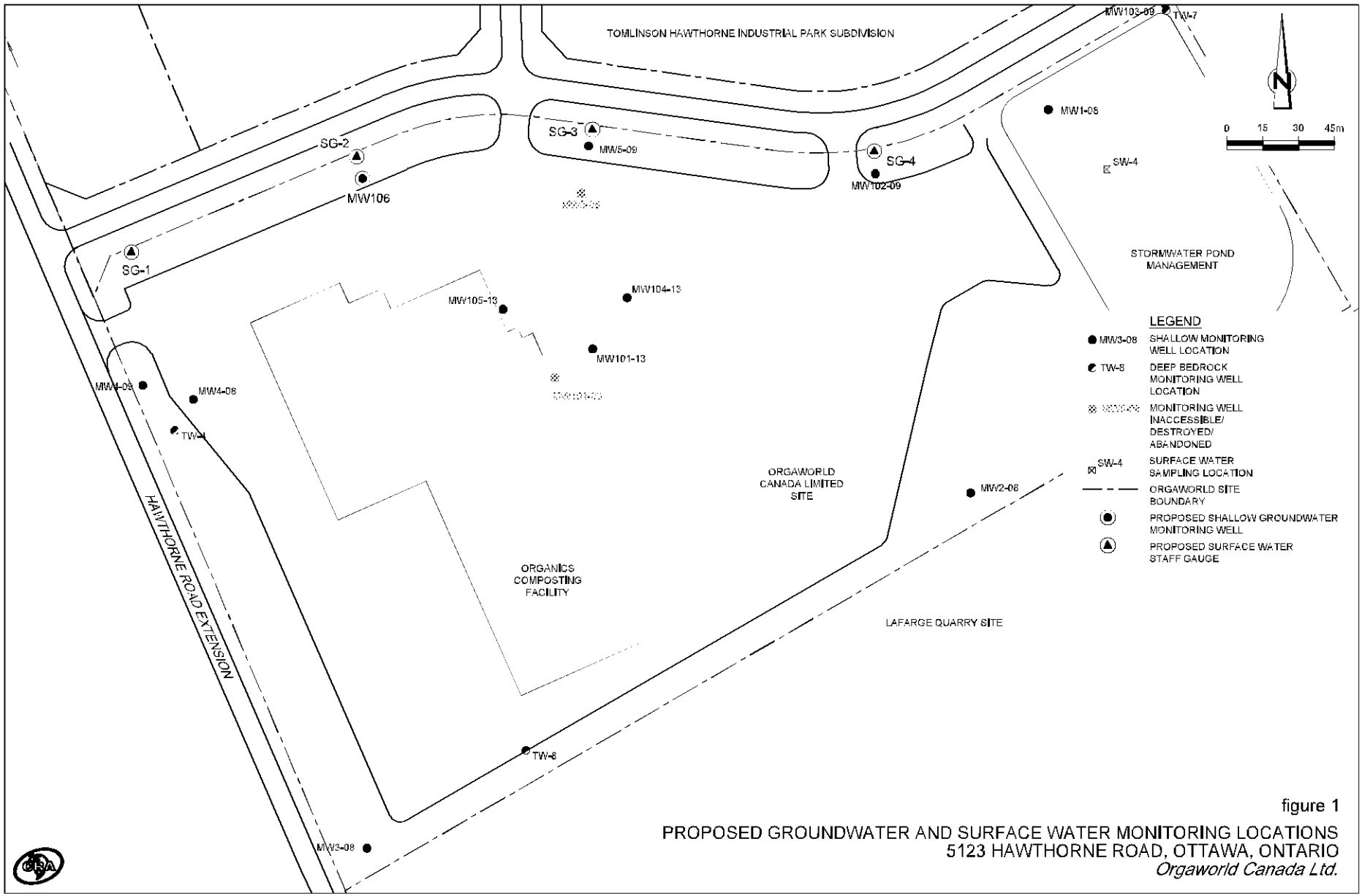


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

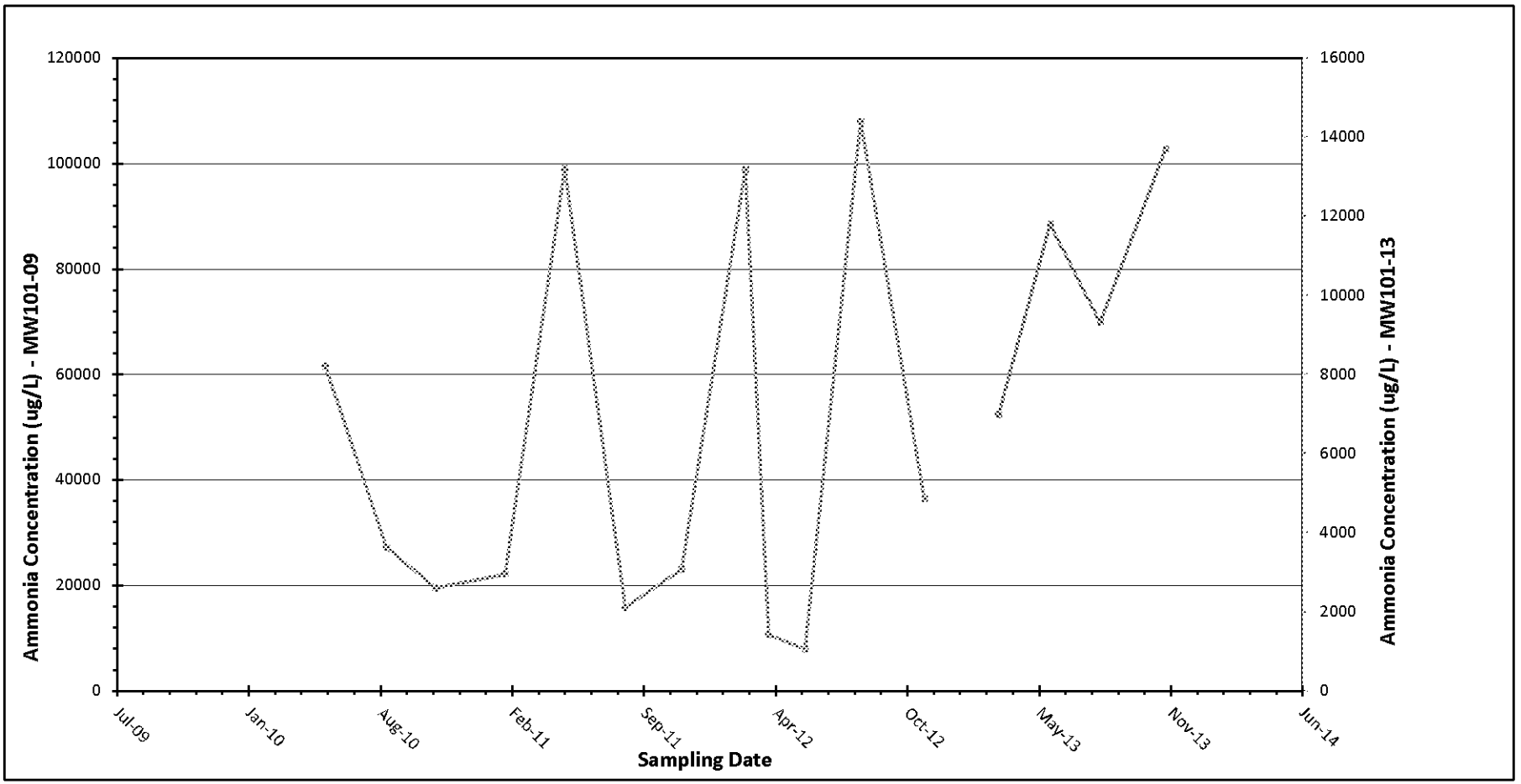


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

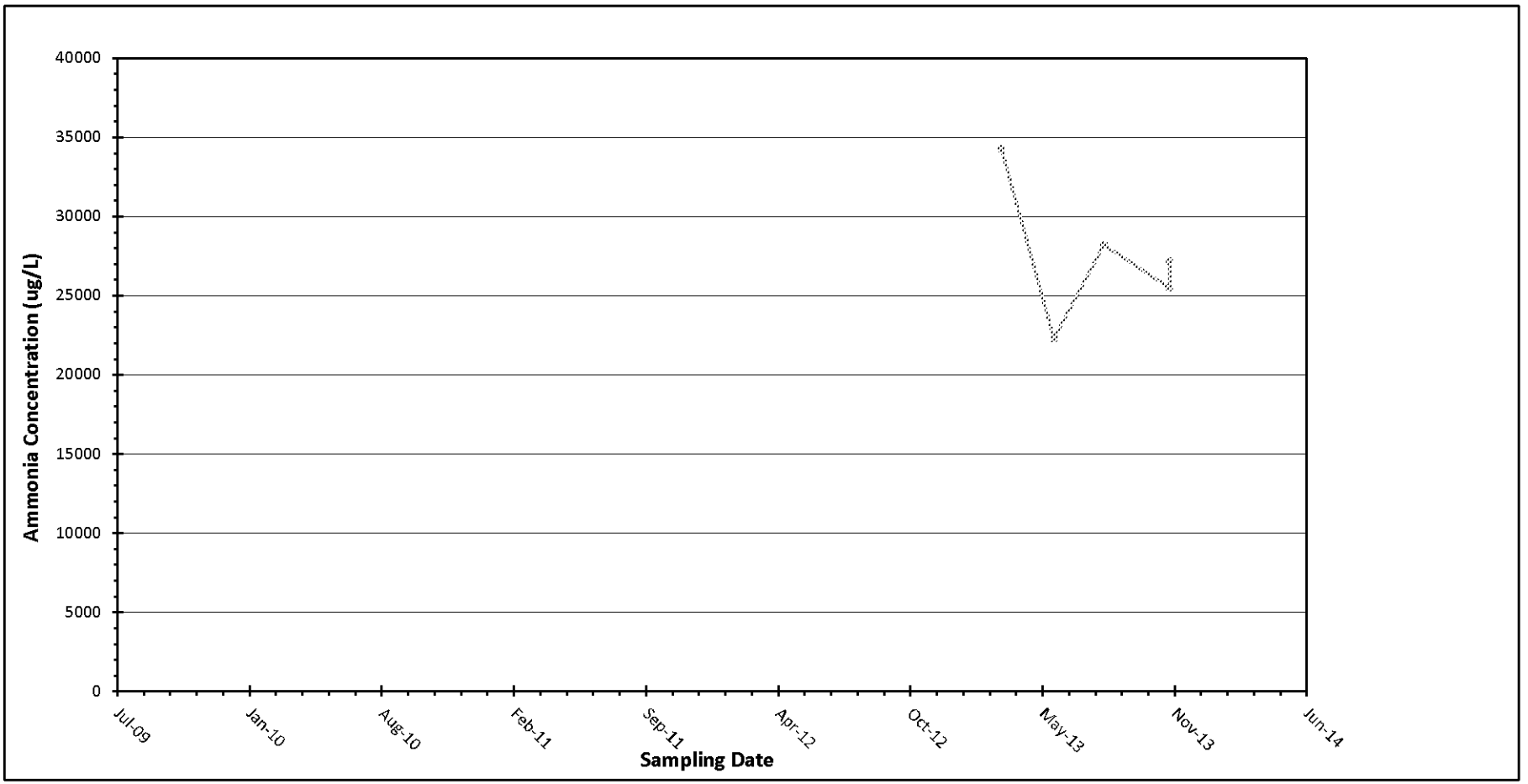


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

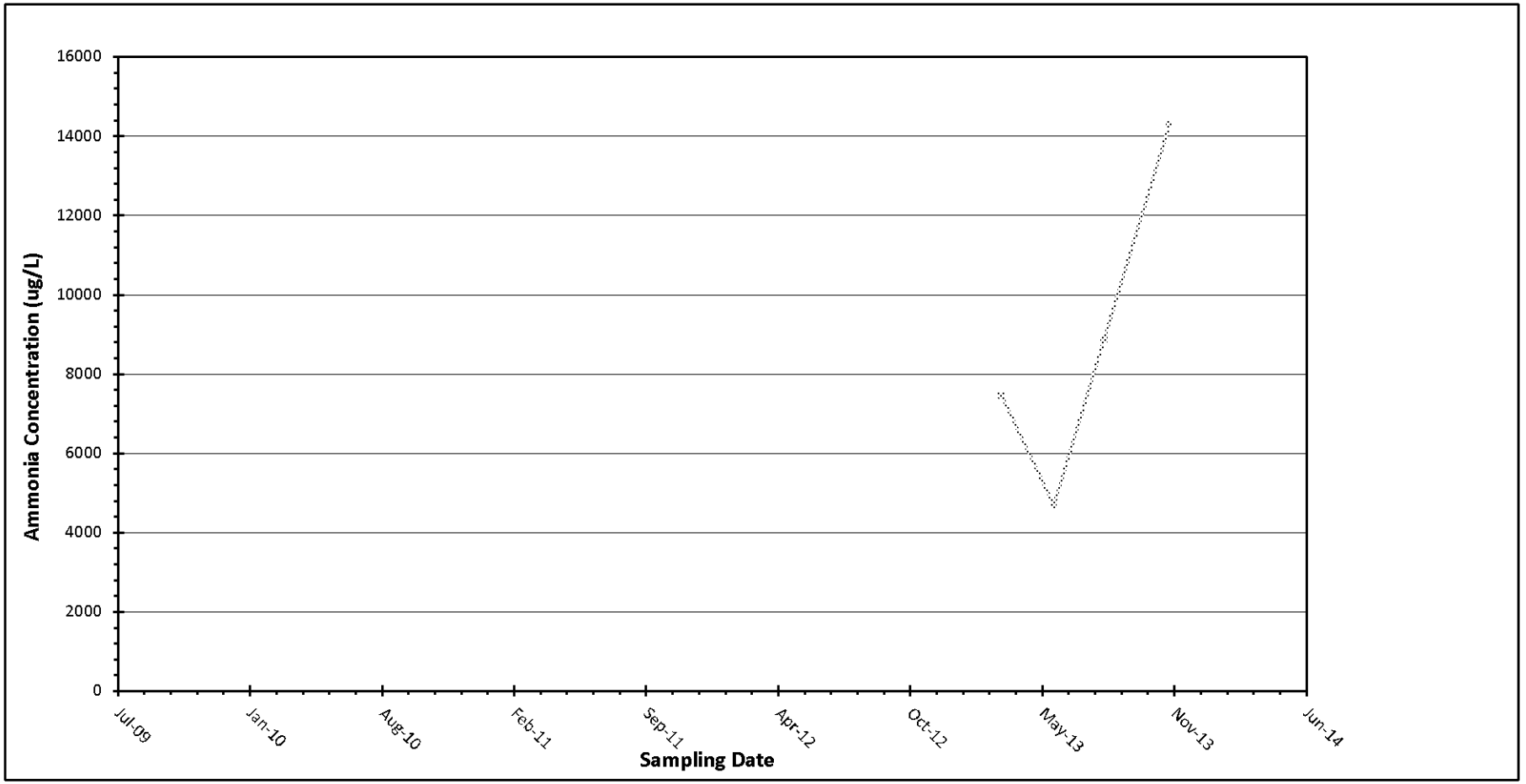


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

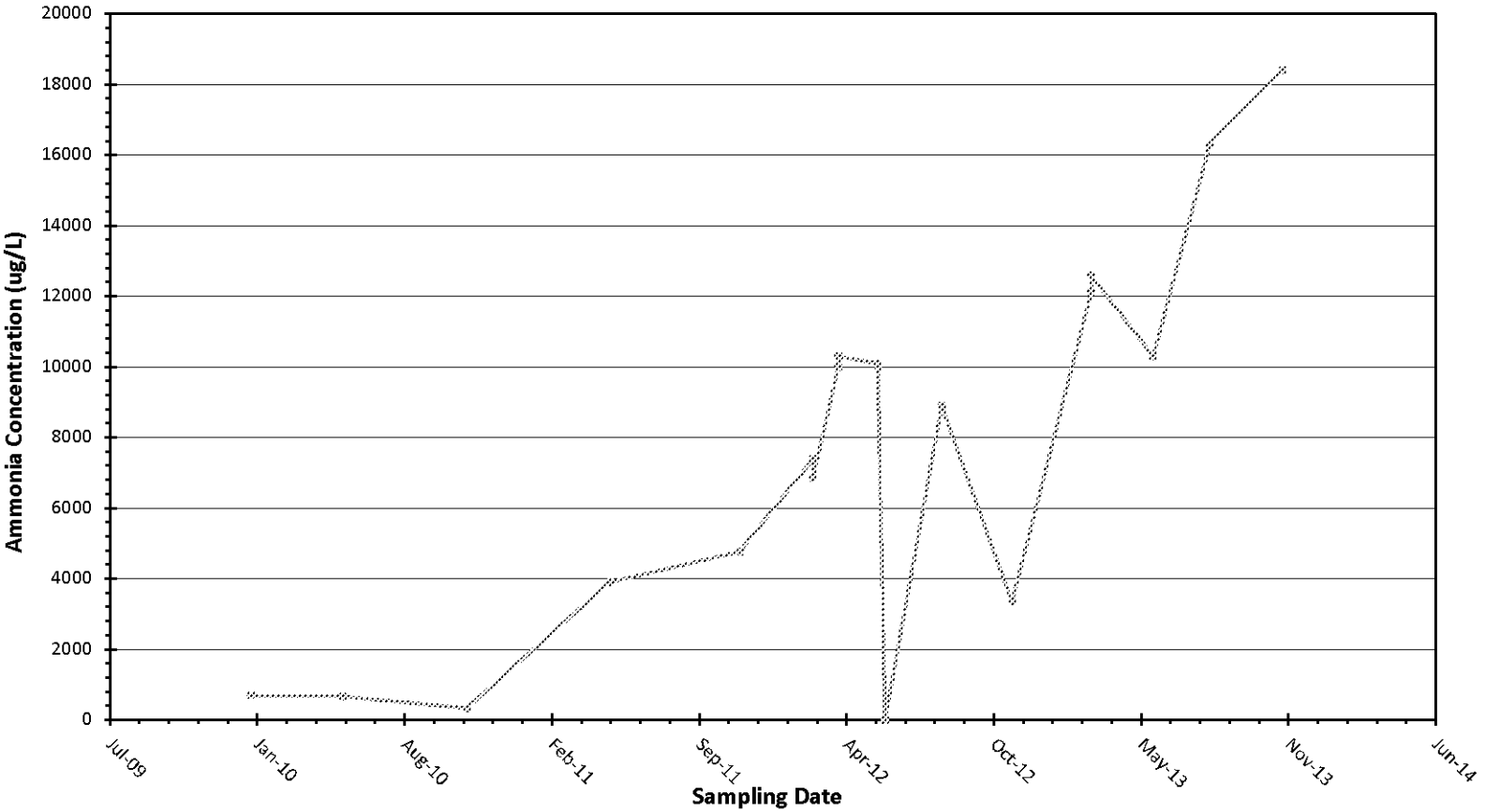


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

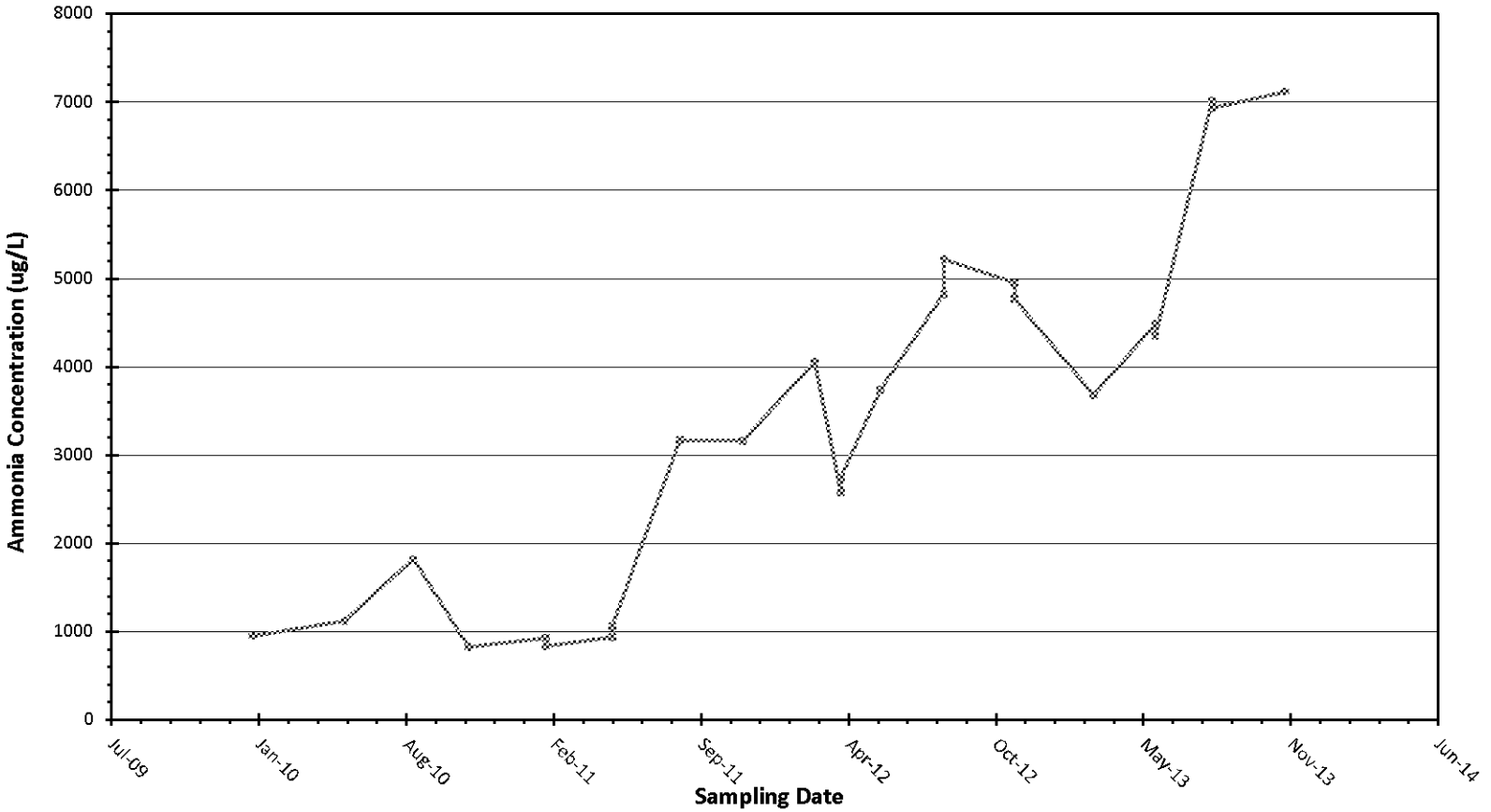


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

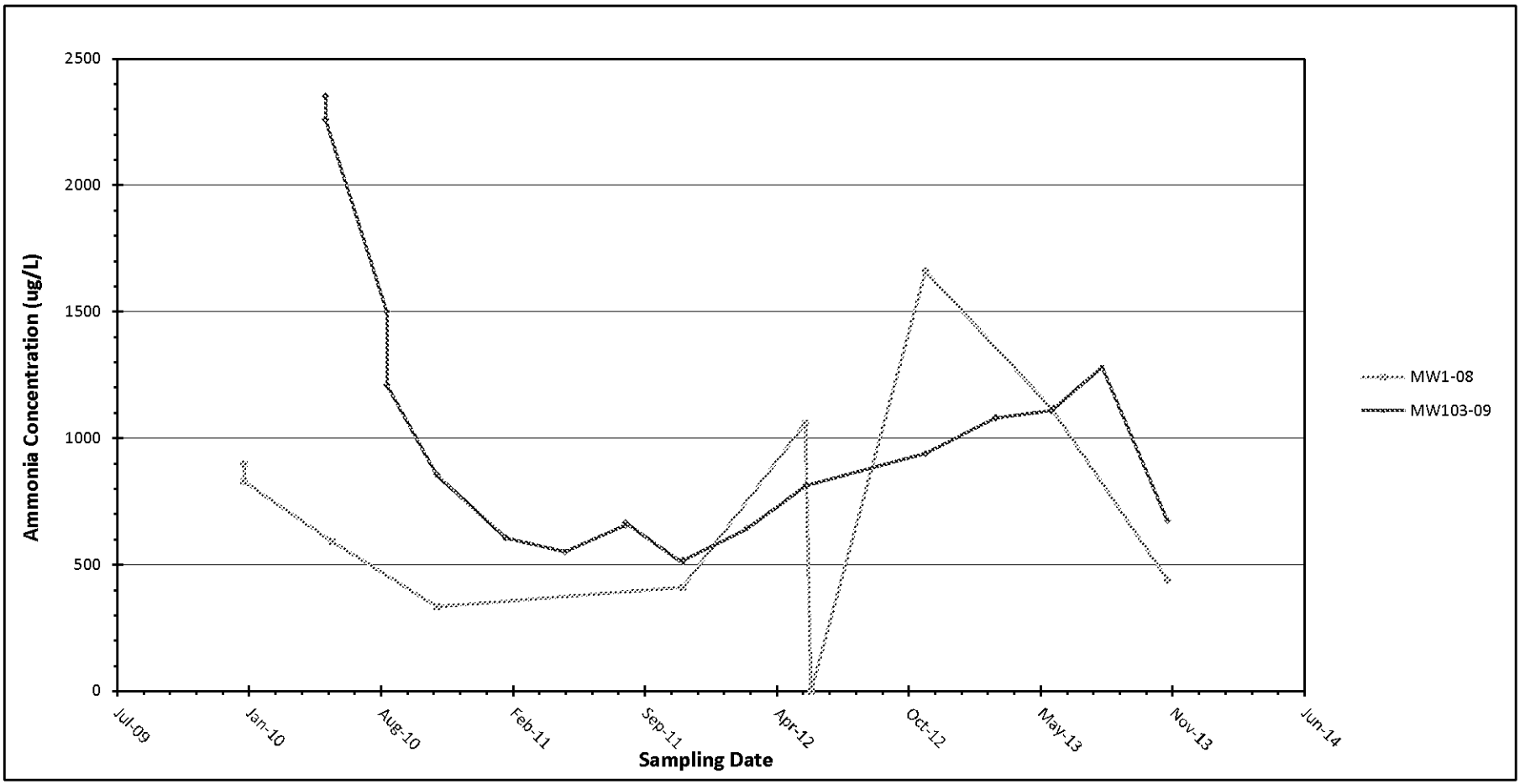


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

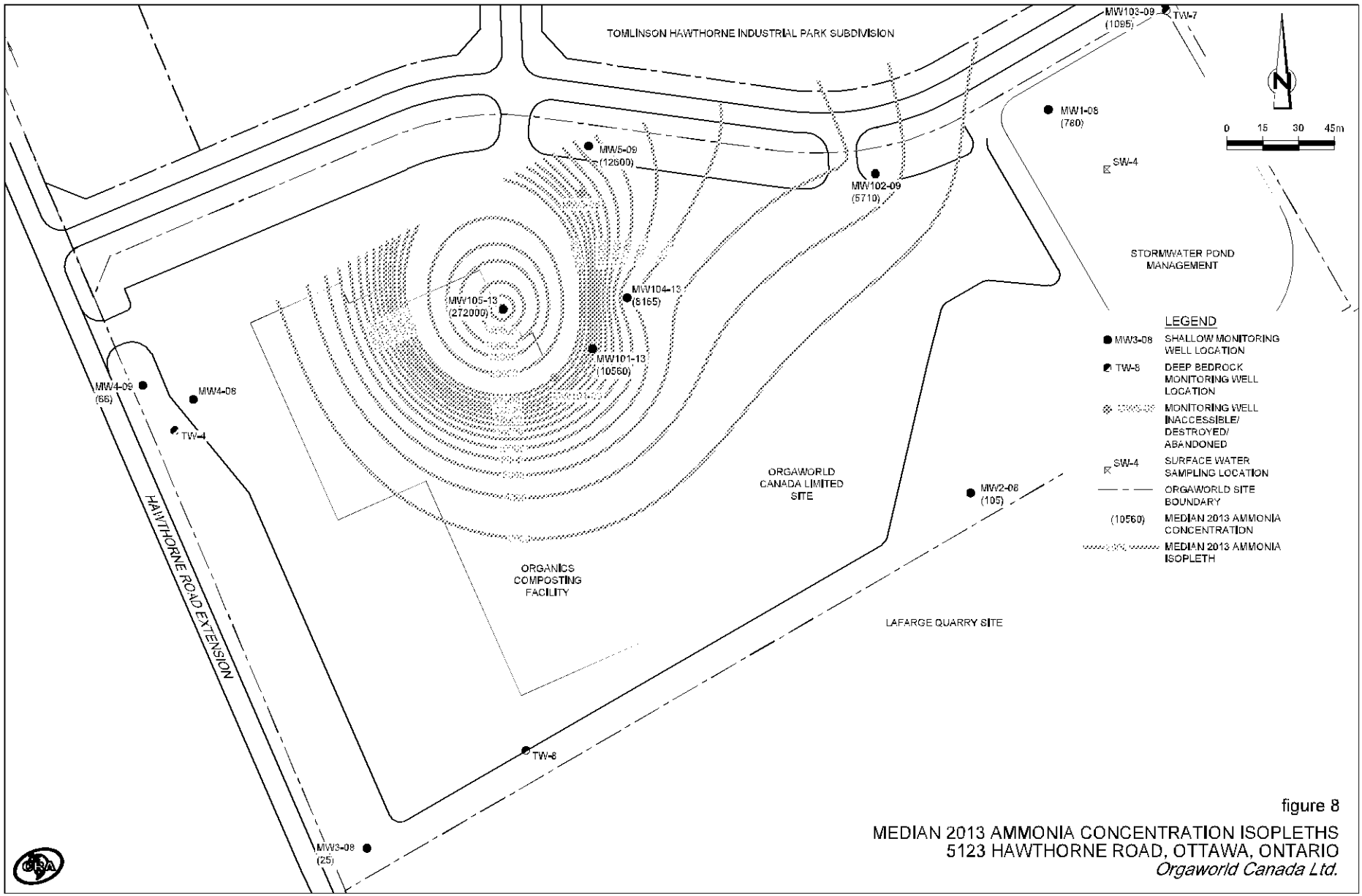


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

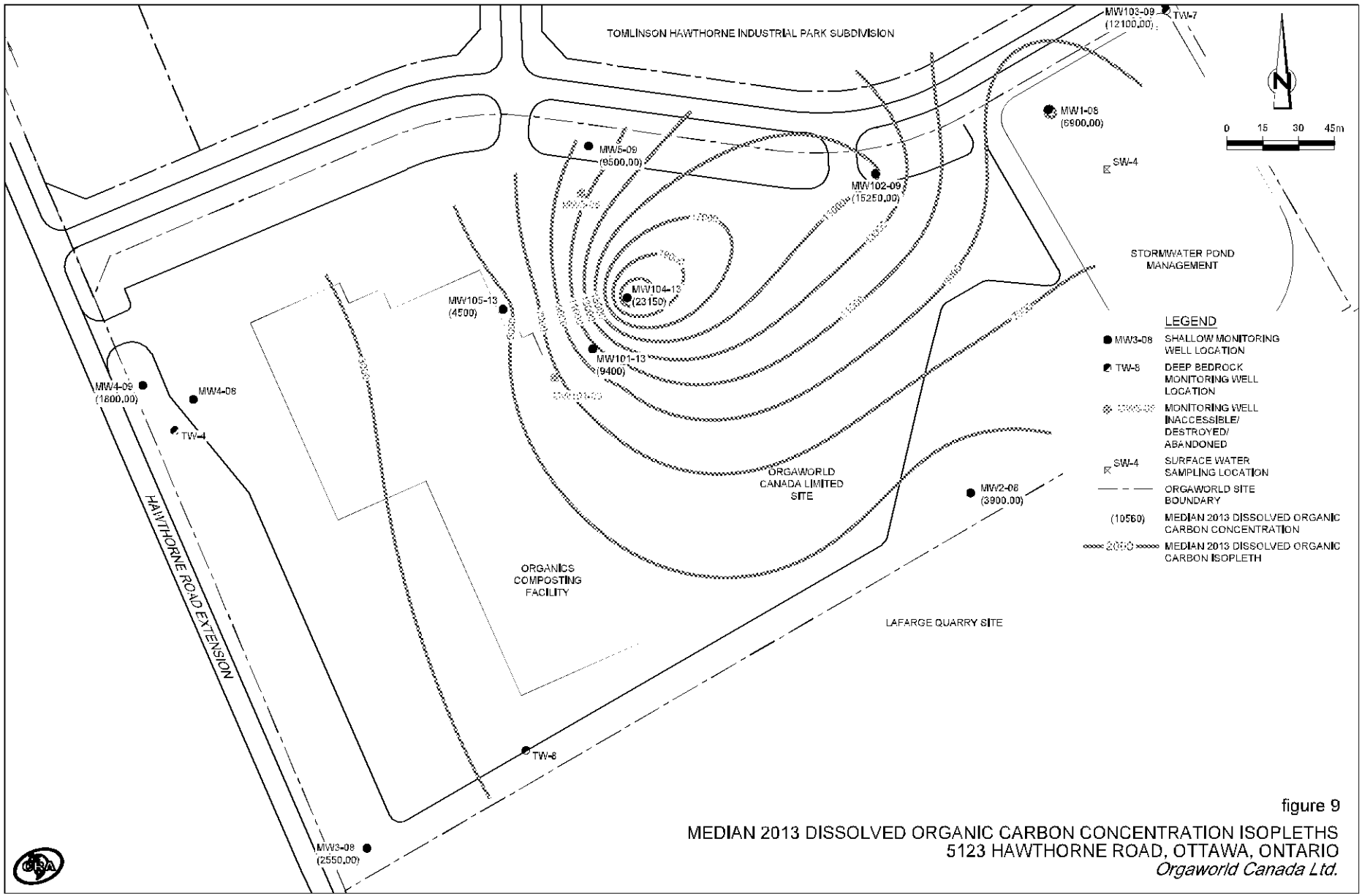


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

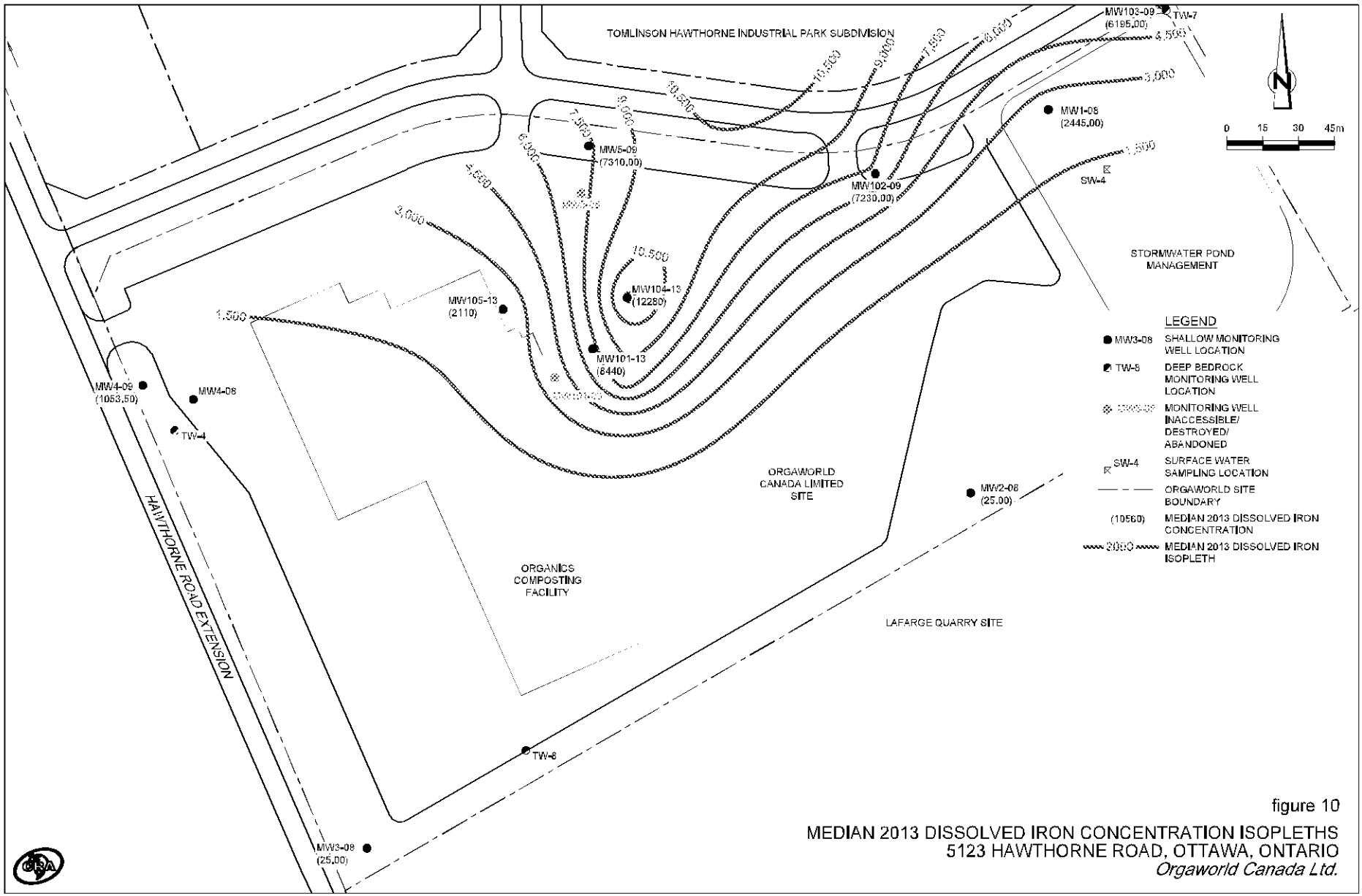


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

003174

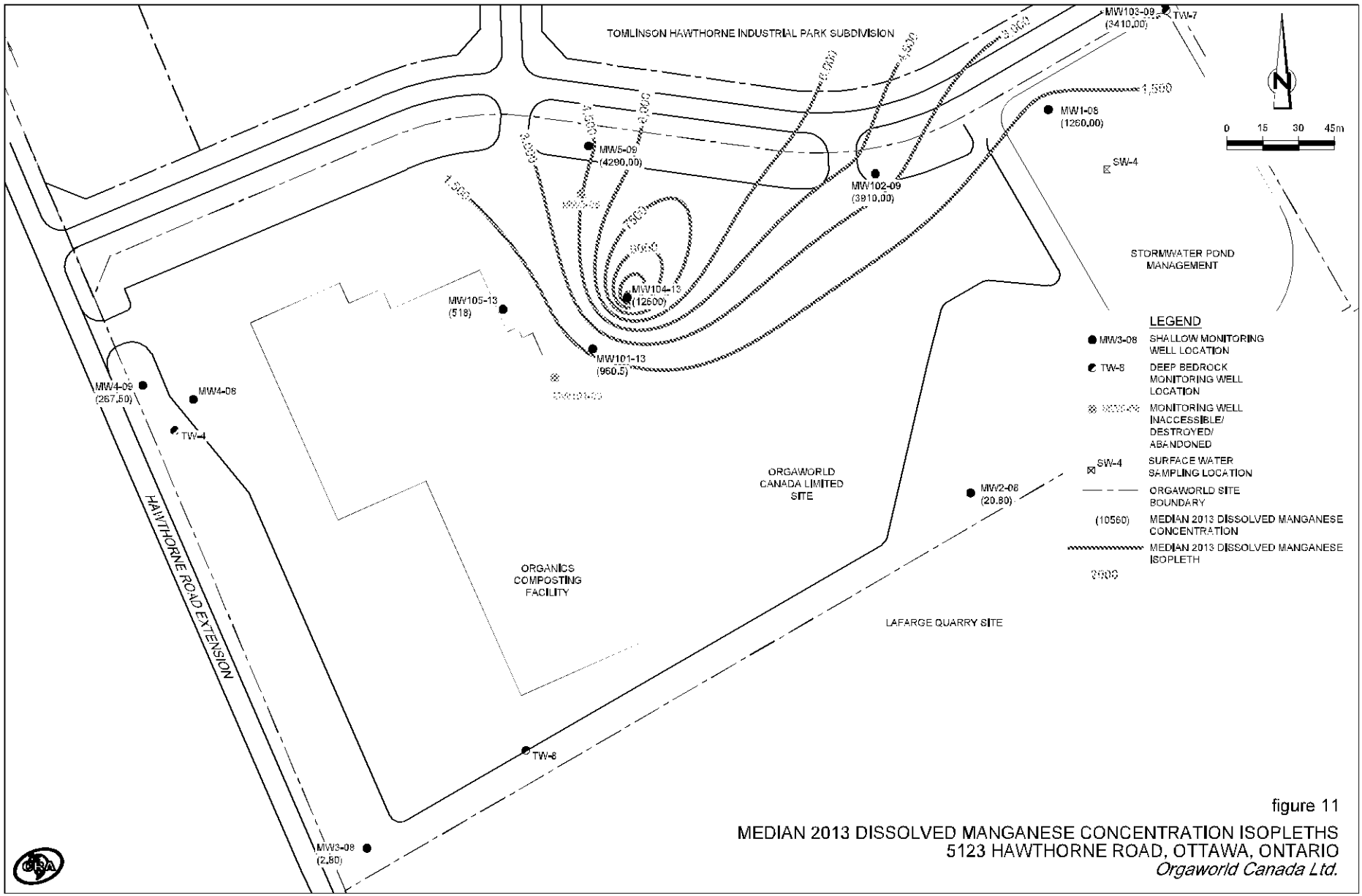
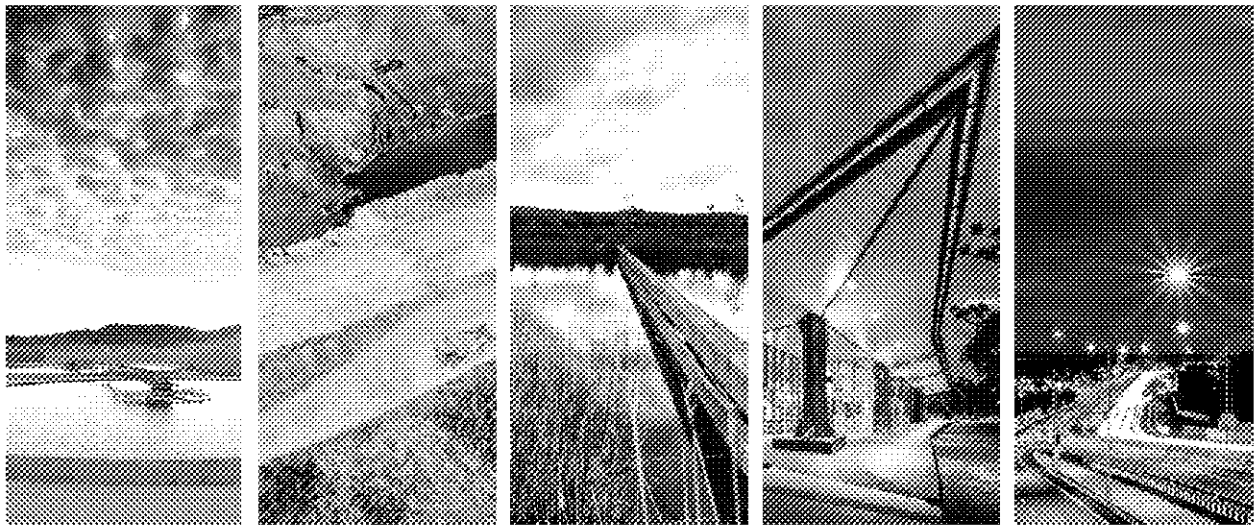


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014



2016 Groundwater and Surface Water Monitoring Report

Orgaworld Organics Facility
5123 Hawthorne Road
Ottawa, Ontario

Orgaworld Canada Limited

GHD | 651 Colby Drive Waterloo Ontario N2V 1C2 Canada
045804 | 58 | **** | Report No 66 | March 31 2017

Table of Contents

1. Introduction 1
   - 1.1 Site Background 1
   - 1.2 Site Setting 2
   - 1.3 Site Processes 3
   - 1.4 MOECC Correspondence to Date 4
   - 1.5 Groundwater/Surface Water Monitoring Activities 5
2. Physical Setting 6
   - 2.1 Site Geology 6
   - 2.2 Site Hydrogeology 8
   - 2.3 Surface Water and Drainage Features 8
   - 2.4 Groundwater Use 8
3. Monitoring Program 9
   - 3.1 Monitoring Network 9
   - 3.2 Monitoring Protocol 9
     - 3.2.1 Groundwater Monitoring 9
     - 3.2.2 Surface Water Monitoring 10
   - 3.3 Quality Assurance/Quality Control Program 10
4. Monitoring Results 11
   - 4.1 Groundwater Hydraulic Monitoring 11
   - 4.2 Water Quality Monitoring 12
     - 4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality 12
     - 4.2.2 Deep Bedrock Aquifer Groundwater Quality 18
     - 4.2.3 Surface Water Quality 20
5. Shallow Groundwater Extraction System 21
6. Compliance and Trigger Level Program 22
   - 6.1 Trigger Parameters 22
   - 6.2 Trigger Concentrations 23
   - 6.3 Trigger Level Assessment 23
7. Conclusions 25
8. Recommendations 26
9. References 26

Figure Index

Figure 1.1	Site Location Map
Figure 1.2	Site Plan
Figure 3.1	Groundwater and Surface Water Monitoring Locations
Figure 3.2	Orgaworld Property Groundwater and Surface Water Monitoring Locations
Figure 4.1	Unconfined Shallow Groundwater Elevations – May 17, 2016
Figure 4.2	Unconfined Shallow Groundwater Elevations – November 15, 2016
Figure 4.3	Bedrock Groundwater Elevations – May 17, 2016
Figure 4.4	Bedrock Groundwater Elevations – November 15, 2016
Figure 4.5	Median 2016 Ammonia Concentration Isopleths
Figure 4.6	Median 2016 Dissolved Iron Concentration Isopleths
Figure 4.7	Median 2016 Dissolved Manganese Concentration Isopleths
Figure 4.8	Median 2016 Dissolved Organic Carbon Concentration Isopleths
Figure 4.9.1	Temporal Plots Selected Parameters MW1 08
Figure 4.9.2	Temporal Plots Selected Parameters MW2 08
Figure 4.9.3	Temporal Plots Selected Parameters MW3 08
Figure 4.9.4	Temporal Plots Selected Parameters MW4 08 & MW4 09
Figure 4.9.5	Temporal Plots Selected Parameters MW5 09
Figure 4.9.6	Temporal Plots Selected Parameters MW101 09 & MW101 13
Figure 4.9.7	Temporal Plots Selected Parameters MW102 09
Figure 4.9.8	Temporal Plots Selected Parameters MW103 09
Figure 4.9.9	Temporal Plots Selected Parameters MW104 13
Figure 4.9.10	Temporal Plots Selected Parameters MW105 13
Figure 4.9.11	Temporal Plots Selected Parameters MW106 15
Figure 4.9.12	Temporal Plots Selected Parameters – EW107 15
Figure 4.10	Northern Ditch Topography with May 17, 2016 Groundwater Contours
Figure 4.11.1	Temporal Plots Selected Parameters TW 7
Figure 4.11.2	Temporal Plots Selected Parameters TW 4
Figure 4.11.3	Temporal Plots Selected Parameters – TW 8
Figure 4.12	Temporal Plot Select Parameter – SW4

Table Index

Table 2.1	Monitoring Location Details
Table 3.1	2016 Monitoring Program Schedule
Table 3.2	2017 Monitoring Program Schedule
Table 4.1	Groundwater Elevations
Table 4.2	Shallow Unconfined Aquifer Groundwater Analytical Results
Table 4.2A	MW103 09 Analytical Results – PWQO Comparison
Table 4.3	Deep Bedrock Aquifer Groundwater Analytical Results
Table 4.4	Surface Water Analytical Results
Table 4.5	SW4 09 Monthly Sampling Analytical Results
Table 5.1	EW107-15 Daily Pumping Log

Appendix Index

Appendix A	Environmental Compliance Approval (No. 7251 8GKRPD and No. 2844-9YNGZC)	
Appendix B	Background Correspondence	
	Appendix B1	Compliance and Trigger Level Program Memorandum
	Appendix B2	Monitoring Program Rationalization Memorandum
	Appendix B3	Groundwater Assessment and Work Plan Memorandum
Appendix C	Stratigraphic and Instrumentation Logs	
	Appendix C1	Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs
	Appendix C2	Deep Bedrock Water Well and Stratigraphic Logs
Appendix D	QA/QC Assessment Memorandum and Laboratory Analytical Reports	
Appendix E	2010 – 2015 Analytical Data	

1. Introduction

GHD Ltd. (formerly Conestoga-Rovers & Associates [CRA]) was retained by Orgaworld Canada Ltd. (Orgaworld) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Orgaworld Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

A Site location map is provided on Figure 1.1.

The 2016 Monitoring Program was completed in general accordance with the scope of work outlined in the June 25, 2009 correspondence to the Ministry of the Environment and Climate Change (MOECC) under MOECC reference number 4852-7KEQ29, and as required under the Facility's Industrial Sewage Works Environmental Compliance Approval (No. 7251-8GKRPD), as amended on May 30, 2011 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A which is included on the CD at the end of this report. Please note that all Appendices are included on the CD.

The purpose of the Monitoring Program is to assess the potential for activities conducted at the Site to adversely affect the surrounding surface water and groundwater quality, in accordance with the ECA.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Orgaworld is a tenant of Tomlinson.

Between June and August 2008, GHD conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO facility in the southwest portion of the HIP (CRA, 2008a). GHD submitted the ESAs to the City of Ottawa on behalf of Orgaworld.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates Ltd. (Golder) conducted a pumping test and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, GHD was tasked by Orgaworld to generate the Monitoring Program, based on a request from the MOECC through the process of reviewing the ECA application. In March 2010, the Monitoring Program was modified through an ECA amendment to reflect current Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, GHD prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/2015. The TLP was submitted to the MOECC along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 5.0. For reference, a copy of the memorandum sent to the MOECC that outlines the updated TLP is included in Appendix B1.

GHD prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure that groundwater and surface water was being adequately monitored. This was accomplished through a review of the monitoring program and removal of any redundant or unnecessary monitoring. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of GHD's memorandum outlining the MPR is included in Appendix B2. The 2016 monitoring program remained largely unchanged from 2015. GHD received MOECC approval to implement the changes to the monitoring program in a memo dated January 3, 2017. The 2017 monitoring program will be amended to reflect the changes proposed in the MPR.

On February 1, 2017, the MOECC issued a revised ECA (No. 2844-9YNGZC) for the facility. The revised ECA incorporates the updated TLP submitted to the MOECC in March 2015. The previous ECA (No. 7251-8GKRPD) was in effect during the monitoring period for this report. Future monitoring reports will follow the conditions included within this revised ECA. A copy of the revised ECA is included in Appendix A.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2016.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of a large processing plant with a delivery/receiving area, administrative office, septic bed area, and emission stack. An asphalt skirt extends around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system. The on-Site perimeter ditch system drains to the storm water management (SWM) pond located at the east side of the Site (see Figure 1.2) Surface run-off from the Site generally drains to the on-Site perimeter ditch system to the on-site SWM pond where it is impounded for re-use in the Facility process or until manual release off-Site through local roadside ditches within the HIP subdivision, which discharge to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River. The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, levelled fill material, and a few shrubs and grass scrub.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects as backfill, and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to convey groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry (all located west/southwest of the Site) has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), brush material, food wastes (solid or sludge), commercial waste (restaurant wastes, etc.) and other sludges. Organics are processed into an unrestricted use product (UUP) suitable for application on agricultural lands, use as potting soil, or for other similar applications. The Facility is designed to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts that are a result of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond and is retained for use in Orgaworld's process, in accordance with the Site's ECA. If excess water is available in the SWM pond, then Orgaworld undertakes analysis and testing of the pond water. If analysis and testing show acceptable water quality, the excess stormwater is discharged into the HIP roadside ditch network.

1.4 MOECC Correspondence to Date

The correspondence below documents the communications between Orgaworld and the MOECC with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 7251-8GKRPD:

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b).
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009).
- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009).
- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a).
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010).
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011).
- Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013).
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014).
- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015).
- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015).

- Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2015).
- Memorandum RE: Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa- Hydrogeologic Assessment from Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region (MOECC, January 3, 2017).

  Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOECC, February 1 ,2017).

1.5 Groundwater/Surface Water Monitoring Activities

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), GHD has completed ongoing monitoring from 2009 to present.

The following monitoring activities were completed at the Site during the current monitoring period:

- February 2016 - Quarterly sampling
  - Sampling at seven shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, and MW106-15)
  - Hydraulic monitoring at the remaining shallow unconfined aquifer and deep bedrock aquifer wells
  - Hydraulic monitoring of the staff gauges in the northern ditch
- May 2016 - Semi-annual sampling
  - Sampling at four surface water locations (SW1-09 to SW4-09)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
- August 2016 - Quarterly sampling
  - Sampling at seven shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, and MW106-15)
  - Hydraulic monitoring at the remaining shallow unconfined aquifer and deep bedrock aquifer wells
  - Hydraulic monitoring of the staff gauges in the northern ditch
- November 2016 - Semi-annual sampling
  - Sampling at four surface water locations (SW1-09 to SW4-09)

- Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
- Sampling and hydraulic monitoring at the extraction well, EW107-15
- Hydraulic monitoring of the staff gauges in the northern ditch

2. Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and through examination of the stratigraphic logs.

A total of 19 monitoring wells and one extraction well have been completed in the shallow unconfined aquifer unit throughout the HIP subdivision, 16 of which have been completed within the limits of the Orgaworld Site.

Test wells (TW-1 to TW-6) were completed by Golder in 1993 and 2008. TW-1 through TW-6 extend into the deep bedrock aquifer unit which was identified as the Nepean bedrock formation (Golder Associates, 2008).

In May 2010, GHD oversaw the installation of two on-Site deep bedrock test wells (TW-7 and TW-8). The stratigraphic logs from GHD's monitoring wells confirmed the presence of limestone.

Ontario Geologic Survey (OGS) mapping shows the Oxford Formation (Dolostone) covers much of the Site with the March and Nepean Formations (Dolostone/Sandstone formations) exist in the Northern portions of the HIP (OGS, Map 1508A).

The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix C for the overburden and deep bedrock wells. Monitoring location details are provided in Table 2.1.

Examination of the stratigraphic logs prepared by GHD indicates that the geology is generally consistent across the HIP subdivision. Five main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer
- Alluvial sand and silts
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, marine deposits with some removal by fluvial erosion. The Site is located on a former

quarry and thus filling activities have been carried out since the early 1990's which have significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the ground surface; however the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by GHD indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick), occasionally some clay, boulders, and dredged sediment. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was dark brown to black in colour, and was generally loose and moist. Topsoil was found in most locations that were not used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface outcrops to a depth of approximately 7.6 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to identify and characterize the bedrock. The bedrock at MW2-08 and MW4-08 was described as fractured grey limestone. The

bedrock was generally found to be fractured in the upper meter, where core recovery ranged from 93 to 94 percent and Rock Quality Designation (RQD) ranged from 63 to 75 percent. At depths in excess of 1 m into the bedrock, at MW2-08, the bedrock was found to be more competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- A shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock.
- A deep confined bedrock unit (referred to as the deep bedrock aquifer).

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

As part of GHD's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. During the pumping test, water levels gathered from the shallow unconfined aquifer unit indicated no corresponding drawdown between the shallow and deep wells. Water levels in the deep bedrock aquifer unit lowered from 1.2 to 3.7 m during the 6-hour period. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface water run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to the on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch which runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually out letting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Orgaworld Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by GHD shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep

bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs (Appendix C2). Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. As necessary, TW-4 is also used as an alternative refilling source for replenishing the fire suppression water holding tank.

3. Monitoring Program

The Site's Monitoring Program consists of the following:

- Hydraulic (water level) monitoring (in the monitoring wells, extraction well, and surface water staff gauges)
- Groundwater and surface water sample collection and analysis
- Quality Assurance/Quality Control (QA/QC) sample collection and analysis

3.1 Monitoring Network

Currently the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer unit: twelve groundwater monitoring wells and one extraction well: MW01-08, MW2-08, MW3-08, MW4-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, MW106-15, and EW107-15.
- Deep bedrock aquifer unit: three monitoring wells: TW-4, TW-7, and TW-8.

Surface water quality is monitored through four surface water monitoring locations (SW1-09 to SW4-09). Surface water level monitoring in the northern ditch is monitored by the four staff gauges (SG-1 through SG-4).

Table 3.1 provides a summary of the 2016 monitoring program. A summary of the approved monitoring program for 2017 is provided in Table 3.2.

The groundwater and surface water monitoring locations within the HIP subdivision are provided on Figure 3.1. Figure 3.1 also shows the Site limits included in the Orgaworld lease and the boundary of the HIP subdivision.

Figure 3.2 shows the groundwater and surface water locations on the Orgaworld Property. Each of the newly installed locations have not been surveyed. Their approximate locations are shown on Figure 3.2.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following GHD's field method guideline protocols, which are consistent with MOECC requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling techniques with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled following stabilized field readings.

During mid-2016, a dedicated sampling port was installed in the Facility to facilitate sampling from EW107-15. The sample is collected after the extraction well and sample port are purged for several minutes to ensure the sample port and associated lines are clear of stagnant water. The May 2016 sample collected from EW107-15 was collected following GHD's low-flow sampling techniques.

Due to the greater depth to groundwater, deep bedrock aquifer unit monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted to ALS Environmental (ALS) of Waterloo, Ontario for analysis under standard chain-of-custody protocol. Analytical results are discussed in Section 4.0.

The analytical parameter list for groundwater is summarized in Table 3.1.

The original laboratory analytical reports are provided in Appendix D.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW1-09 to SW4-09) following GHD's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch, creek or pond water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, dissolved oxygen, oxidation reduction potential (ORP), turbidity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. Potential dissolution of particulates by the acid preservative in the metals sample bottles may affect parameter results for the surface water samples. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

Hydraulic level monitoring is completed at four staff gauges located throughout the northern Site ditch. The depth to surface water was visually observed to be dry during 2016; however, future depth to water measurements will be made using a steel tape measure using the top of the staff gauge (a steel t-bar) as the reference point. Surface water elevations will be calculated for each staff gauge by subtracting the depth to water measurement from the reference point elevation.

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and

laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2016 analytical data were made through the QA/QC assessment.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix D. The qualifications indicated in Appendix D do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

4. Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 - Groundwater Hydraulic Monitoring
- Section 4.2 - Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow unconfined aquifer unit, deep bedrock aquifer unit, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the May and November 2016 monitoring events are consistent with those observed historically at the Site, and were used to develop groundwater contour figures, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the May 2016 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2016 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.39 to 98.62 metres above mean sea level (m AMSL) at MW103-09 and MW3-08 during the May monitoring event and 90.00 to 98.92 m AMSL at MW103-09 and MW3-08 during the November event. Based on the groundwater elevations gathered in May and November 2016, flow occurs in an east-northeast direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the May and November 2016 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.02 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 40 percent for the shallow

unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)

K = hydraulic conductivity (L/T)

i = horizontal hydraulic gradient (unitless)

n = effective porosity

Based on this equation, the local groundwater velocity in 2016 is estimated to range from a few millimeters per year to a high of approximately 6.7 m per year in the fill deposits and shallow fractured bedrock. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

During the 2016 monitoring period, the deep bedrock aquifer unit groundwater levels ranged from a low of82.47 m AMSL (TW-8) to high of88.86 m AMSL (TW-7). The seasonal water level fluctuation ranged from 0.56 m (TW-8) to 0.59 m (TW-4). Based on the 2016 groundwater elevations, groundwater in the deep bedrock aquifer unit flows in a west-southwest direction, which is opposite to the flow direction of the shallow unconfined aquifer unit. It is likely that the presence of a quarry to the west and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit. This is consistent with previous interpretations of groundwater flow across the Site.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.015 and 0.014 m/m for the May and November 2016 events.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in an east-northeast direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08, MW4-08, and MW4-09
- Upgradient/cross gradient wells: MW2-08
- Facility Area: EW107-15, MW101-13, and MW105-13
- Downgradient: MW1-08, MW5-09, MW102-09, MW103-09, MW104-13, and MW106-15

Tabulated analytical results for the shallow unconfined aquifer from the 2016 sampling program are provided in Table 4.2.

On behalf of Orgaworld, GHD completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment, Appendix B3). The Groundwater Assessment evaluated the 2013 and historical groundwater quality in order to determine appropriate parameters of concern for the Site. Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of an ammonia plume within the shallow unconfined aquifer unit, originating from the Facility.

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MOECC criteria listed in the Ontario Drinking Water Standards (ODWS) (MOECC, 2003, amended 2006). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

Ammonia and DOC are direct indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2016 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleth figures are useful for evaluating and presenting spatial patterns in groundwater chemistry.

In each figure (Figures 4.5 through 4.8), the presence of elevated concentrations of each indicator parameter is identified in close proximity to or just downgradient from the Facility (i.e., at MW104-13 and various downgradient locations). The elevated concentrations appear to extend from the Facility to the east-northeast following the direction of groundwater flow. Some decrease in concentrations are observed with increased distance from the facility (following the path of groundwater flow in the shallow unconfined aquifer) and concentrations remain low to the west, south, and southeast of the Facility. Please note that because of the difference in analytical results between the spring and fall samples, the median concentrations from EW107-15 have not been included in Figures 4.5 to 4.8. Further discussion of the extraction well is provided in Section 5.0.

This distribution of elevated concentrations of ammonia, DOC, iron, and manganese is consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.

The 2016 median concentrations show that elevated DOC and iron concentrations extend to MW103-09, located in the northeastern corner of the Site, but that elevated ammonia and manganese are limited to the western side of the stormwater management pond or the Northern

Ditch (in the vicinity of MW102-09). This indicates that there may be some additional source of impacts contributing to the elevated concentrations at MW103-09.

Figures 4.9.1 to 4.9.12 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges for ammonia, DOC, iron, and manganese in the shallow unconfined aquifer:

Location	Trend	Ammonia Concentration Range (mg/L)	
		Historic (pre-2016)	**2016**
MW4-08	stable	ND(0.050) – 0.069	0.030 – 0.048
MW4-09	stable	ND(0.050) – 0.117	0.037 – 0.073
MW3-08	stable	ND(0.050) – 0.123	ND(0.020) – 0.036
MW2-08	↓	ND(0.050) – 0.105	ND(0.020) – 0.054
EW107-15	↓	8.01 – 51.3	0.123 – 14.1
MW105-13	↓	5.71 – 76.0	4.88 – 16.0/16.1
MW101-13	stable	ND(0.450) – 34.9	0.237 – 29.5
MW104-13	↓	1.93 – 14.3	1.20 – 5.41
MW5-09	↑	0.32 – 31.4	14.7 – 18.7
MW102-09	↑	ND(0.050) – 10.6	6.61 – 7.18
MW1-08	stable	0.335 – 2.08J	0.803 – 0.917
MW103-09	stable	0.508 –2.35	0.867/0.909 – 1.43
MW106-15	↓	2.90 – 10.0	1.91 – 4.79

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

As presented above, each of the upgradient locations have shown relatively stable and low ammonia levels. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have remained consistently very low to non-detect.

During the 2016 reporting year, overall trends of ammonia concentrations have been decreasing particularly near the facility and downgradient. Ammonia concentrations at MW105-13 and MW101-13 previously showed increasing trends. Current analytical data indicates declining and stable trends at each facility area well. The analytical database for EW107-15 is limited; however, concentrations indicated a significant decreasing trend. Continued monitoring is required to determine/confirm the trend at the extraction well particularly during active pumping periods.

With the exception of MW5-09, and MW102-09 each of the downgradient monitoring locations continue to show overall stable or decreasing temporal trends in ammonia concentrations. MW5-09 and MW102-09 continue to exhibit elevated concentrations downgradient of the Facility and adjacent to the run-off ditches to the north the Site.

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
		Historic (pre-2016)	**2016**	**Historic (pre-2016)**	**2016**
MW4-08	stable and ↓	ND(0.050) – 0.320	ND(0.010) - ND(0.10)	0.0861 – 1.10	0.160 – 0.207
MW4-09	stable and ↓	ND(0.050) – 1.86	0.045 – 0.410	0.137 – 1.25	0.126 – 0.160
MW3-08	↓	ND(0.050) – 1.04	ND(0.010) - ND(0.10)	ND(0.00050)– 0.0987	ND(0.00050) – 0.0386
MW2-08	↓	ND(0.050) – ND(0.10)	ND(0.010)	0.00072 – 0.177	0.00171 – 0.00270
EW107-15	↑ and ↓	0.19 – 0.40/0.45	0.022 – 2.56	1.04 – 4.52/4.57	0.0650 – 1.01
MW105-13	↑	0.080/0.095 – 7.61	2.20 – 5.77	0.413/0.443 – 1.06	0.534/0.536 – 0.852
MW101-13	↓	ND(0.050) – 34.5	ND(0.10) – 7.07	0.0299 – 2.24	0.0114 – 1.09
MW104-13	↓	0.071 – 23.9	6.05 – 14.5	0.548 -19.4	4.01 – 8.13
MW5-09	↑ and stable	1.99 – 14.5	4.66 – 10.3	2.45 – 5.33	2.67 – 3.58
MW102-09	↓ and ↑	ND(0.010) – 24.0/24.7	4.06 – 8.02	ND(0.00050) – 5.02	2.50 -5.16
MW1-08	↓	0.897 – 16.6/17.2	6.28 – 8.11	0.539 – 10.9/11.0	1.26 – 2.09
MW103-09	↓	2.69 – 22.9/23.8	3.73/3.81 – 8.40	1.78 – 7.70/7.77	2.58 – 4.29
MW106-15	stable	1.50 – 3.09/3.20	0.838 – 4.66	1.35 – 2.44	1.06 – 2.62

Notes:
ND non-detect at the associated value

Elevated concentrations of dissolved iron and manganese are apparent in the facility area and downgradient of the facility, with the most elevated concentrations being reported at MW101-13, MW105-13, MW104-13, MW5-09, and MW102-09. This pattern is generally consistent with the patterns observed for ammonia.

Concentrations of dissolved iron and manganese show variable temporal trends downgradient of the Facility. However, with the exception of iron and manganese at MW105-13, iron at MW5-09, and manganese at MW102-09 concentrations of both parameters have continued to show an overall decreasing trend. The overall decreases are partially related to sharp drops in iron concentrations observed between May 2010 and May 2011 at several monitoring locations. Since 2011 many locations have shown relatively stable levels of dissolved iron and manganese.

Concentrations of both iron and manganese have shown variable concentrations over the past monitoring year. This is particularly evident at monitoring wells within the facility area and immediately downgradient. Continued monitoring is recommended to observe the evolution of the contaminant plume.

Location	Trend	DOC Concentration Range (mg/L)	
		Historic (pre-2016)	**2016**
MW4-08	Stable to ↓	ND(1.0) – 8.7	1.1 – 3.5
MW4-09	Stable to ↓	1.0 – 3.1	1.3 – 2.8
MW3-08	Stable	1.5 – 3.5/9.0	2.4 – 2.9
MW2-08	↑	1.5 – 10.0	5.1 – 10.0
EW107-15	↓*	10.7 – 965/1,030	3.2 – 6.3
MW105-13	Stable to ↓	2.6 – 9.3/9.4	3.8 – 5.6
MW101-13	Stable	3.6 – 14.8	4.5 – 10.4
MW104-13	↓	6.5 – 51.2	5.9 – 9.2
MW5-09	Stable	5.4 – 11.1/12.1	6.6 – 11.4
MW102-09	↓	ND(1.0) – 18.5	8.3 – 11.0
MW1-08	Stable	6.2 – 10.7	7.3 – 9.7
MW103-09	Stable	3.0/8.9 – 17.9	8.5 – 11.5
MW106-15	↑	8.0 – 12.7	9.9 – 13.0

Notes:
ND non-detect at the associated value
* Initial DOC levels in August 2015 were highly elevated. Trend will be reassessed with further data.

The current levels of DOC have remained consistent with some minor decreasing trends. Concentrations of DOC are relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility had previously demonstrated trends of elevated and increasing levels of DOC. Over the past monitoring year many of the concentrations have demonstrated decreasing or stable trends. Further sampling results are needed to establish the trend at EW107-15 following the initial August 2015 results being highly elevated. The 2016 DOC levels from this location were lower than the previous year.

In general, the increases in DOC concentrations downgradient of the facility relative to upgradient concentrations are minor compared to those observed for ammonia, iron or manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MOECC on the 2012 annual report, the MOECC requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of the future annual monitoring reports. Table 4.2A provides the 2016 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during the current monitoring period. The following provides a summary of those exceedances:

- Arsenic – 5 of 5 samples
- Cobalt - 1 of 5 samples
- Copper - 1 of 5 samples
- Iron – 5 of 5 samples

- Phenols – 3 of 5 samples
- Phosphorus – 3 of 5 samples
- Field Measured Dissolved Oxygen –4of4 measurements

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included that staff gauges be installed at four points within the northern ditch system and that a topographic survey of the northern portion of the Site be undertaken.

Topographic surveying of the northern ditch system (including the ditch which drains into the SWM Pond and the ditch that continues towards Findlay Creek – the HIP Ditch) was completed and the four staff gauges were installed in early 2015; however, the geodetic surveying of the staff gauges has not been completed to date. The Site's northern ditch was dry at each of the staff gauge locations during each monitoring event in 2016, which provides some evidence that a significant volume of groundwater may not be continuously discharging to the creek.

Figure 4.10 presents the results of the topographic surveying of the northern ditch overlain by the May 17, 2016 groundwater contours. The topographic contours are provided in 0.5 m intervals with the lowest elevation presented representing the bottom of the ditch.

As shown in Figure 4.10, the topography of the ditches is 'w' shaped. The two ditch valleys or troughs travel parallel to the northern Site boundary with the on-Site ditch (that drains to the SWM Pond) found south of the HIP ditch. The inferred groundwater elevations from May 17, 2016 coincide closely with the bottom elevation of the ditches, and are above the bottom of the northern (roadside) ditch in several locations. These locations are illustrated on Figure 4.10 and are interpreted to be areas where shallow groundwater is discharging to the northern ditch. It should be noted that cattails are present in portions of this ditch providing further support to this interpretation.

Based on the shallow groundwater aquifer unit flow patterns, some groundwater elevations are above the bottom of the roadside ditch in several sections. The intersection between the groundwater and topographic contours suggests that groundwater is discharging to surface water. The presence of cattails and other hydrophyllic vegetation at the base of this ditch is indicative of groundwater discharge to the ditch.

Figure 4.10 further shows that the total area where groundwater elevations are higher than the ditch bottom increases with proximity to the pond (the fall in the ditch is greater than the drop on groundwater elevation). Therefore, groundwater is likely discharging to the ditch during periods of high groundwater levels (typically during the spring freshet). This seepage is likely to be more prevalent closer to the stormwater pond.

However, as noted above each of the staff gauge locations did not contain sufficient standing or flow water for sampling during the 2016 monitoring events. Based on the information available, the volume of groundwater seeping into the ditch is too low to maintain a consistent base flow. It is likely that groundwater seepage into the ditch is largely lost to evapotranspiration.

In conclusion, small volumes of groundwater are likely seeping to the north roadside ditch but the volumes are insufficient to form a base flow. Based on current available information, groundwater

discharging to the ditch is unlikely to cause any adverse impacts to the surface water bodies in the vicinity of the Site.

4.2.2 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2016 sampling program are provided in Table 4.3.

Because the deep bedrock aquifer is a potential source of drinking water in the vicinity of the Site, Table 4.3 also provides a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOECC, June 2003, revised June 2006).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2016:

Location	ODWQS Exceedances	
	May 2016	November 2016
TW-7 (upgradient)	iron, manganese, total coliform bacteria, pH (field), turbidity (field and lab)	total coliform bacteria, pH (field and lab), turbidity (field and lab)
TW-4 (downgradient)	iron, manganese, alkalinity, chloride, total coliform bacteria, TDS, turbidity (lab)	manganese, alkalinity, chloride, TDS, turbidity (field and lab)
TW-8 (downgradient)	iron, manganese, ammonia, total coliform bacteria, TDS, turbidity (lab), pH (field)	total coliform bacteria, TDS, turbidity (field and lab)

ODWQS Operational Guidelines as well as the criteria for colour, temperature, and turbidity do not relate directly to water samples collected from monitoring wells. The criteria for each are included in the ODWQS as they related to the effectiveness of water treatment and are thus not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and are thus not directly relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer has historically been poor. Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer.

Water quality results from the both downgradient wells show that operations at the Facility are potentially degrading the already poor upgradient water quality. Figures 4.11.1 to 4.11.3 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

		Ammonia Concentration Range (mg/L)		DOC Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2016)**	**2016**	**Trend**	**Historic (pre-2016)**	**2016**
TW-7	↓	ND(0.05) – 0.157	0.033 – 0.083	↓	2.8 -15.1	3.8 – 4.5
TW-4	↑ to stable	0.218 – 3.72	0.67 – 0.795	stable	4.4 – 8.0	4.8 -7.6
TW-8	stable	<0.050 – 4.60	0.057 – 0.561	↓	2.4 – 13.5	1.9 – 3.9
		Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2016)**	**2016**	**Trend**	**Historic (pre-2016)**	**2016**
TW-7	↓	0.082 – 11.1	0.199 – 1.08	↓	0.0470 – 1.71	0.0486 – 0.218
TW-4	↓	ND(0.050) – 3.30	0.025 – 0.67	↑	0.496 – 1.94	1.55 – 1.69
TW-8	↓	ND(0.050) – 6.25	ND(0.10) – 1.55	↓	0.0439 – 2.95	0.0256 – 0.434

Based on the temporal trends in 2016 (which differed little from 2015), there continues to be evidence of minor potential facility-related impacts to the deep bedrock aquifer. In particular, overall increasing trends in ammonia concentrations are apparent between 2010 and 2016 in TW-4. Concentrations of ammonia showed notable decreases in late 2014 and throughout 2016 at downgradient monitoring wells; however, the presence of ammonia at greater concentrations in downgradient wells indicates that Facility operations may be degrading water quality in the deep bedrock aquifer. Ammonia concentrations in the upgradient monitoring well have steadily remained below or near the detection limits.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. In addition, recent monitoring results indicate a sharp decrease in ammonia concentrations at both downgradient deep aquifer monitoring wells. These results could be indicative of natural fluctuations or improving water quality within the deep bedrock aquifer.

It is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential facility-related water quality impacts. If trends of

deteriorating water quality are consistent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy. Based on the monitoring results from the 2016 monitoring period, no additional investigation is necessary at this time.

4.2.3 Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW4-09) and local ditch monitoring locations (SW1-09 through SW3-09) are presented in Table 4.4 and compared to the Provincial Water Quality Objectives (PWQO). The following table summarizes the surface water monitoring parameters that did not meet the PWQO during the 2016 sampling events.

Location	Parameter (mg/L)	PWQO	Spring	Fall
SW1-09	Molybdenum	0.04	0.230	0.276
SW1-09	Phenolics	0.001	0.0017	0.0017
SW1-09	Field pH	6.5-8.5	8.62	-
SW2-09	Iron	0.3	0.444	-
SW2-09	Phenolics	0.001	0.0018	0.0044
SW2-09	Phosphorus	0.01	0.301	0.0141
SW2-09	Field pH	6.5-8.5	9.19	-
SW3-09	Molybdenum	0.04	-	0.0515
SW3-09	Phenolics	0.001	0.0023/0.0020	0.0035
SW3-09	Phosphorus	0.01	0.0219/0.0214	0.0125
SW3-09	Field pH	6.5-8.5	9.65	-
SW4-09	Chromium	0.001	-	0.00150/0.00166
SW4-09	Iron	0.3	-	0.646/0.710
SW4-09	Phenolics	0.001	0.0022	0.0051/0.0067
SW4-09	Phosphorus	0.01	0.0627	0.215/0.234
SW4-09	Field pH	6.5-8.5	9.11	-

Notes:
0.0537/0.0653 indicates duplicate analytical results
- No exceedance for sampling event

In general, water quality at the downstream surface water monitoring location (SW3-09) is similar to the upstream surface water monitoring locations (SW1-09 and SW2-09), which indicates an upstream source impacting water quality.

Concentrations of phosphorus and total phenolics were consistently above the PWQO at each of the monitoring locations, with the exception of phosphorous at SW1-09 in 2016. In addition, sporadic elevated metals concentrations were noted at SW1-09, SW2-09, and SW3-09.

Previous assessments of the Site concluded that concentrations of un-ionized ammonia were showing increases at SW4-09. Temporal concentration versus time plots for ammonia, DOC, manganese, and iron levels at SW4-09 are presented on Figure 4.12. Figure 4.12 shows that ammonia concentrations spiked throughout 2014 and the 2016 results show a similar spike in November 2016. Iron and manganese were also elevated in the November 2016 samples. .

As discussed in Section 4.2.1, the potential for shallow groundwater to discharge to surface exists within the northern ditch and stormwater management pond. The presence of un-ionized ammonia at elevated concentrations in SW4-09 is likely related to the discharge of impacted groundwater directly to the SWP or via overland flow of impacted runoff entering the pond.

A total of 9 additional samples were collected by Orgaworld staff at surface water monitoring location SW4-09 during the 2016 monitoring period. Orgaworld staff collected monthly samples when the surface water was unfrozen. The analytical results for these samples have been included in Table 4.5 with results highlighted that did not meet their respective PWQO. As indicated in Table 4.5, parameter concentrations that did not meet their respective PWQO were noted for:

- Chromium
- Cobalt
- Escherichia Coli
- pH (Laboratory measured)
- Phenols
- Total Phosphorus
- Un-Ionized Ammonia

Water was discharged from the stormwater management pond once during the 2016 monitoring period in March. Based on the results of the surface water monitoring, there were no measureable effects on downstream surface water quality from the March 2016 discharge.

5. Shallow Groundwater Extraction System

Beginning on October 4, 2016 regular pumping from shallow groundwater extraction well EW107-15 commenced. The daily volumes pumped from EW107-15 are summarized in Table 5.1. EW107-15 is only pumped on days when the Facility is staffed and as such the total available pumping days during the period from October 4 to December 31 was 64 days. Of those available days the well was pumping on 35 days with total volume pumped of 51.19 m^3 (average 0.8 m^3/day).

As previously mentioned, EW107-15 was sampled twice during the current reporting period. The May 18, 2016 sample was collected following GHD's low-flow sampling methods. The November 2016 sample was collected via the dedicated sampling port. The following table provides a summary of the 2016 indicator parameters:

Parameter (mg/L)	May 18, 2016	November 16, 2016
Ammonia-N	0.123	14.1
Iron (dissolved)	0.022	2.56
Manganese (dissolved)	0.0650	1.01
DOC	3.2	6.3
Sulfate	304	945
TDS	673	1880

There is a notable difference in the concentrations reported in the May and November samples. Groundwater quality at the Site is seasonally variable; however, it is likely that using different sampling methods is the cause of a lot of the difference. Continued sampling is required to confirm the 2016 analytical results.

There is currently insufficient data to assess the effectiveness of the extraction well at controlling or reducing groundwater impacts at the Site. It is expected that continued operation of the shallow groundwater extraction well will, over time, remove the most heavily impacted groundwater from the facility area. This will result in improved water quality in both the facility area and downgradient plume which should, in turn, reduce the occurrence of Tier I trigger exceedances.

Future assessments of water quality (i.e., the 2017 annual report) will be used to evaluate the effectiveness of the extraction well at controlling the downgradient migration of Facility-related groundwater quality impacts.

6. Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA (2011) requires the development of trigger level criteria in accordance with MOECC Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MOECC, dated February 27, 2015, GHD provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B1. The memo provides a detailed history of developing the TLP as well as the three tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

6.1 Trigger Parameters

A focused set of parameters which are related to the sources of potential impacts from on-Site activities were selected for the purposes of the TLP. The TLP parameter list includes the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and Escherichia Coli. Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic sources due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

6.2 Trigger Concentrations

The following table provides the trigger levels for the above-referenced trigger parameters.

The trigger levels for the shallow unconfined aquifer are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail on how the trigger concentrations were calculated is provided in Appendix B1.

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.).

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow and deep bedrock aquifer units.

Parameter	Shallow Unconfined Aquifer Trigger Level	Deep Bedrock Aquifer Trigger Level
Ammonia	4.0 mg/L	0.2 mg/L
Phosphorus	7.2 mg/L	0.5 mg/L
Dissolved Organic Carbon	34.6 mg/L	18.4 mg/L
Nitrate	1.3 mg/L	0.5 mg/L
Iron	48.3 mg/L	10.6 mg/L
Manganese	17.1 mg/L	2.1 mg/L
Alkalinity	633 mg/L	996 mg/L
Escherichia Coli	25.6 CFU/100mL	5.0 CFU/100 mL

6.3 Trigger Level Assessment

The first Tier of the TLP consists of regular quarterly and semi-annual monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) have been updated to include the trigger concentrations.

Tier II confirmatory monitoring consists of collecting follow-up water quality samples in duplicate from the location(s) that exceed the Tier I trigger levels. The Tier II confirmatory monitoring will be carried-out during the next scheduled monitoring event. Tier I monitoring will resume following confirmatory samples below the Tier I trigger levels.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2016 Tier	Trigger Level Exceedances				2017 Tier
		February	May	August	November	
MW1-08	I	-	None	-	None	I
MW2-08	I	-	None	-	None	I
MW5-09	I	Ammonia	Ammonia	Ammonia	Ammonia	I
MW101-13	II*	Nitrate	Ammonia	Ammonia	Ammonia, Nitrate	II*
MW102-13	II*	Ammonia	Ammonia	Ammonia	Ammonia	I
MW103-13	I	None	None	None	None	I
MW104-13	II*	Nitrate	None	Ammonia, Nitrate	Nitrate	II*
MW105-13	I	Ammonia	Ammonia	Ammonia	Ammonia	I
MW106-15	I	Ammonia	Ammonia	None	None	I

Notes:
- -- not sampled
* - Tier II sampling conditions are met; however, Tier I is recommended – see below

As indicated in the above table, ammonia and nitrate concentrations were reported above their recommended trigger levels at several locations during 2016. In addition, the November 16 sample collected from the extraction well, EW107-15, indicated concentrations of ammonia above the trigger limit. In two instances (MW101-13 in November, and MW104-13 in August), two parameters were above their trigger limits during the same monitoring event, thus, triggering the need for a Tier II response. However, the MW104-13 trigger level exceedances were not persistent. That is, the results from follow-up sampling events showed a decrease in trigger parameter concentrations to levels that no longer exceeded the trigger level.

It should be noted that the Site initiated a program of groundwater remediation in 2016 in response to elevated ammonia concentrations in shallow groundwater near and downgradient of the facility. Operation of this system represents implementation of the contingency remedial response to observed groundwater quality impacts. Accordingly, future trigger level assessments should be undertaken for the purpose of tracking the evolution of groundwater quality as it relates to the remedial response, and should not be used for the purpose of triggering additional remedial response.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2016 Tier	Trigger Level Exceedances		2017 Tier
		May	November	
TW-7	I	None	None	I
TW-4	I	Ammonia	Ammonia	I
TW-8	II	Ammonia	None	I

Concentrations of ammonia and nitrate concentrations exceeded their respective deep bedrock Tier I trigger levels at TW-8 in the fall 2015 sample. Thus, it was recommended that that Tier II sampling be initiated at TW-8 in the spring of 2016. In May 2016, nitrate concentrations at TW-8 were reported non-detect (detection limit of 0.020 milligrams per litre (mg/L)) in both the duplicate sample and the original sample which were below the Tier I trigger limit of 0.5 mg/L. Therefore, a Tier II response is not required at this time. On the basis of the above, it is recommended that all bedrock groundwater wells are sampled under the normal Tier I sampling frequency during 2017.

7. Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2016:

1. Based on the groundwater elevations gathered in May and November 2016, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source emanating from the Facility. Recent monitoring results suggest a trend of stable to decreasing ammonia levels downgradient of the facility.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer may be altered by Facility operations. Increasing trends of ammonia concentrations during previous monitoring periods have been observed downgradient of the Facility. The 2016 monitoring results have shown some evidence of an overall decreasing trend which includes ammonia when comparing 2016 to 2015 analytical data.
4. Surface water sample results indicate that surface water quality downstream of the Site was largely unaltered by Site activities during the 2016 monitoring period.
5. Surface water was discharged once from the on-Site Stormwater Management Pond during the 2016 monitoring period (March). In the March 2016 sample collected from the Stormwater Management Pond all parameters were below their respective trigger levels listed in the Site ECA.

8. Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. Operation of the groundwater extraction system should continue, removing as much impacted groundwater from the shallow flow system as is practical.
2. The newly installed surface water staff gauges should be surveyed and monitored so that an assessment of potential groundwater discharge to surface water can be made using direct monitoring data from each staff gauge.
3. Future monitoring reports should assess the effectiveness of the extraction well and provide recommendations for continued operation or expansion, as appropriate, of the current remediation system.

9. References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, March 23, 2015. 2014 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, March 25, 2015. Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2016- 2015 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario.

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

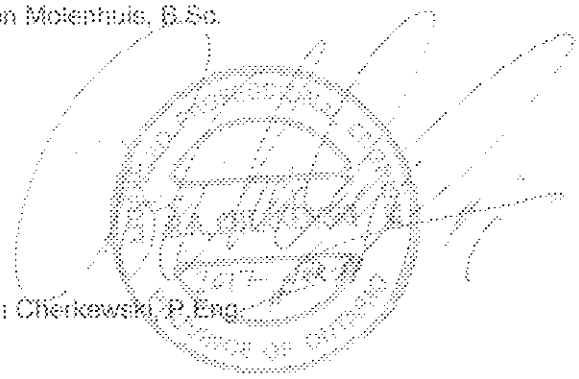
USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

All of Which is Respectfully Submitted,

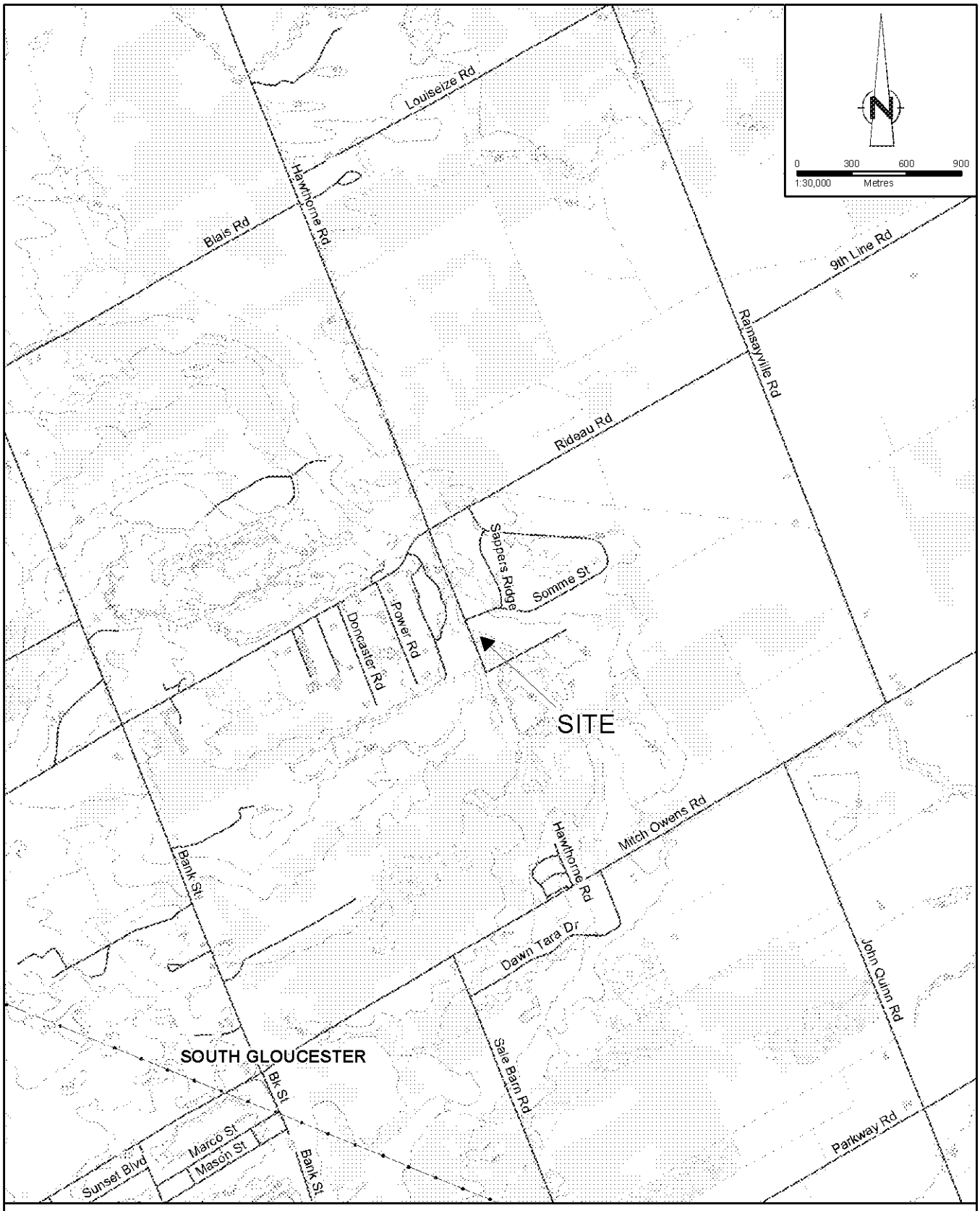
GHD

Ben Kempel, B.E.S.

Allan Molenhuis, B.Sc.



Ron Cherkewski, P.Eng.



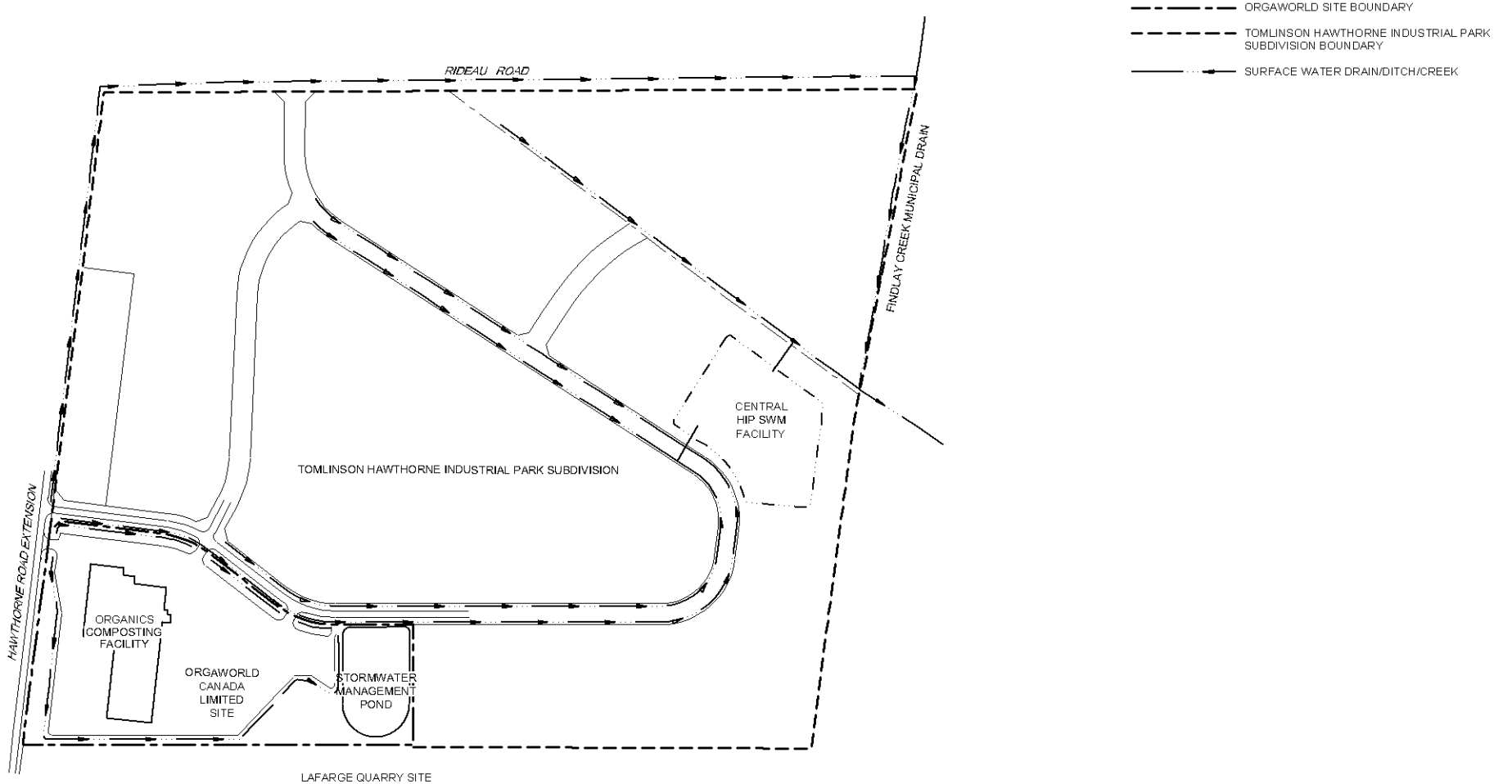
Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;
Coordinate System: NAD 1983 UTM Zone 18N

figure 1.1

SITE LOCATION MAP
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

045804-00(066)GIS-WA001 March 31, 2017

003208



0 50 100 150m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

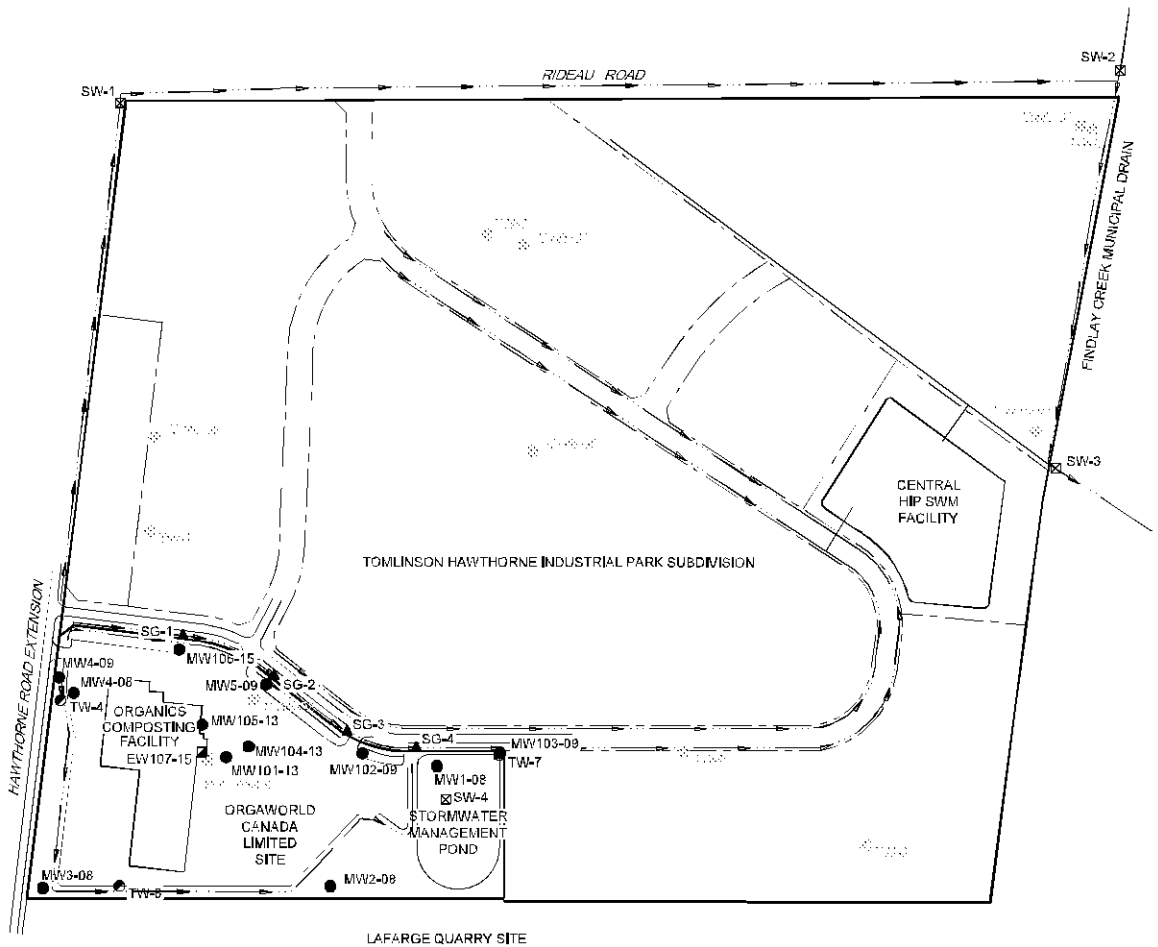
45804-58
Mar 10, 2017

SITE PLAN

figure 1.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58(066)\45804-58(066)GN\45804-58(066)GN-WA001.dwg

003209



LEGEND

- ORGAWORLD SITE BOUNDARY
- TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
- SURFACE WATER DRAIN/DITCH/CREEK
- MW2-08 — SHALLOW MONITORING WELL LOCATION
- TW-4 — DEEP BEDROCK MONITORING WELL LOCATION
- EW107-15 — SHALLOW EXTRACTION WELL LOCATION (APPROX.)
- SW-3 — SURFACE WATER MONITORING LOCATION
- SG-2 — SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
- MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE (SEE NOTE BELOW)

NOTES:

1. SHALLOW AND DEEP MONITORING WELLS LOCATED OUTSIDE OF ORGAWORLD SITE LIMITS ARE NO LONGER ACCESSIBLE TO OCL OR GHD AS OF JANUARY 2010.

0 50 100 150m

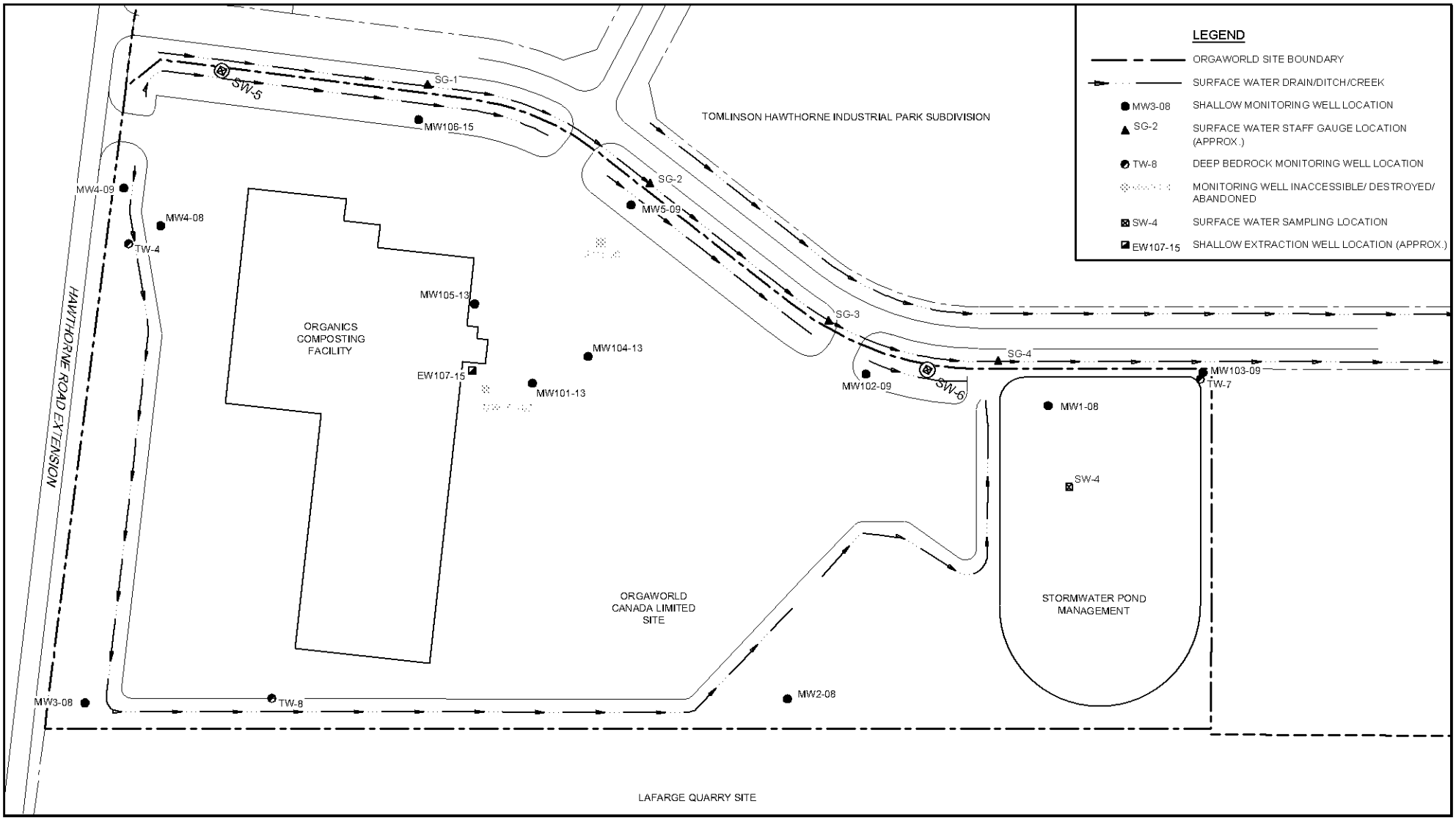
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Mar 10, 2017

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS figure 3.1

CAD FILE: [illegible]

003210



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

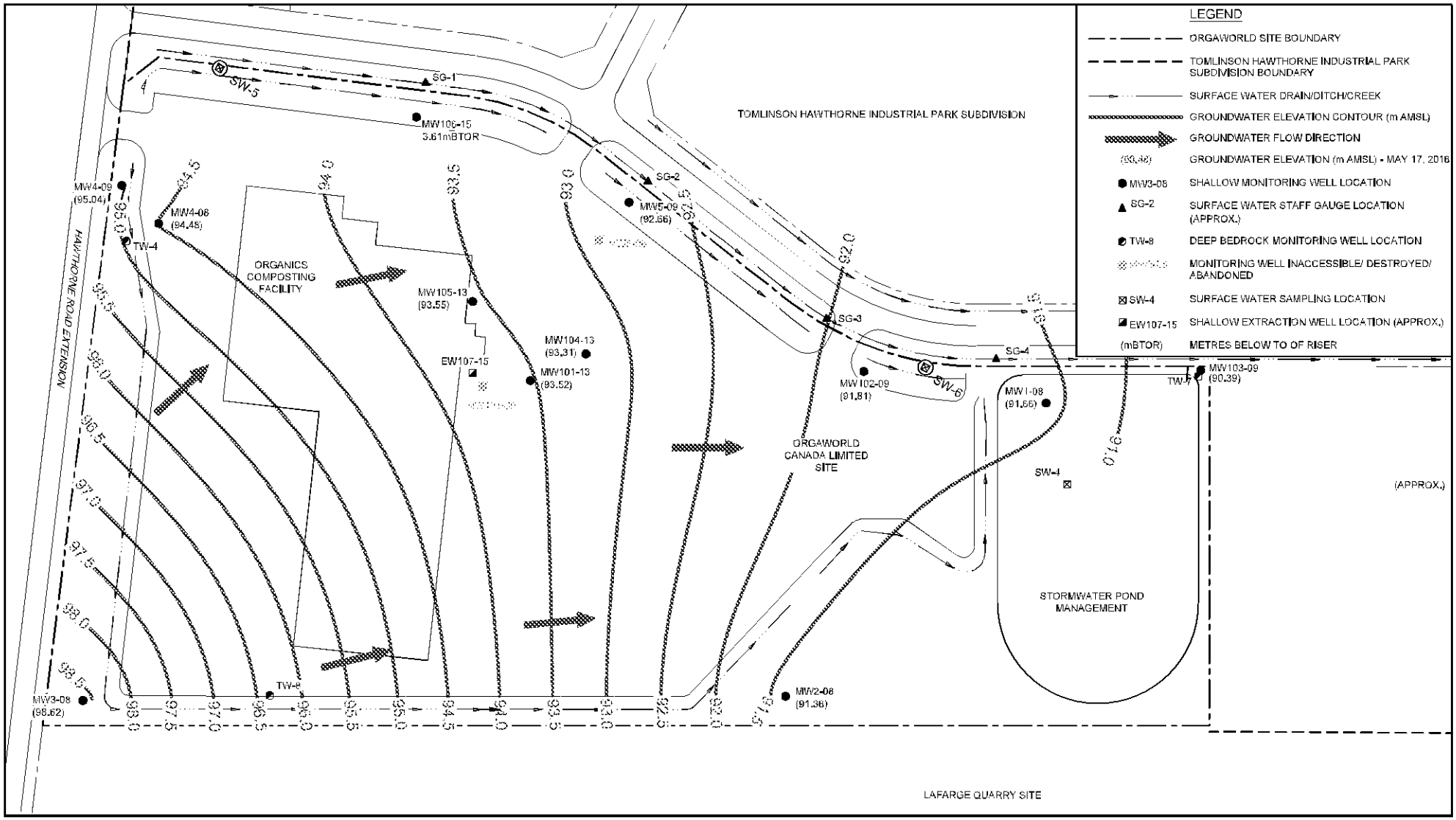
ORGAWORLD PROPERTY GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

45804-58
Mar 10, 2017

figure 3.2

CAD File: P:\drawings\45000s\45804\45804-reports\45804-58(066)\45804-58(066)GN\45804-58(066)GN-WA003.DWG

003211



0 15 30 45m

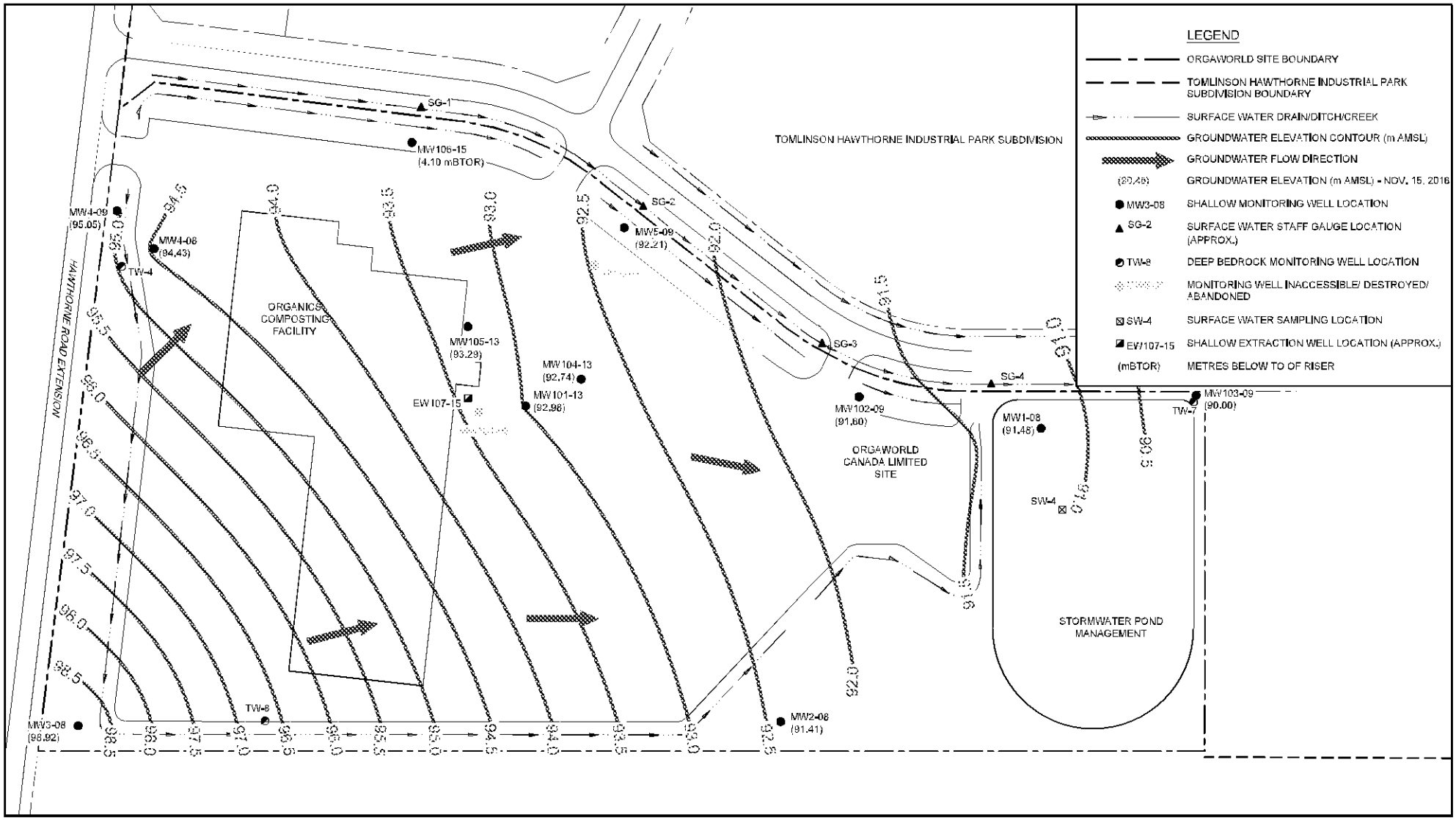
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
MAY 17, 2016

45604-58
Mar 10, 2017

figure 4.1

CAD File: P:\drawings\45000s\45604-58\cad\45604-58-088s\45604-58-088s-SHWA-2016.DWG

003212



0 15 30 45m

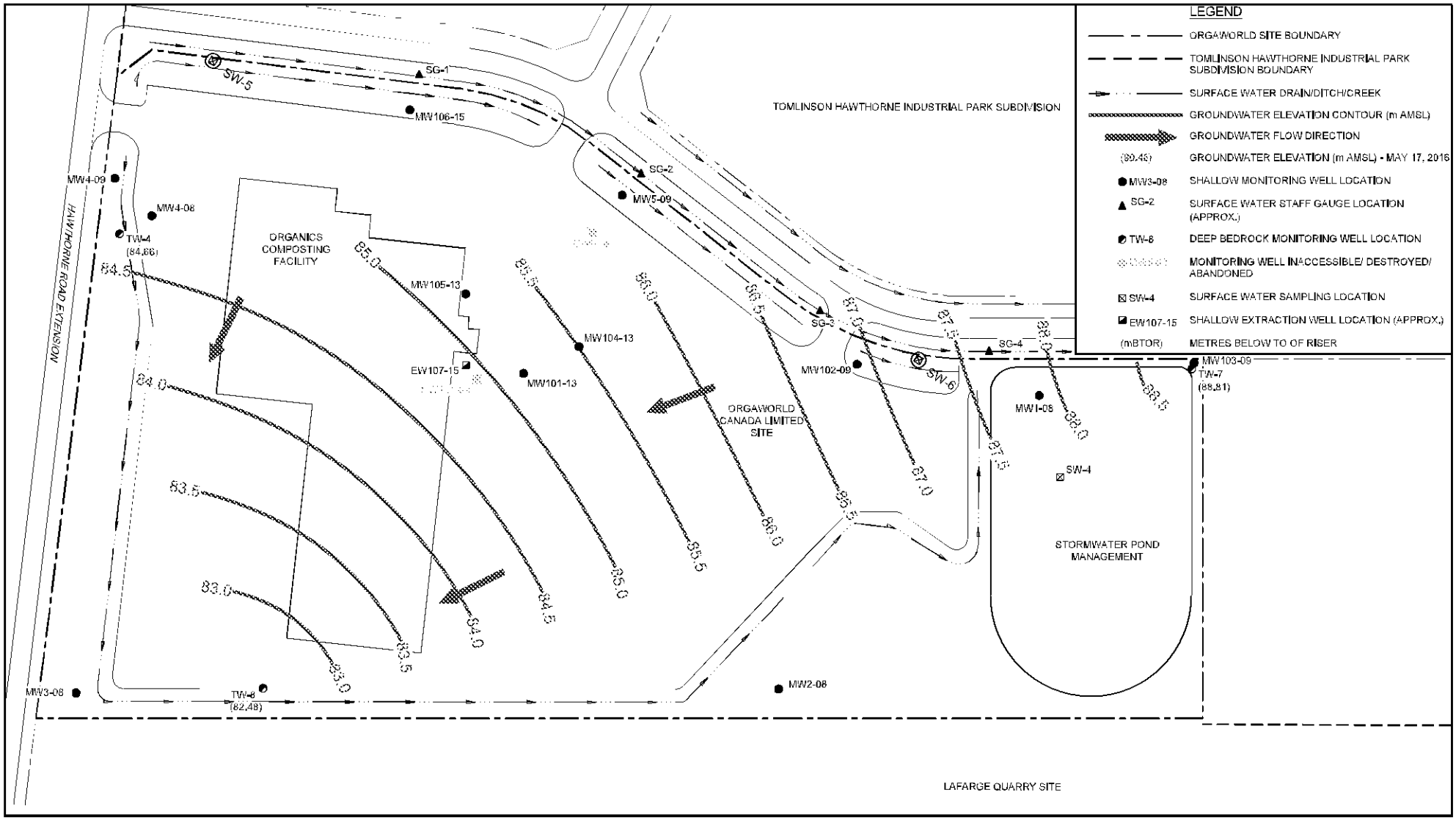
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
NOVEMBER 15, 2016

45604-58
Mar 10, 2017

figure 4.2

CAD File: P:\drawings\45000s\45604-58\cad\45604-58-088s\45604-58-088s-SHWA-005.DWG

003213



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

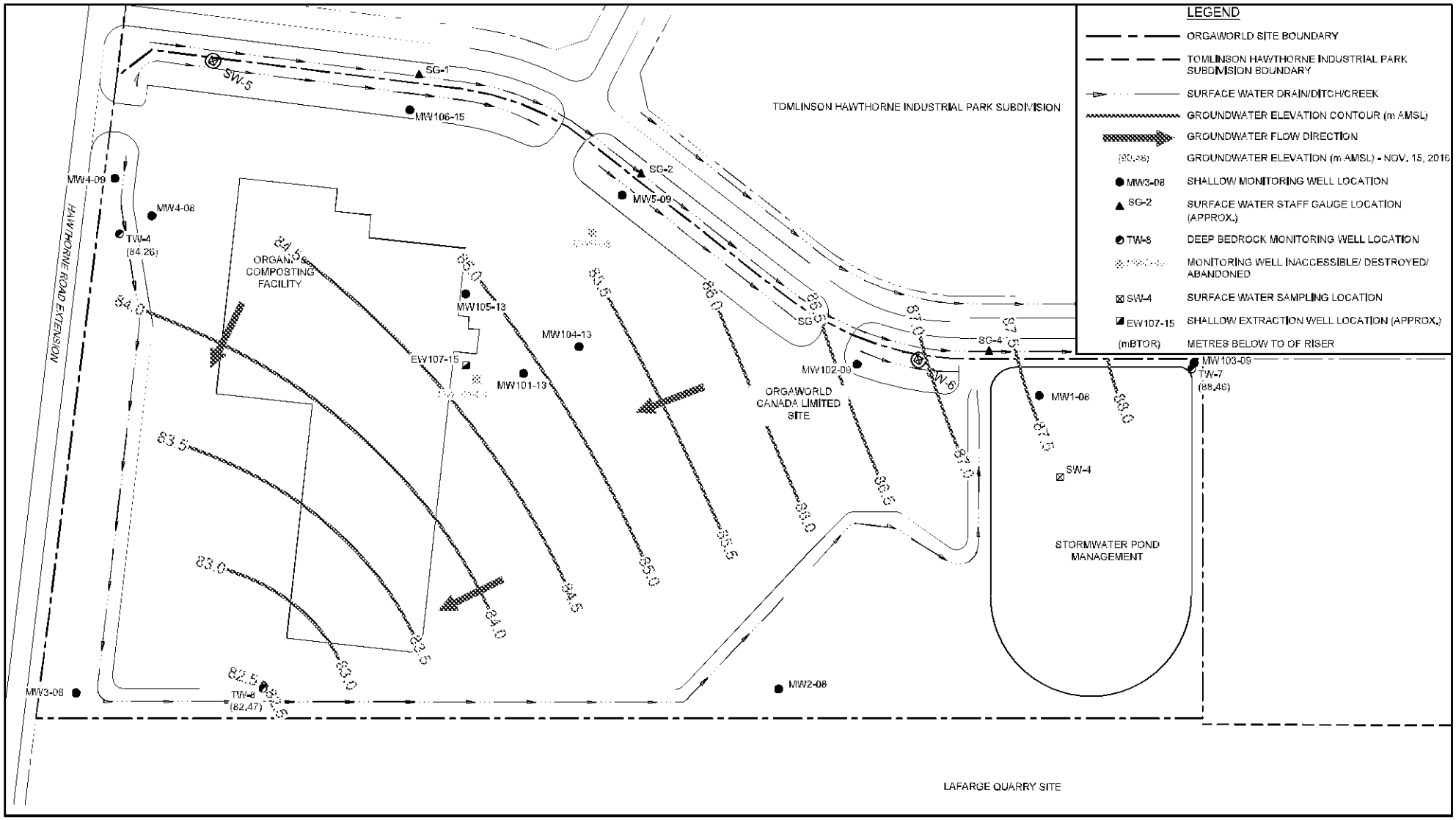
BEDROCK GROUNDWATER ELEVATIONS
MAY 17, 2016

45804-58
Mar 10, 2017

figure 4.3

CAD File: P:\drawings\45000s\45804-58\...

003214



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

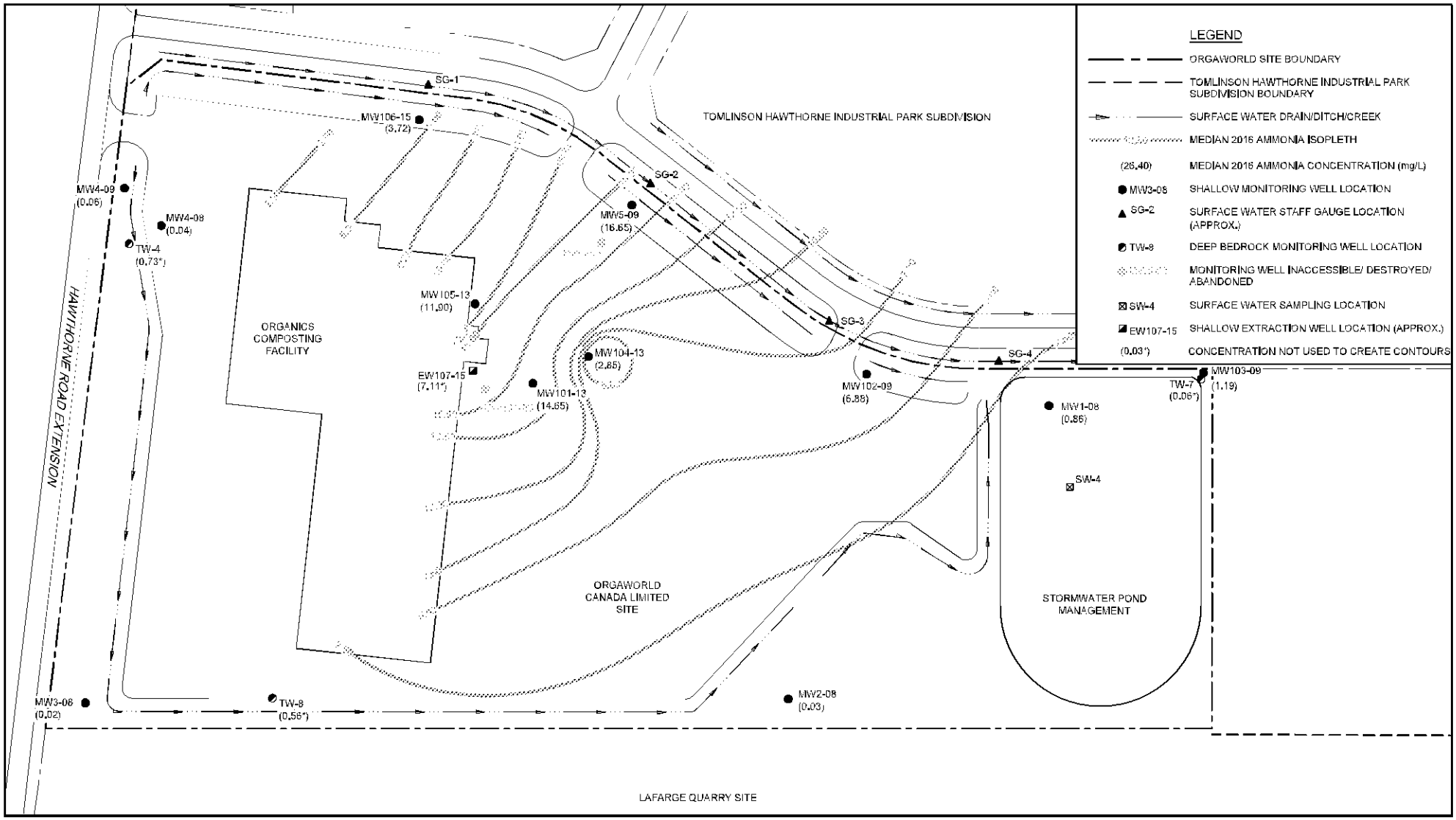
BEDROCK GROUNDWATER ELEVATIONS
NOVEMBER 15, 2016

45604-58
Mar 23, 2017

figure 4.4

CAD File: P:\drawings\45000s\45604-58\...

003215



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

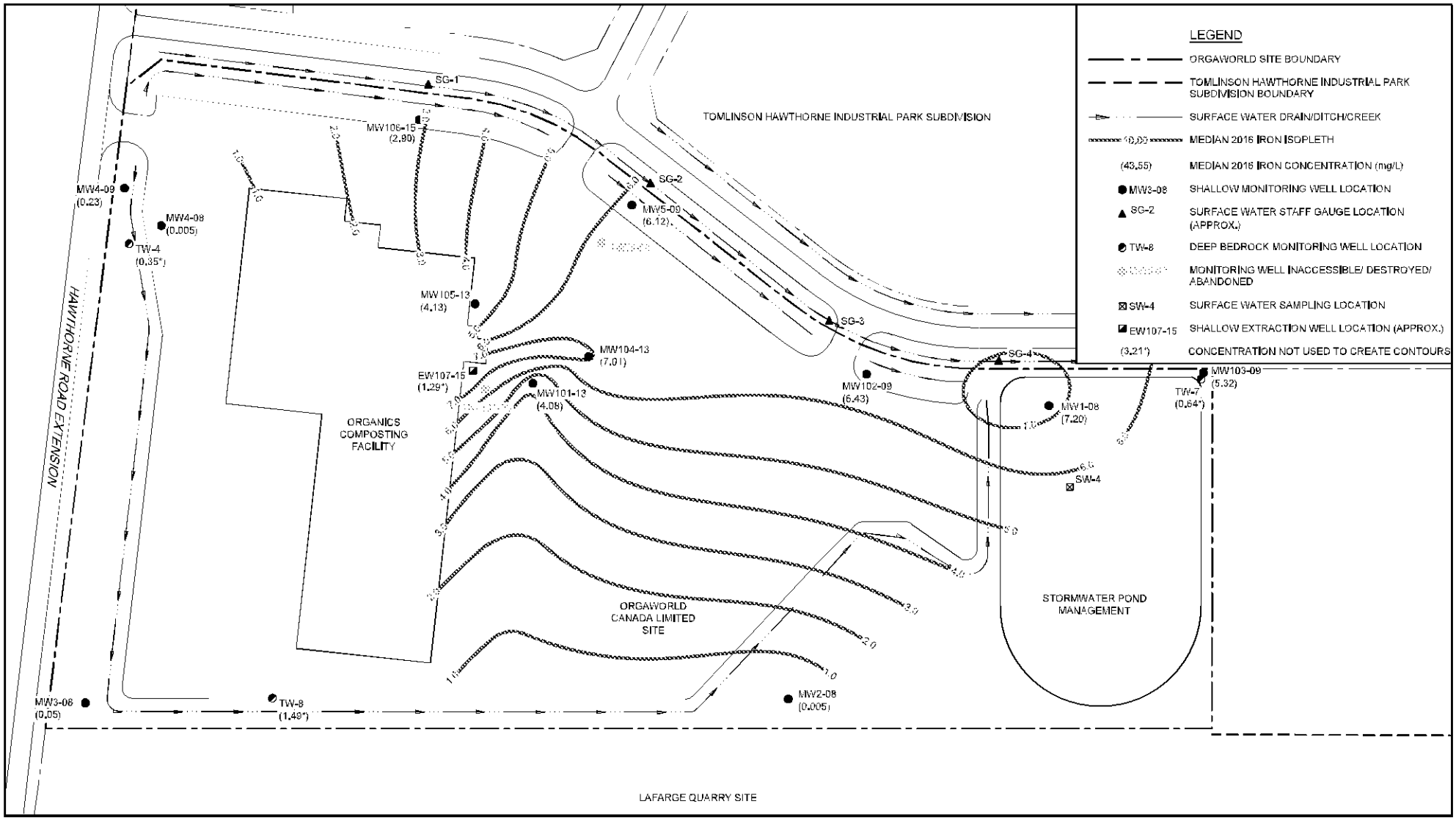
45604-58
Mar 13, 2017

MEDIAN 2016 AMMONIA CONCENTRATION ISOPLETHS

figure 4.5

CAD File: P:\drawings\45000s\45604-58\...

003216



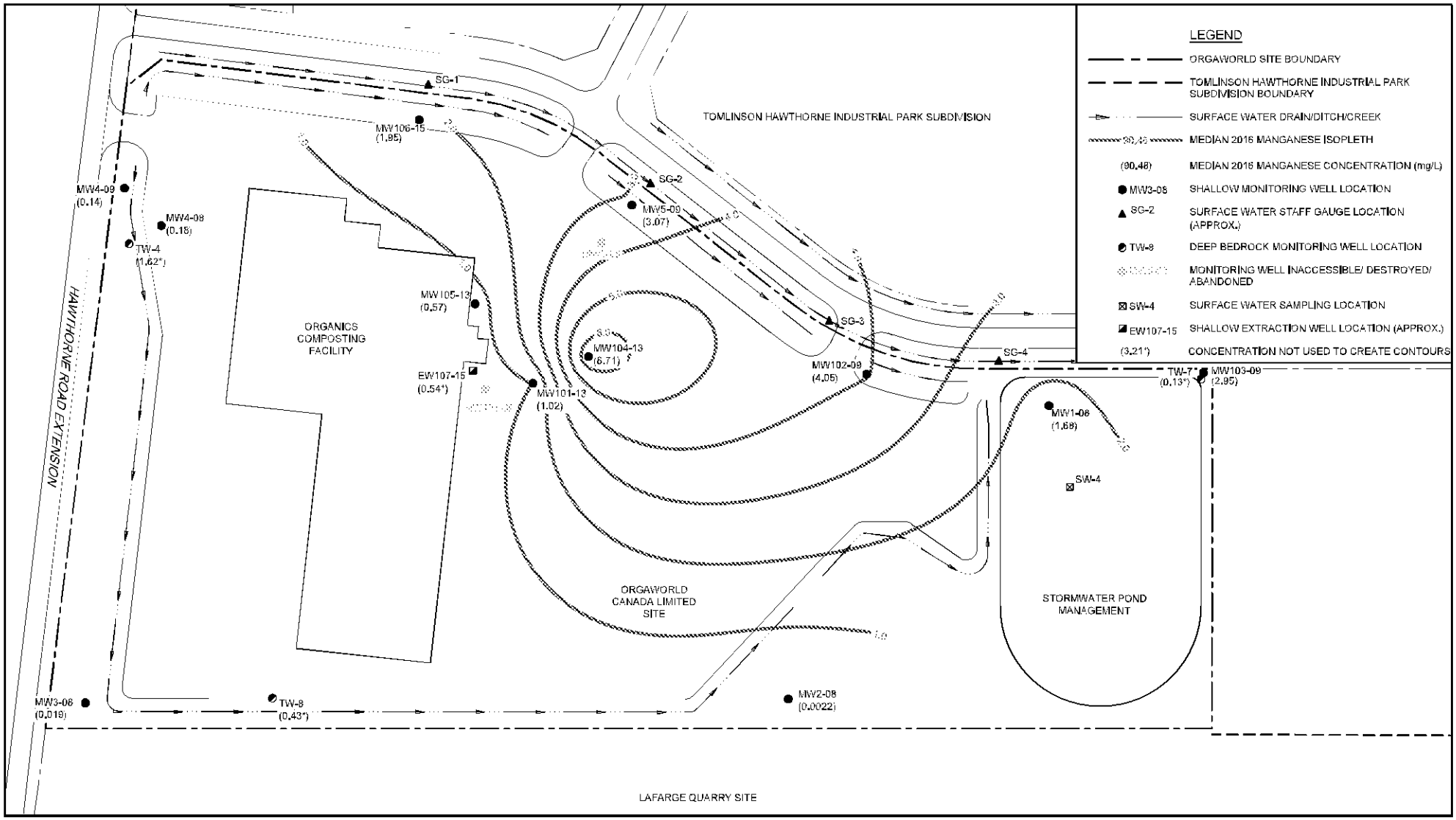
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Mar 13, 2017

MEDIAN 2016 DISSOLVED IRON CONCENTRATION ISOPLETHS figure 4.6

CAD File: P:\drawings\45000s\45804\4753-reports\45804-58\088\45804-58-088-SHWA-2016.DWG

003217



ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

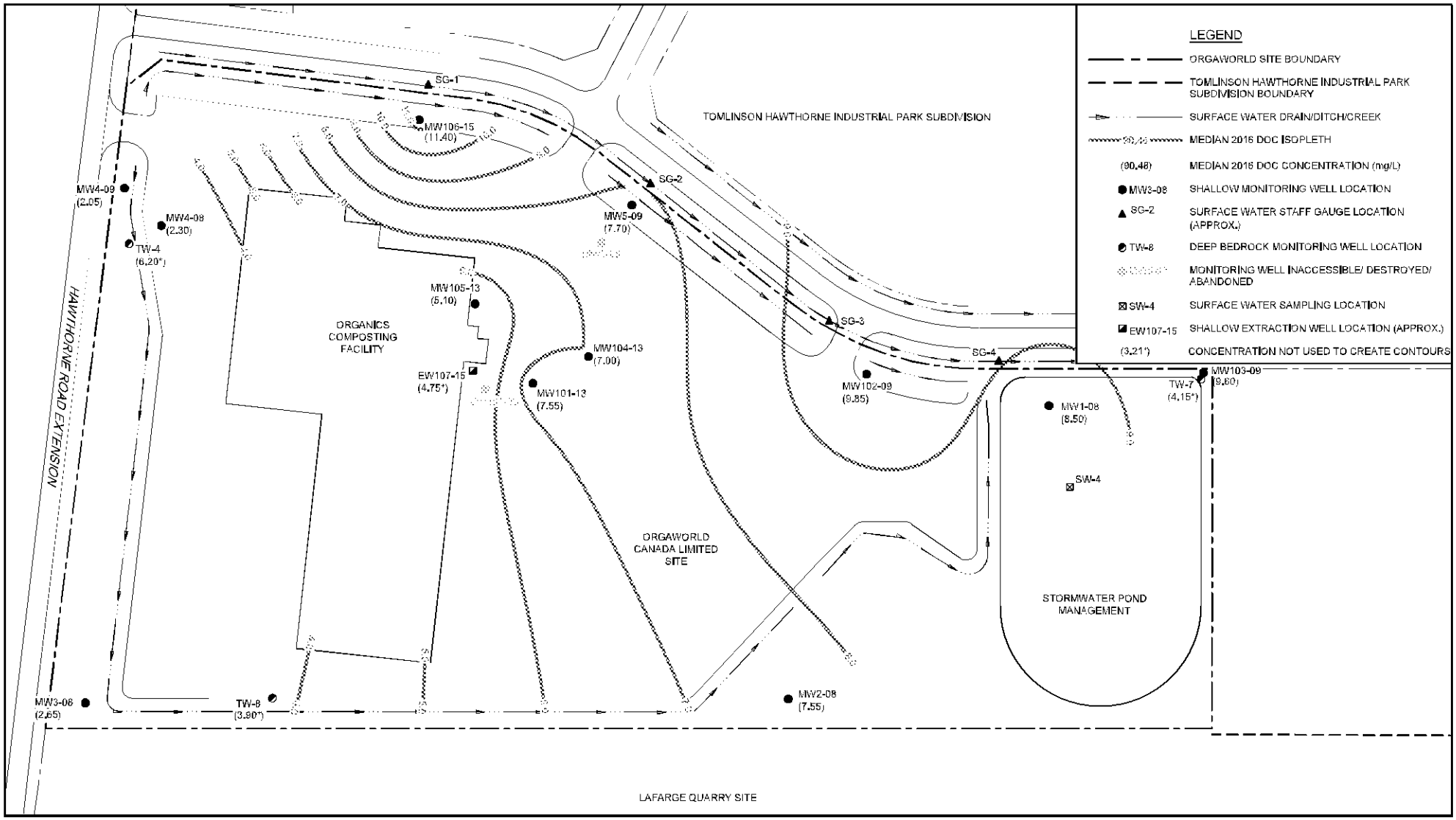
MEDIAN 2016 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS

45804-58
Mar 13, 2017

figure 4.7

CAD File: P:\drawings\45000s\45804-58\...\45804-58-SWMP-2016.DWG

003218



0 15 30 45m

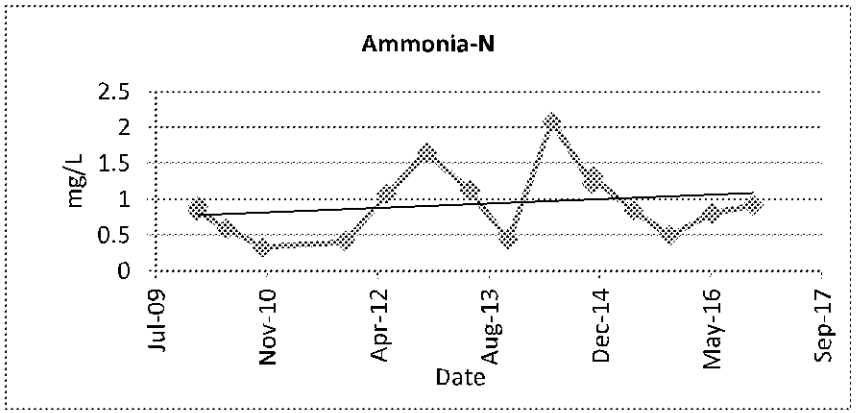
ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

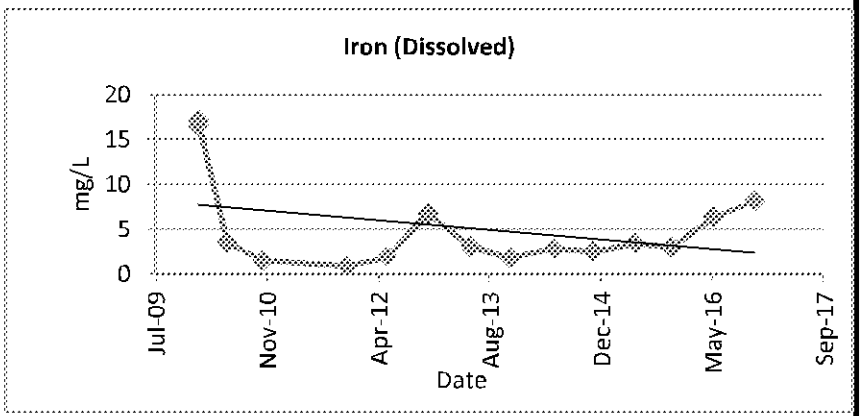
MEDIAN 2016 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS

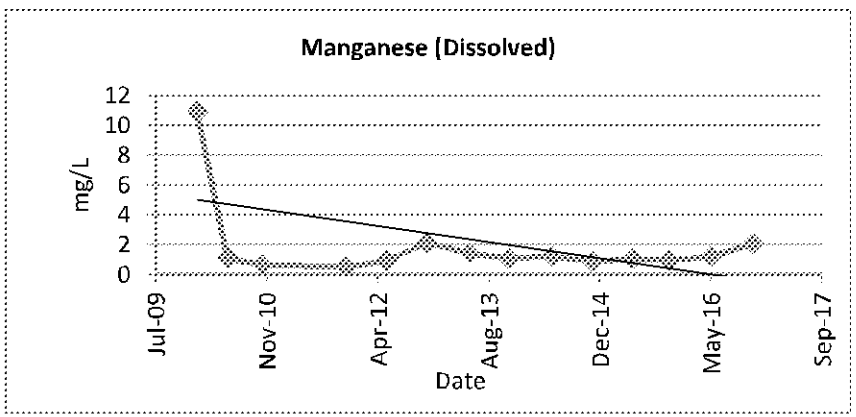
45804-58
Mar 13, 2017

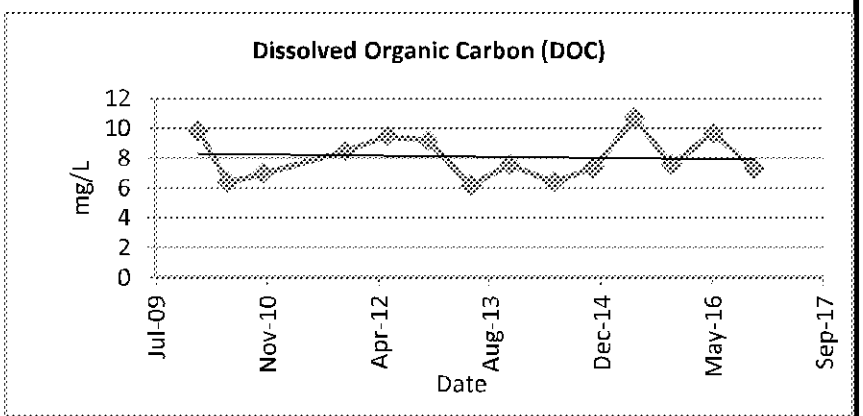
figure 4.8

CAD File: P:\drawings\45000s\45804-58\...\45804-58-SHEWA-011.DWG





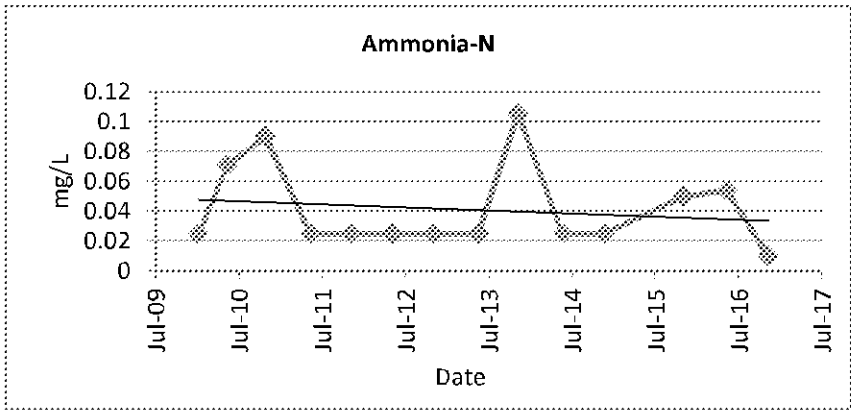


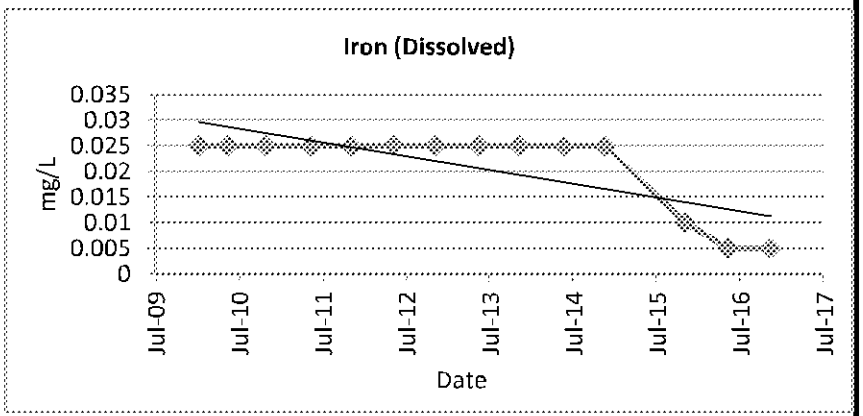


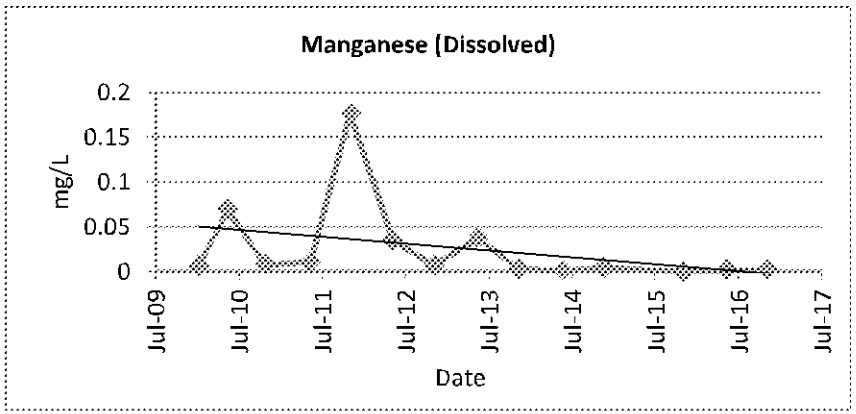
Note: ND results as 1/2 the detection limit

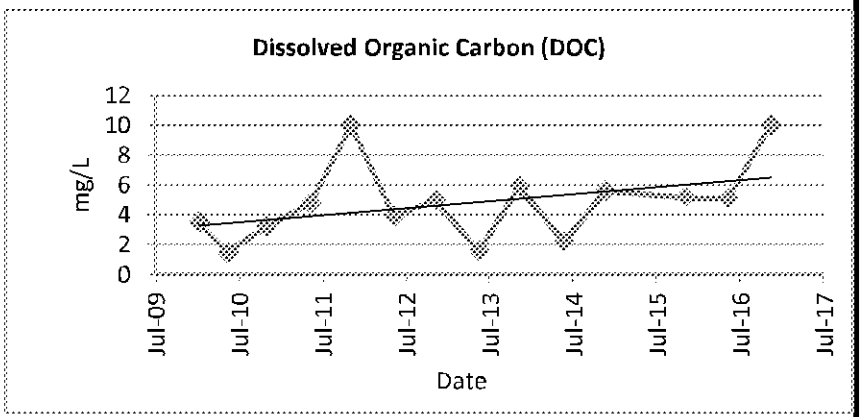
figure 4.9.1

TEMPORAL PLOTS - SELECTED PARAMETERS
MW1-08
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





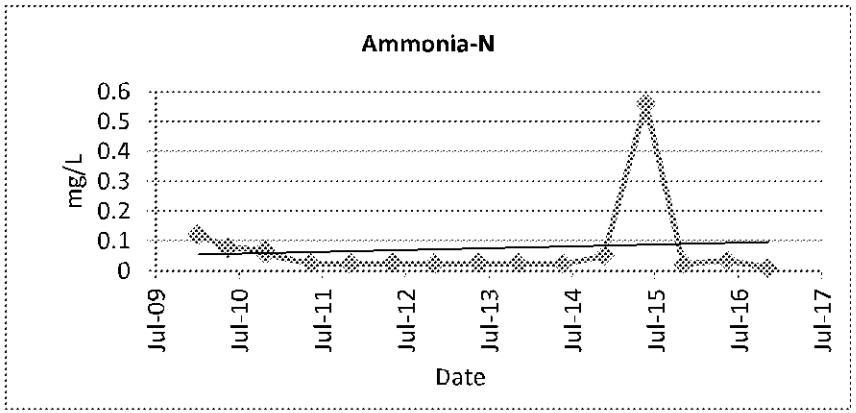


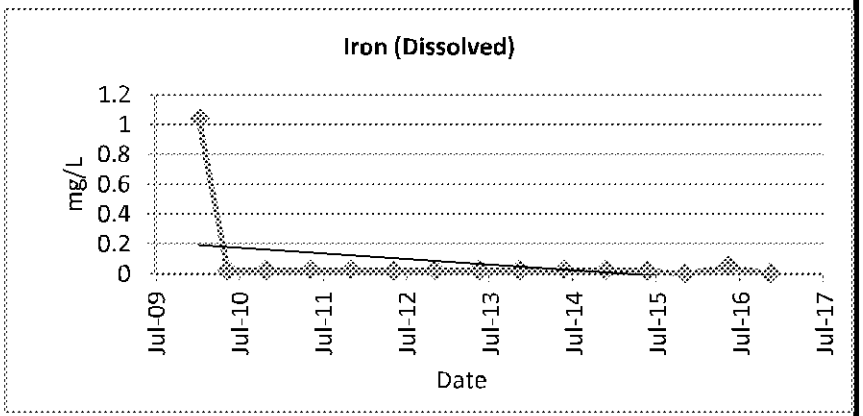


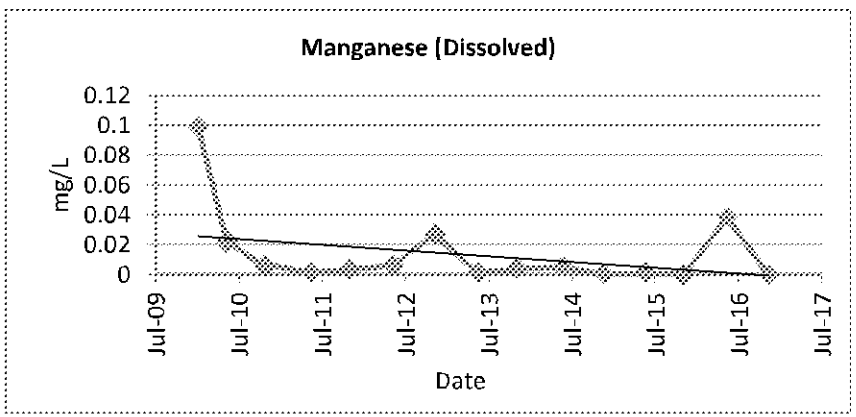
Note: ND results as 1/2 the detection limit

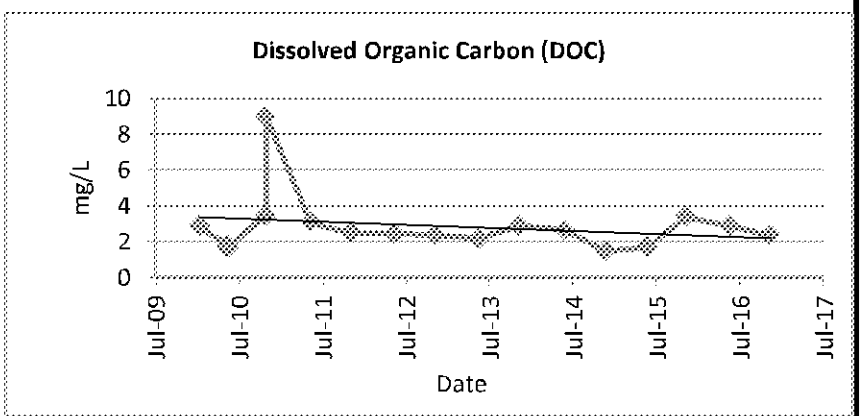
figure 4.9.2

TEMPORAL PLOTS - SELECTED PARAMETERS
MW2-08
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





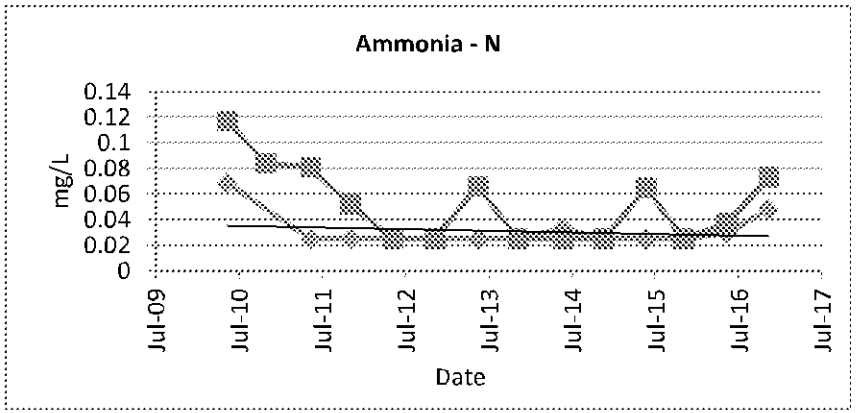


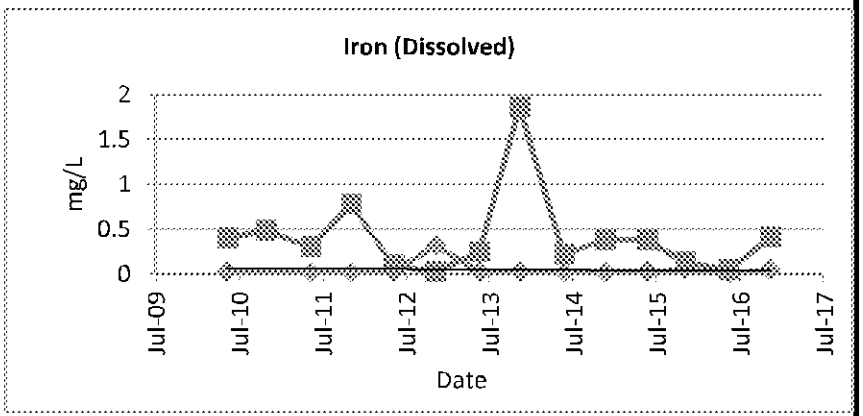


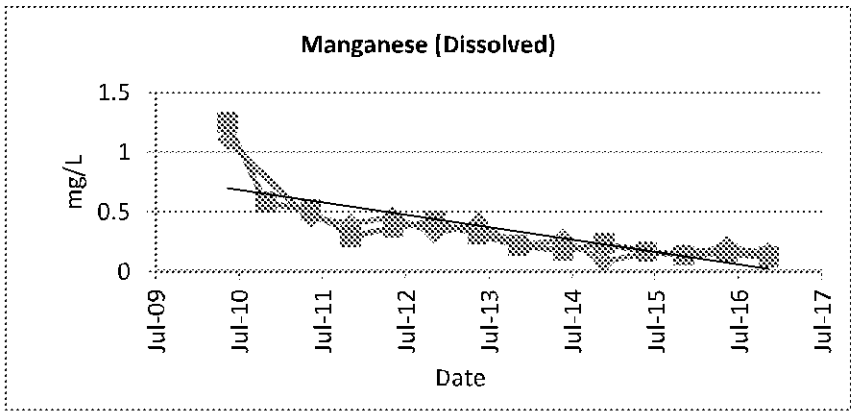
Note: ND results as 1/2 the detection limit

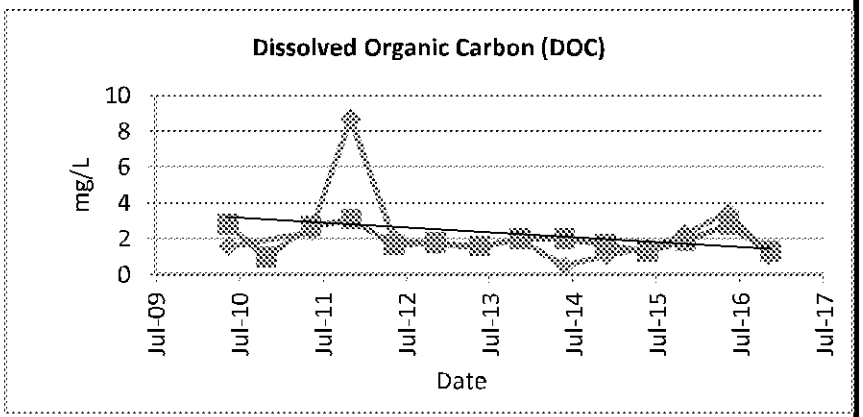
figure 4.9.3

TEMPORAL PLOTS - SELECTED PARAMETERS
MW3-08
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY







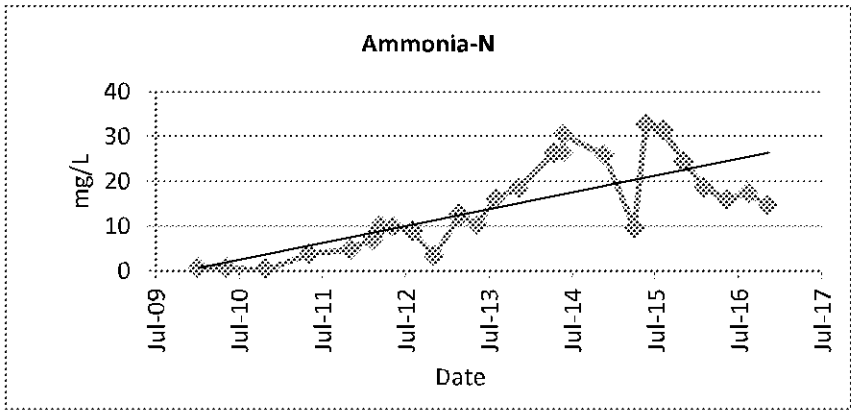


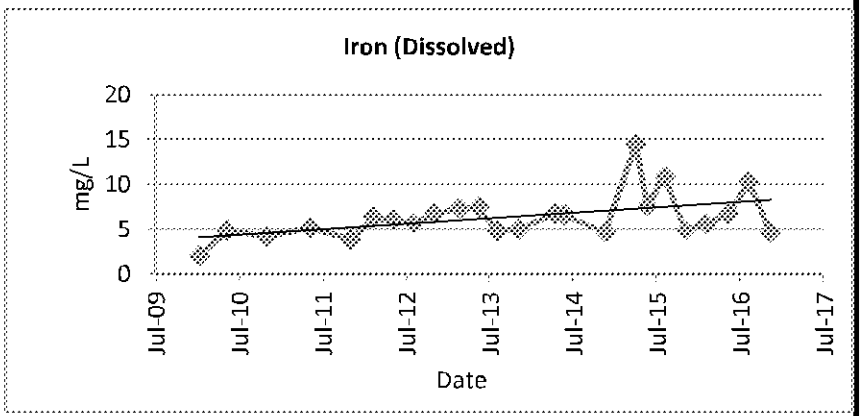
Note: ND results as 1/2 the detection limit

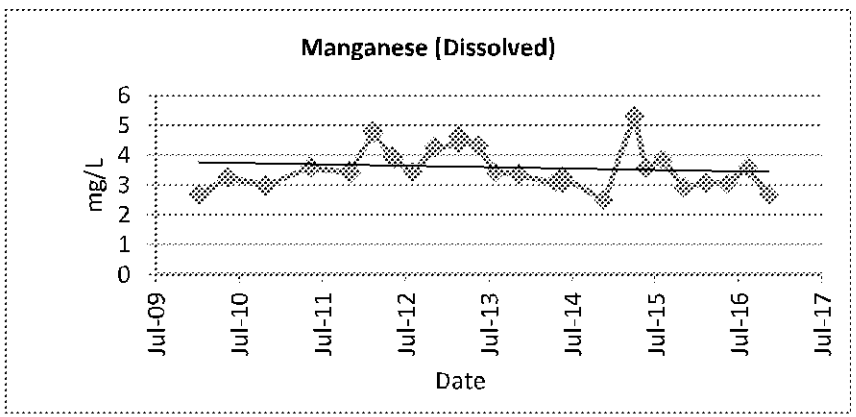
MW4-08
MW4-09

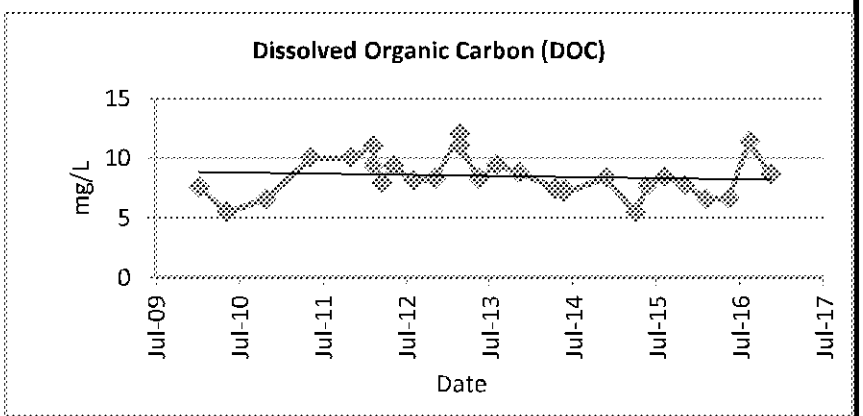
figure 4.9.4

TEMPORAL PLOTS - SELECTED PARAMETERS
MW4-08 & MW4-09
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





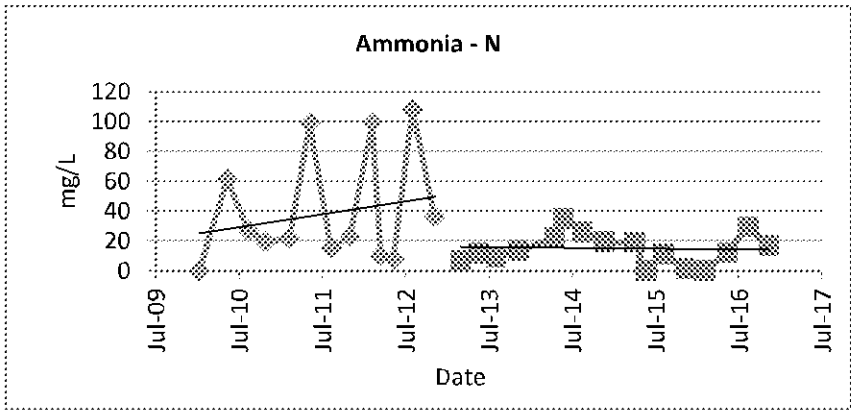


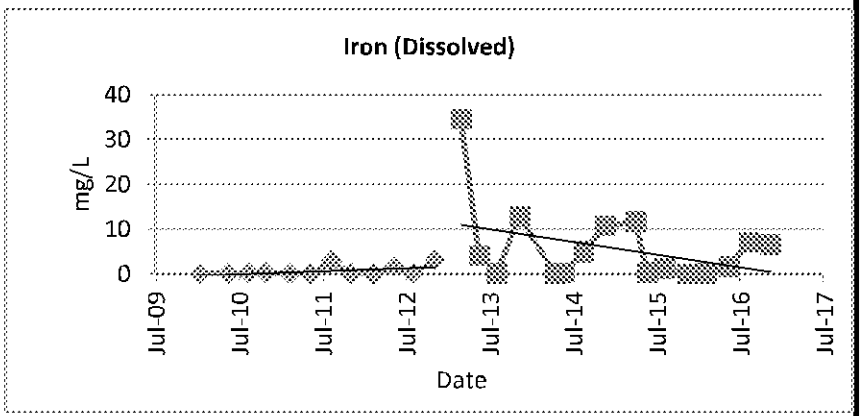


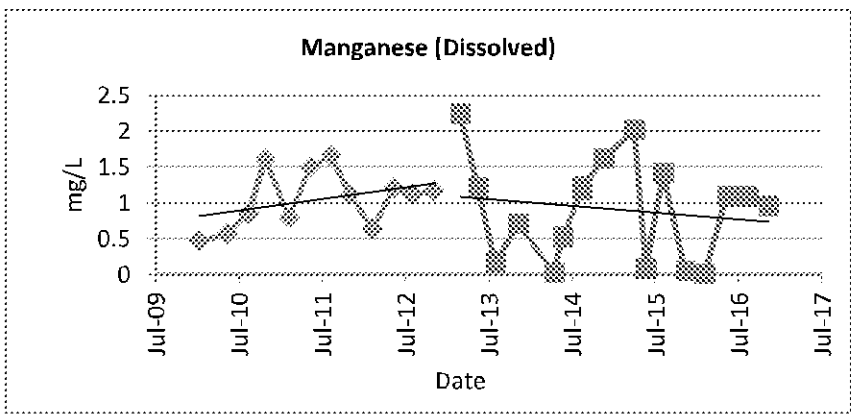
Note: ND results as 1/2 the detection limit

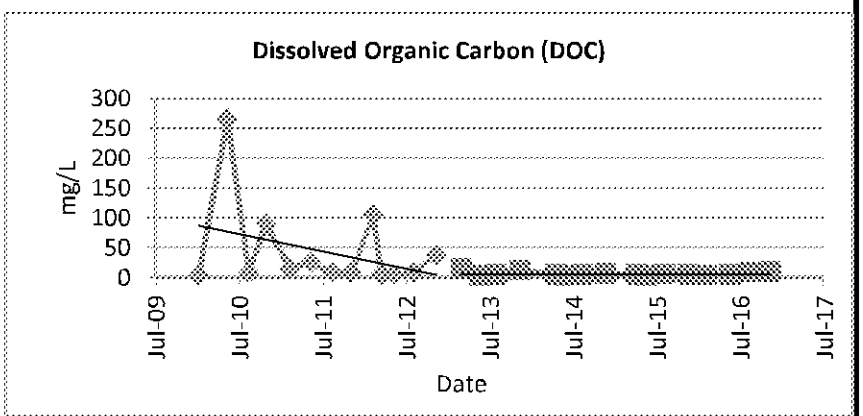
figure 4.9.5

TEMPORAL PLOTS - SELECTED PARAMETERS
MW5-09
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY







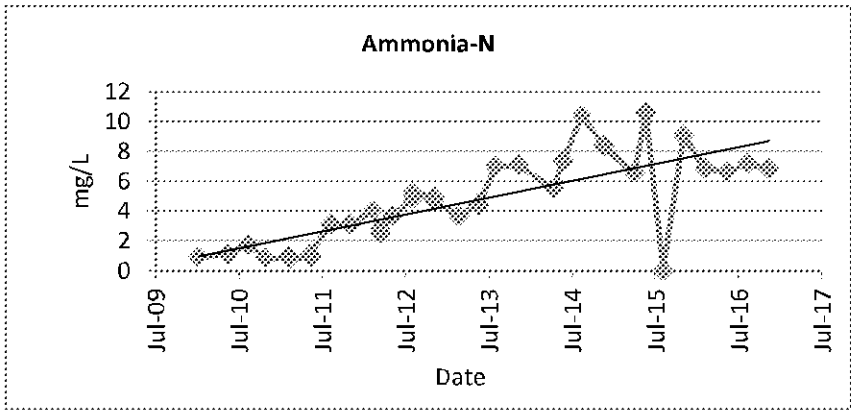


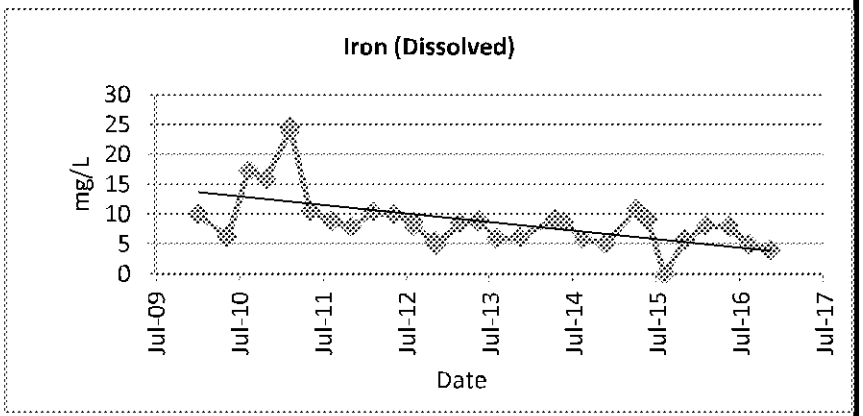
Note: ND results as 1/2 the detection limit

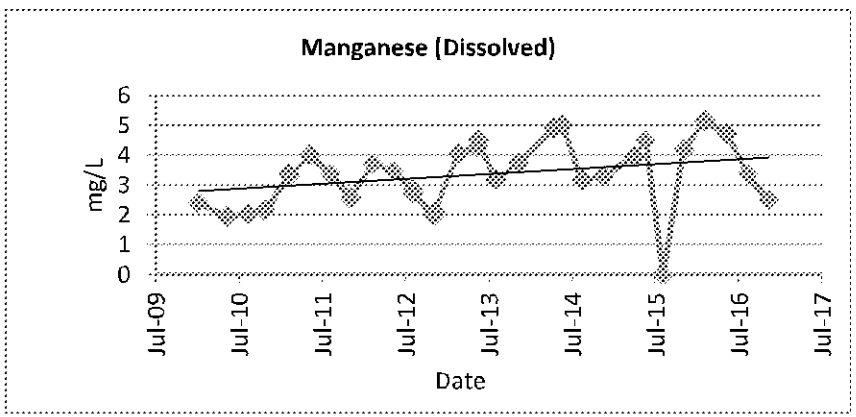
MW101-09
MW101-13

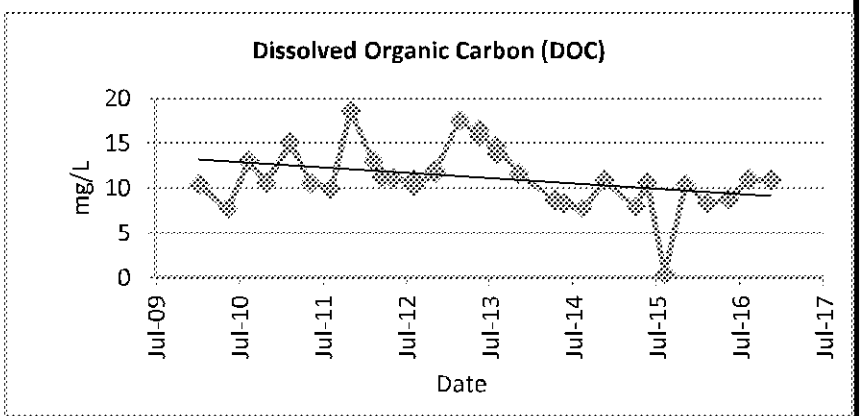
figure 4.9.6

TEMPORAL PLOTS - SELECTED PARAMETERS
MW101-09 & MW101-13
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





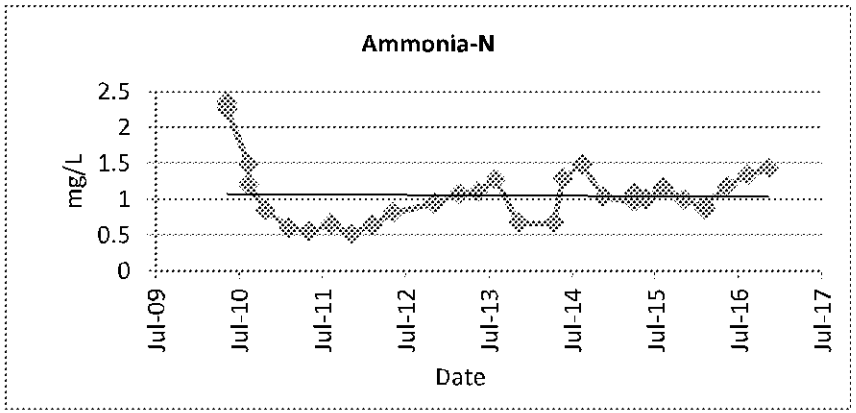


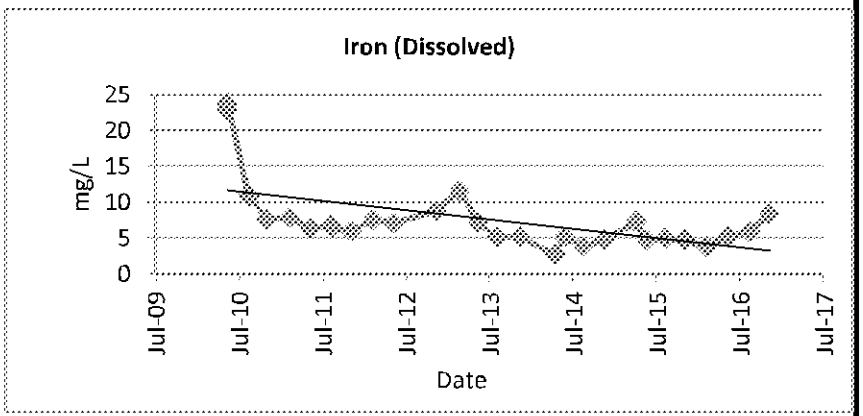


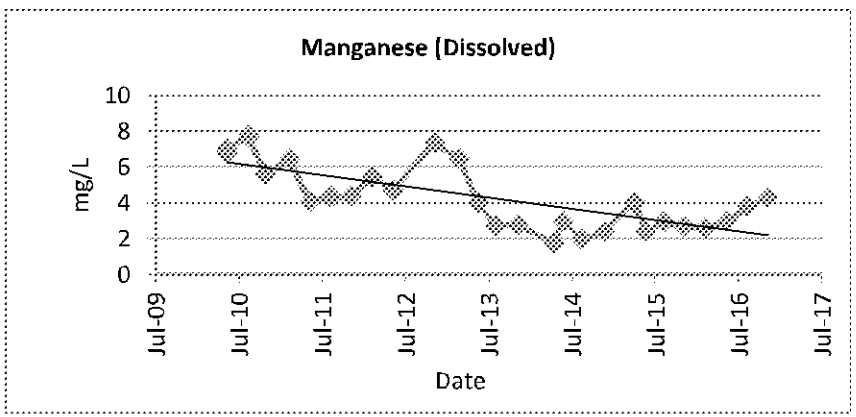
Note: ND results as 1/2 the detection limit

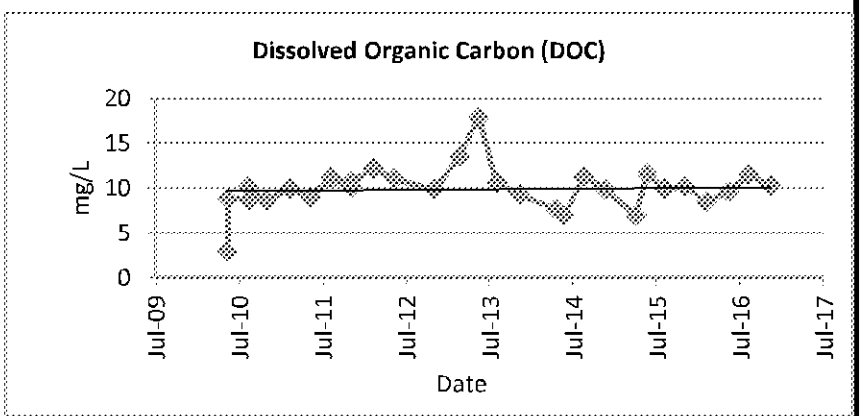
figure 4.9.7

TEMPORAL PLOTS - SELECTED PARAMETERS
MW102-09
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





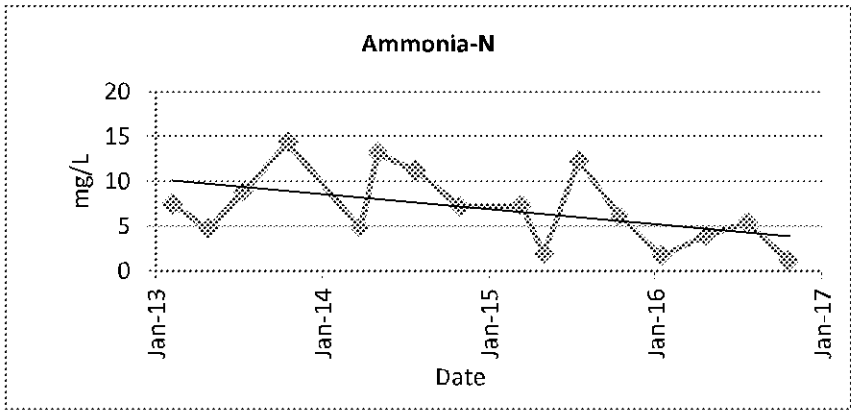


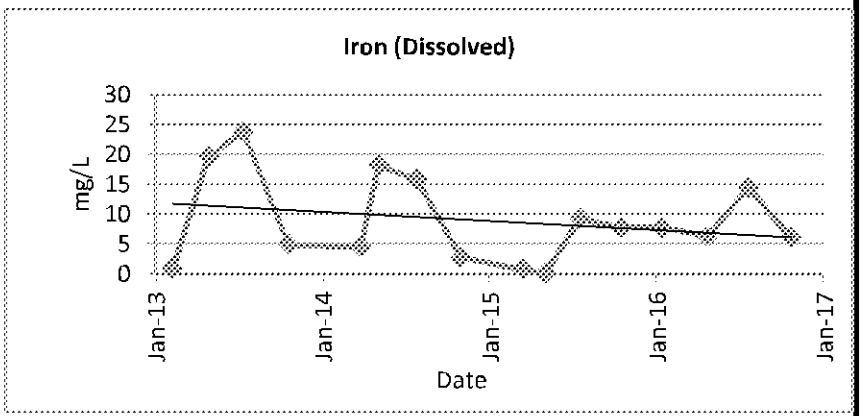


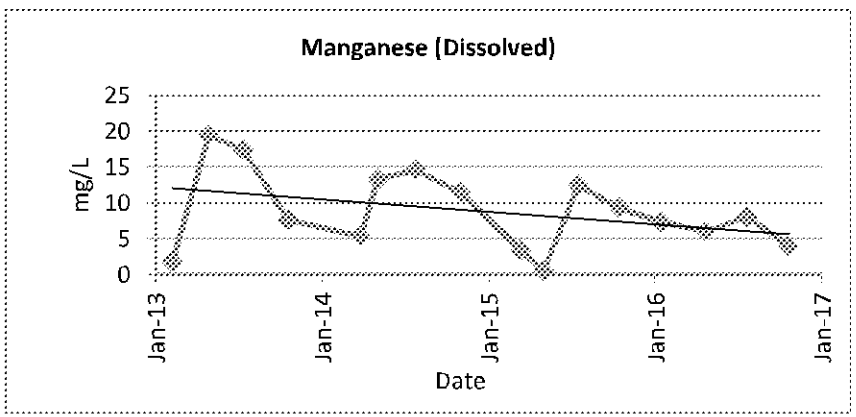
Note: ND results as 1/2 the detection limit

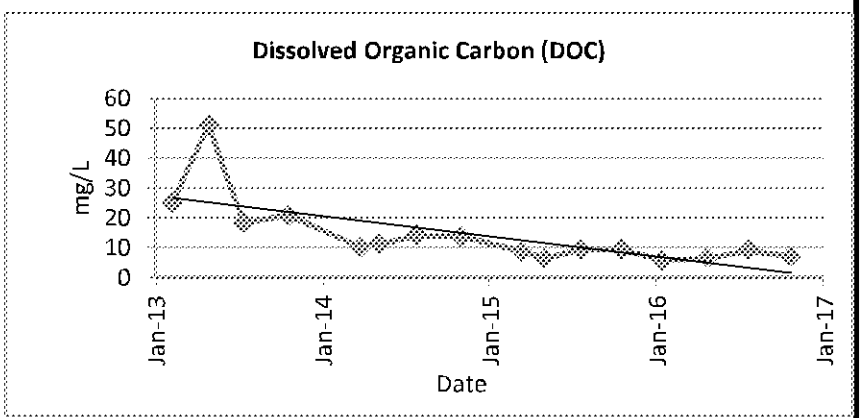
figure 4.9.8

TEMPORAL PLOTS - SELECTED PARAMETERS
MW103-09
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





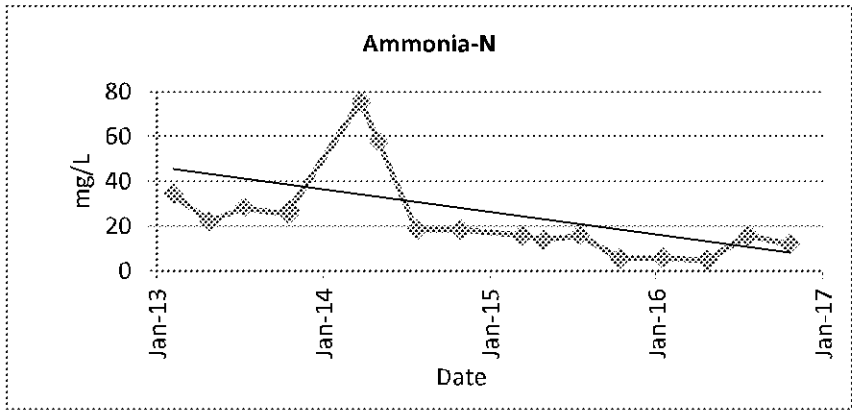


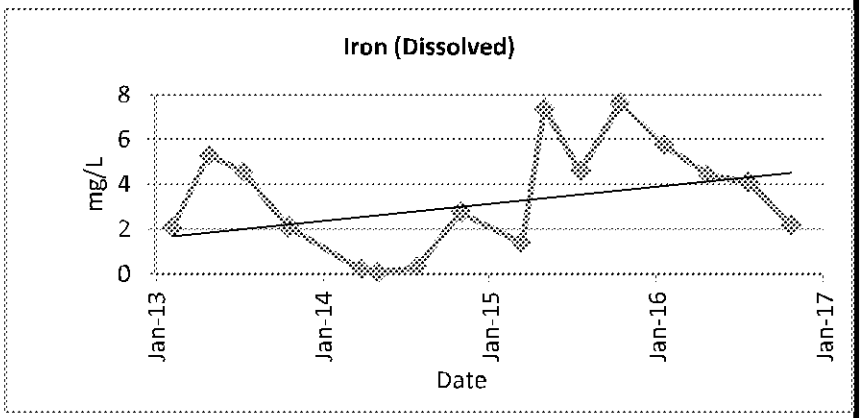


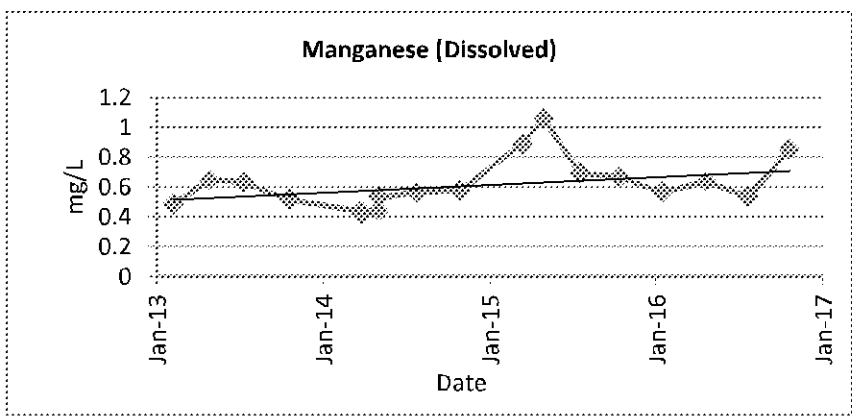
Note: ND results as 1/2 the detection limit

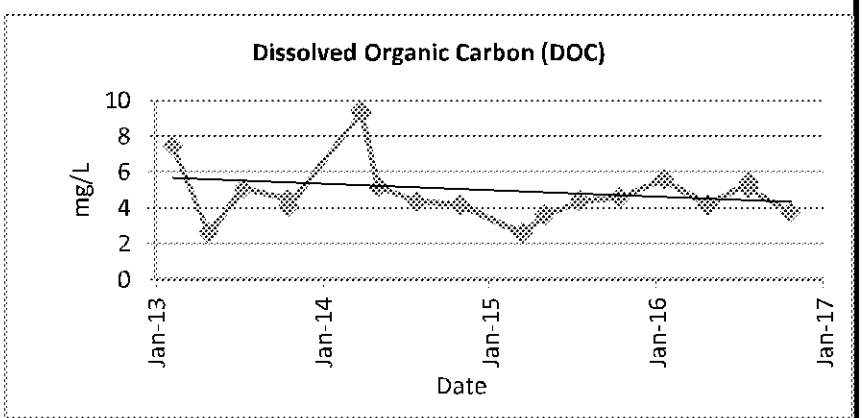
figure 4.9.9

TEMPORAL PLOTS - SELECTED PARAMETERS
MW104-13
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





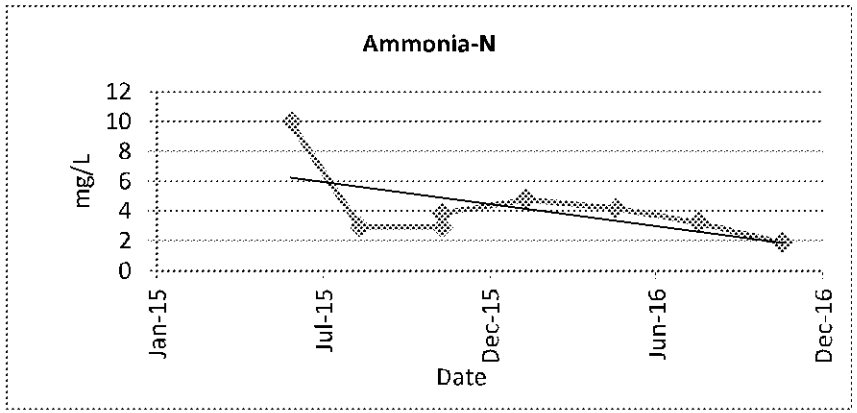


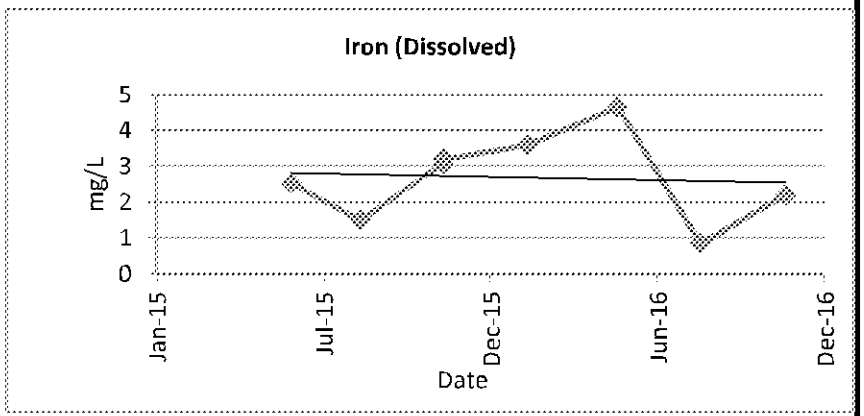


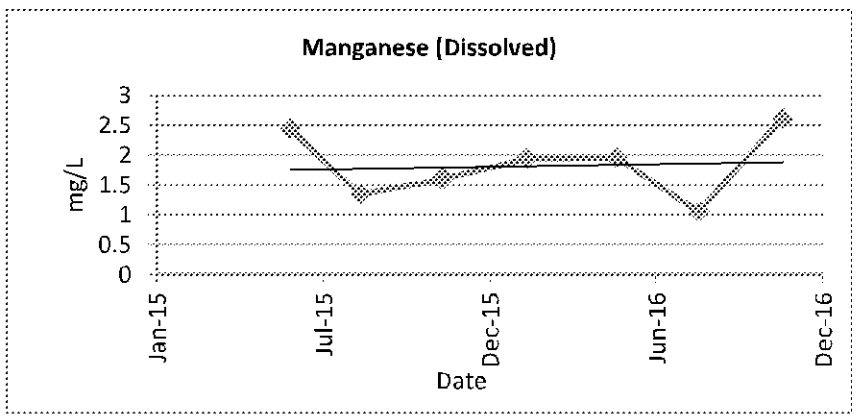
Note: ND results as 1/2 the detection limit

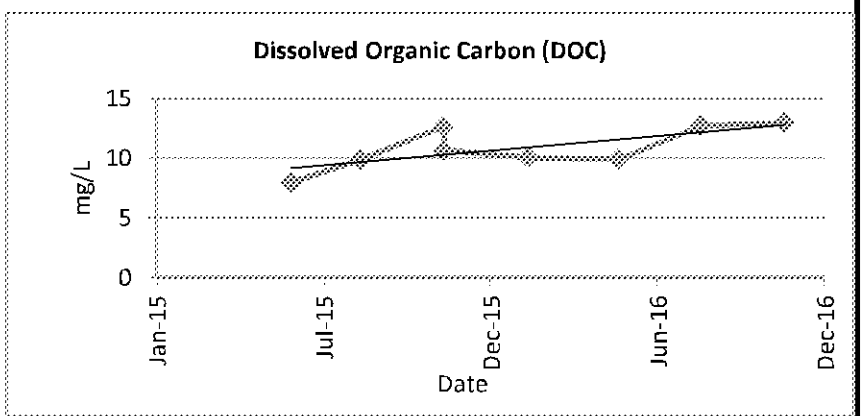
figure 4.9.10

TEMPORAL PLOTS - SELECTED PARAMETERS
MW105-13
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





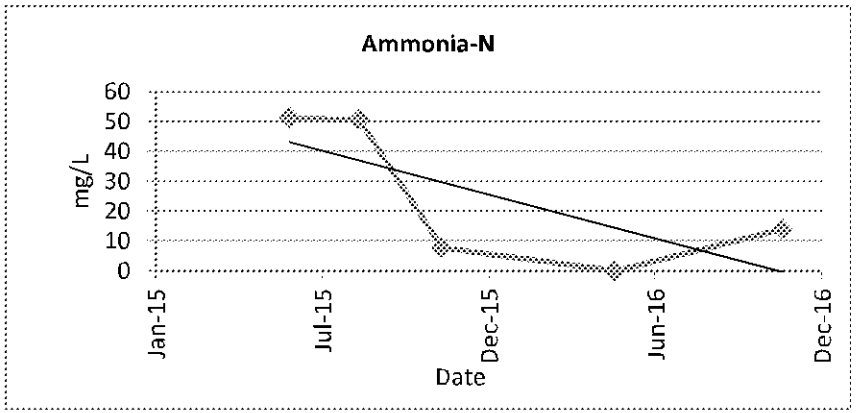


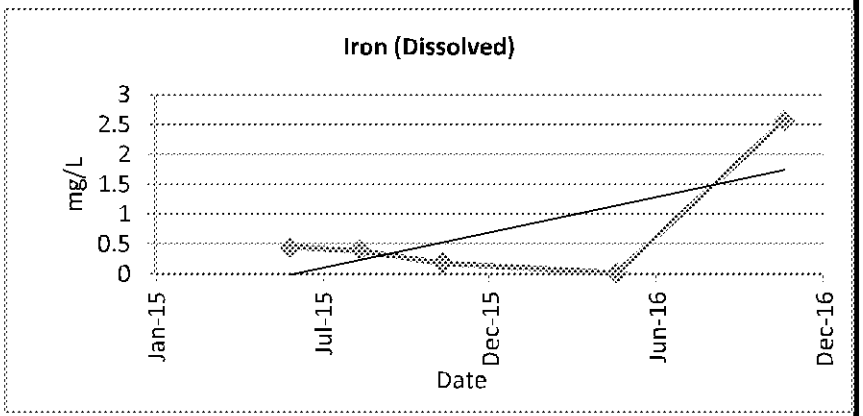


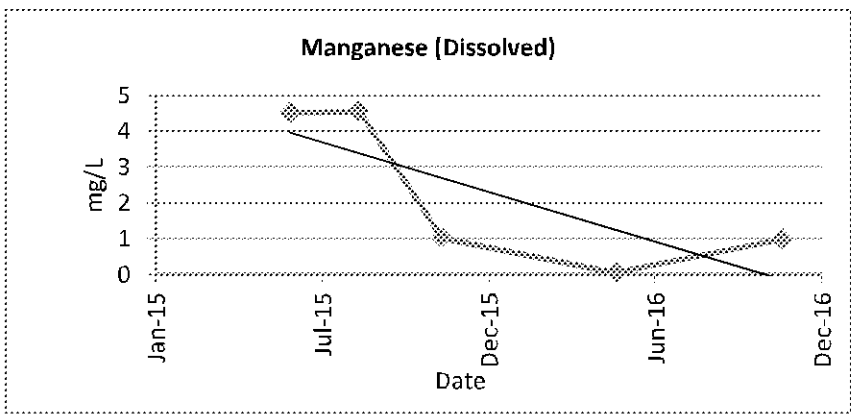
Note: ND results as 1/2 the detection limit

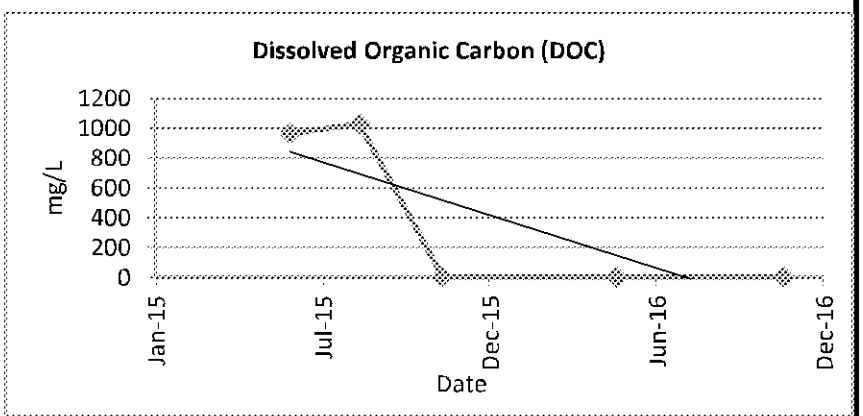
figure 4.9.11

TEMPORAL PLOTS - SELECTED PARAMETERS
MW106-15
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





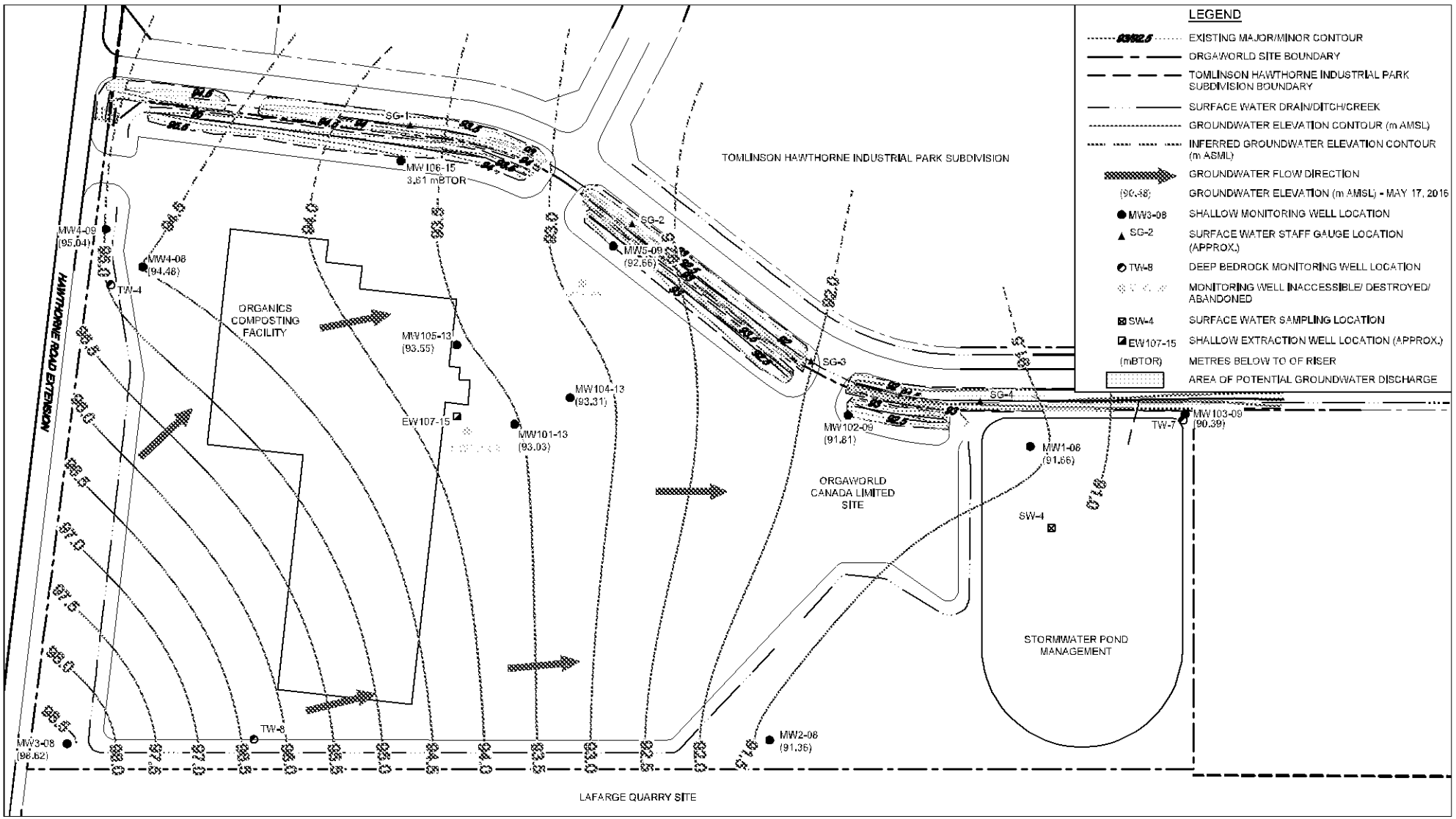




Note: ND results as 1/2 the detection limit

figure 4.9.12

TEMPORAL PLOTS - SELECTED PARAMETERS
EW107-15
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY



0 15 30 45m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

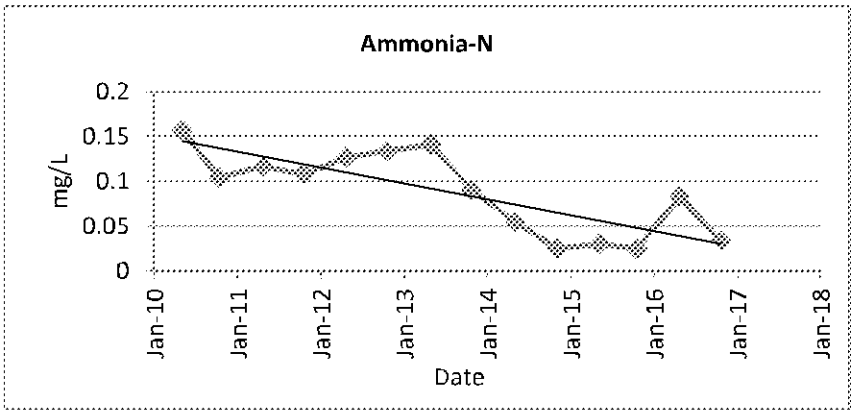
NORTHERN DITCH TOPOGRAPHY WITH MAY 17, 2016 GROUNDWATER CONTOURS

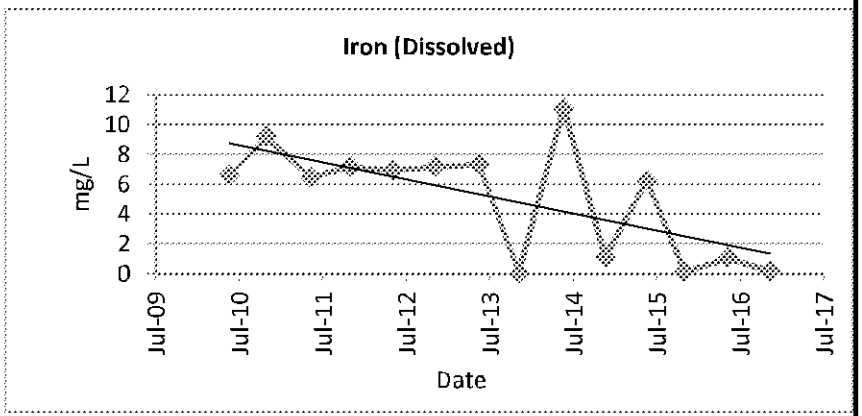
45804-58
Mar 30, 2017

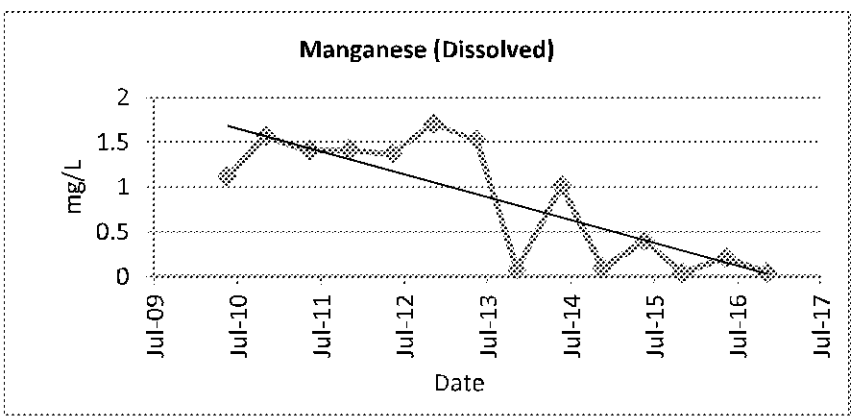
figure 4.10

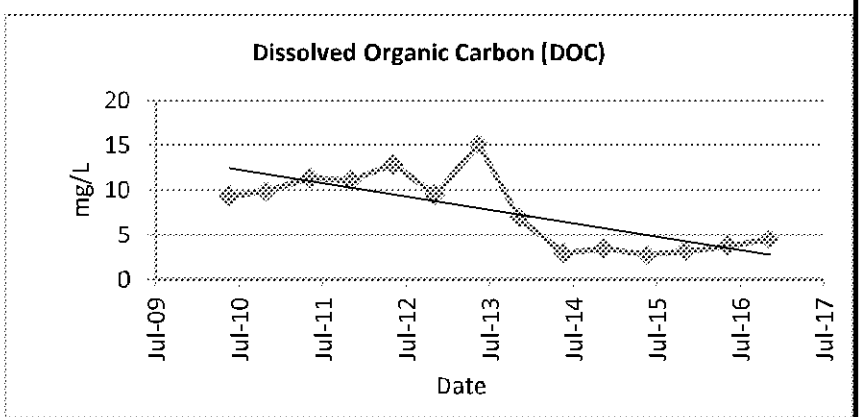
CAD File: P:\dmr\gis\MEC30s\753\ME507\ea\pub\M5804\M5804-58\066\M5804-58-066[C]-ME507-753[055]CM-MW-012.DWG

003232





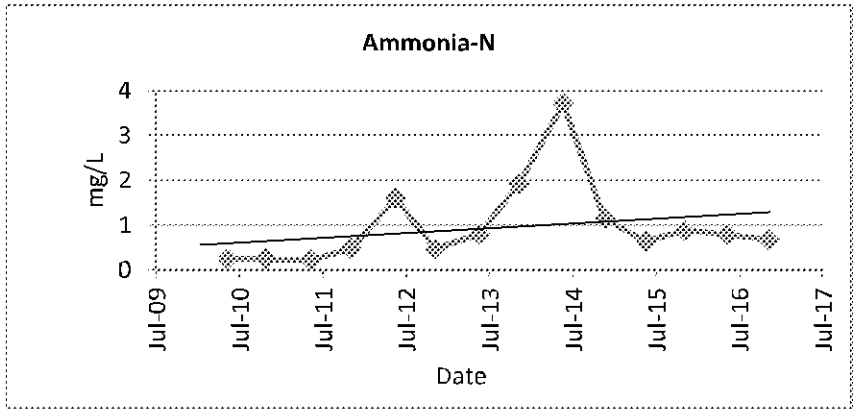


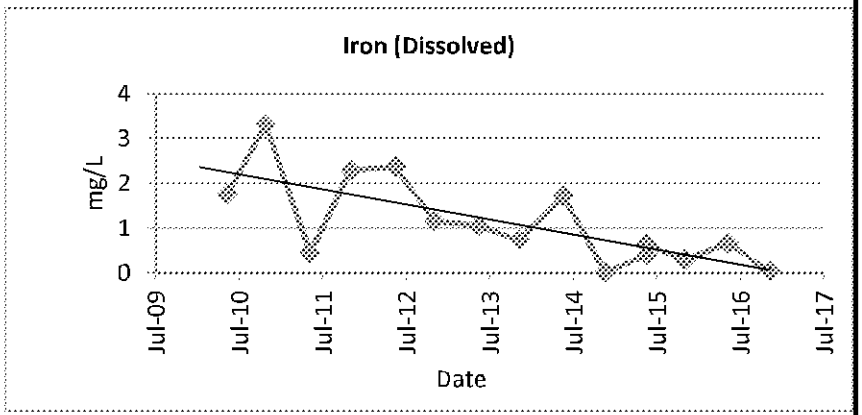


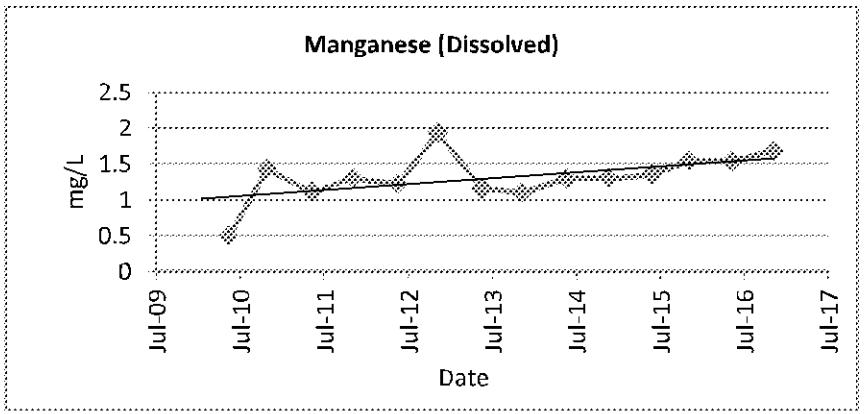
Note: ND results as 1/2 the detection limit

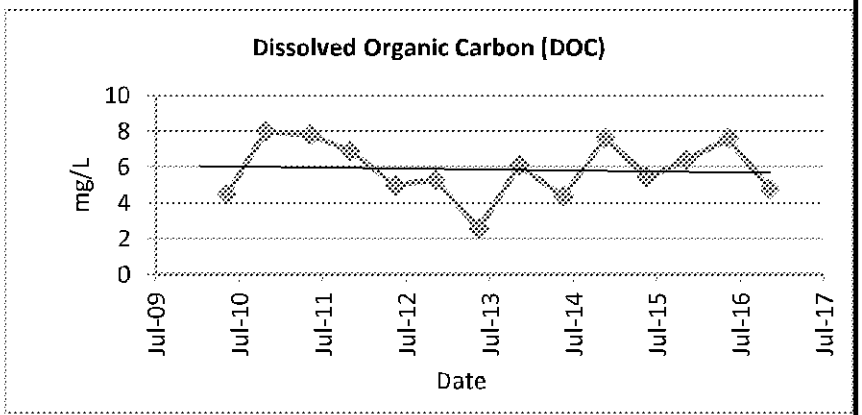
figure 4.11.1

TEMPORAL PLOTS - SELECTED PARAMETERSS
TW-7
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

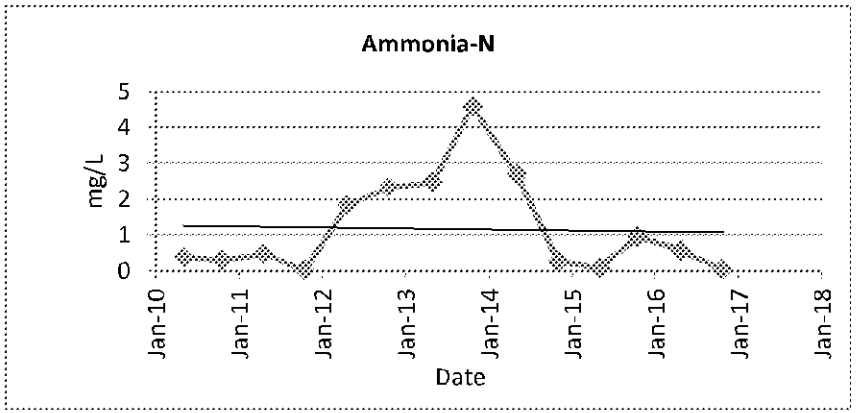
figure 4.11.2

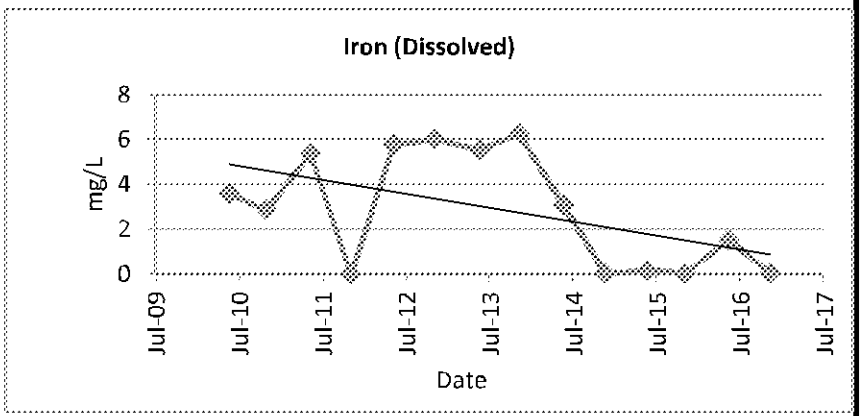
TEMPORAL PLOTS - SELECTED PARAMETERSS

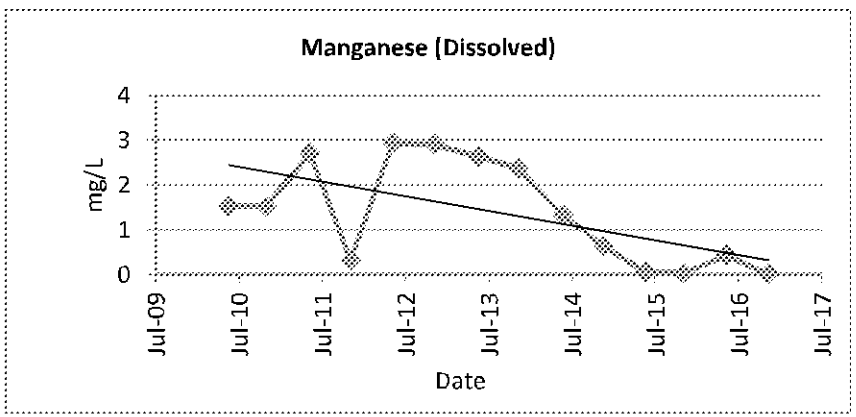
TW-4

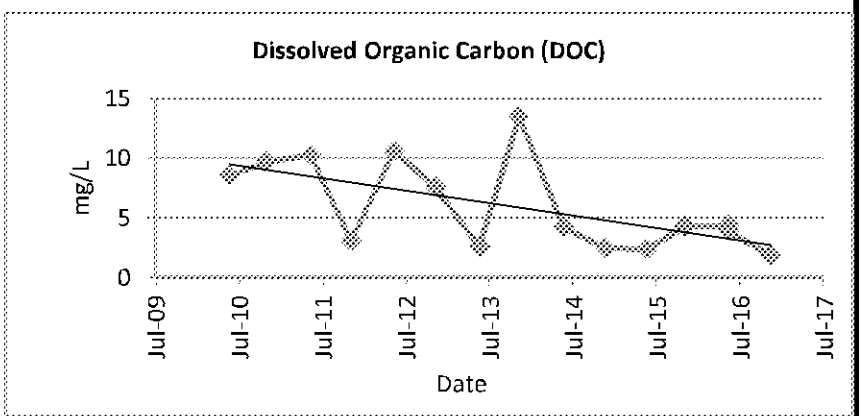
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT

ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY





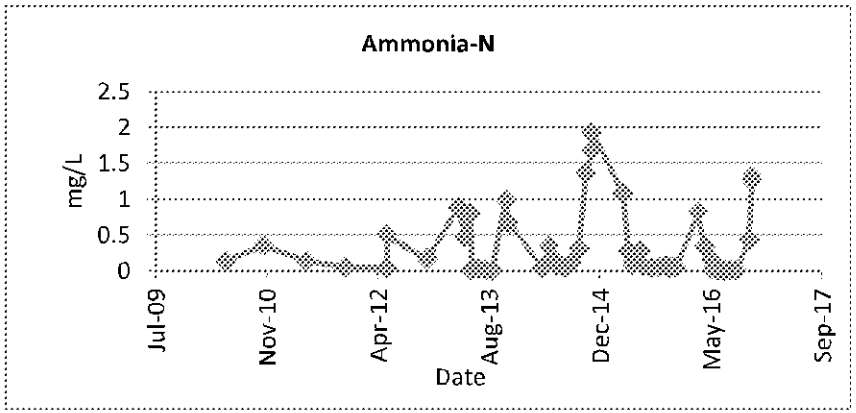


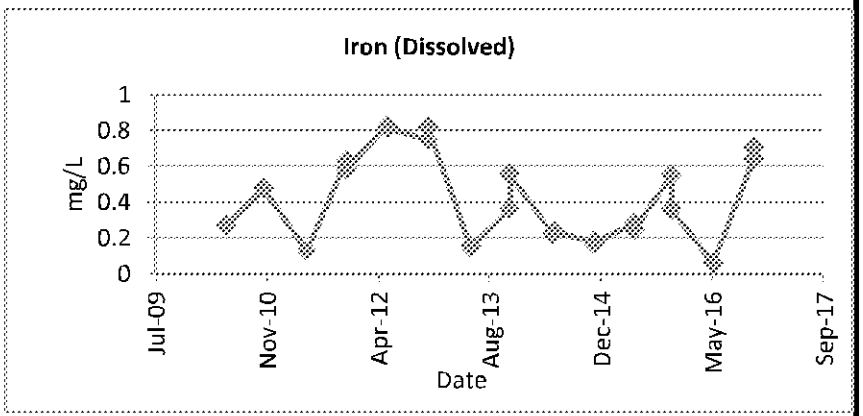


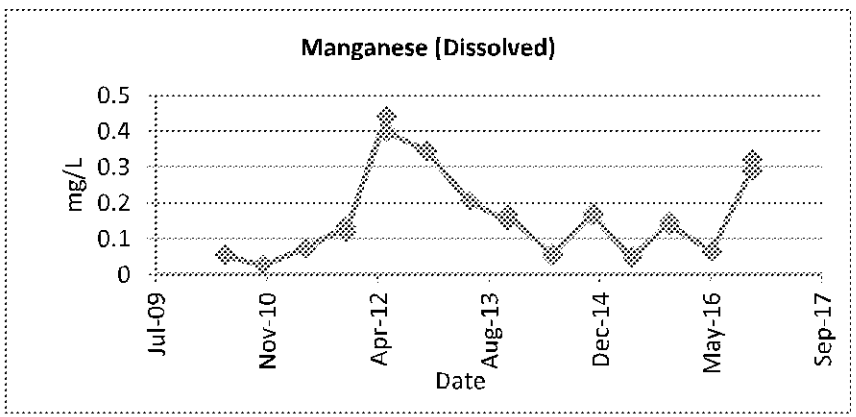
Note: ND results as 1/2 the detection limit

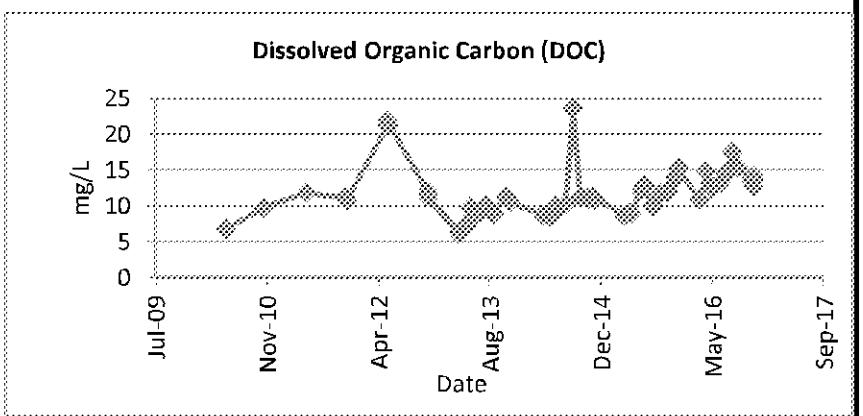
figure 4.11.3

TEMPORAL PLOTS - SELECTED PARAMETERSS
TW-8
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure 4.12

TEMPORAL PLOTS - SELECTED PARAMETERS
SW4-09
2016 GROUNDWATER AND SURFACE WATER MONITORING REPORT
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY

Table 2.1

Monitoring Location Details
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval [2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Shallow Water Table Wells								
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill	
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)	
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)	
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)	
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand	
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill	Decommissioned, replaced by MW05-09
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand	
MW6-08[3]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface	Decommissioned, replaced by MW05-09
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface	No access
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill	No access
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay	No access
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand	No access
MW101-09[5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill	Decommissioned, replaced by MW101-13
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay	
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand	
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel	
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel	
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel	
MW106-15	NS	NS	3.33	6.38	NS	NS	Fill and silty sand till	
Bedrock Wells								
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock	No access
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock	No access
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock	No access
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock	
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock	No access
TW-6 (2008)[4]	83.08	83.73	17.67	25.36	65.41	57.72	Competent Bedrock	No access
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock	
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock	

003237

Table 2.1

Monitoring Location Details
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval [2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Bedrock Wells								
EW107-15	NS	NS	2.44	5.49	NS	NS	Bedrock (fractured)	
Surface Water Staff Guages								
SG-1	NS	NS	-	-	-	-	North Drainage Ditch	
SG-2	NS	NS	-	-	-	-	North Drainage Ditch	
SG-3	NS	NS	-	-	-	-	North Drainage Ditch	
SG-4	NS	NS	-	-	-	-	North Drainage Ditch	

Notes:

m AMSL metres above mean sea level.
m bgs metres below ground surface.
NI No Information.
NS Not Surveyed.
(1) The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe, respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010. The 2015-series wells have not yet been surveyed.
(2) Bedrock wells are open to the rock.
(3) Decommissioned, replaced by MW05-09
(4) Located on Tomlinson property; no longer accessible.
(5) Decommissioned, replaced by MW101-13

003238

Table 3.1

2016 Monitoring Program Schedule
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd 5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters					
Location	**Water Level**	**Field pH, Conductivity, Temperature, Turbidity**	**Field Dissolved Oxygen**	**General Chemistry[1]**	**Metals[2/3]**	**PAHs[4]**	**PHC (F1 - F4)**	**Bacteriological Components[5]**	**Collection Method**
Surface Water Monitoring Locations (4 locations)									
SW-1	-	√	√	√	√	√	√	√	grab
SW-2	-	√	√	√	√	√	√	√	grab
SW-3	-	√	√	√	√	√	√	√	grab
SW-4[7]	-	√	√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (12 locations)									
MW1-08	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X	X	X	X	X	low-flow (peristaltic pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[3] Surface water metals are total while groundwater metals are dissolved.

[4] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by GHD field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected quarterly (winter, spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

o Samples are collected annually (typically spring)

003239

Table 3.1

2016 Monitoring Program Schedule
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd 5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters					
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	Metals[2/3]	PAHs[4]	PHC (F1 - F4)	Bacteriological Components[5]	Collection Method
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)									
TW-4	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√	√	√	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√	√	√	√	√	low-flow (bladder pump)
Extraction Well Location (1 location)									
EW107-15	X	√	√	√	√	√	√	√	sample discharge
Surface Water Staff Gauge Locations (4 locations)									
SG-1	X								water level only
SG-2	X								water level only
SG-3	X								water level only
SG-4	X								water level only

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[3] Surface water metals are total while groundwater metals are dissolved.

[4] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by GHD field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected quarterly (winter, spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

o Samples are collected annually (typically spring)

003240

Table 3.2

2017 Monitoring Program Schedule
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd 5123 Hawthorne Road, Ottawa, Ontario

Location	Field Test Parameters			Laboratory Test Parameters				Collection Method
	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	SW General Chemistry[2]	Metals[3/4]	Bacteriological Components[5]	
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall

Table 4.1

Groundwater Elevations
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Location	Reference Elevation [1] [2] (m AMSL)	February 10, 2016		May 17, 2016		August 16, 2016		November 15, 2016	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations									
MW1-08	93.00	1.25	91.75	1.34	91.66	NA	NA	1.59	91.41
MW2-08	93.78	1.35	92.43	2.42	91.36	NA	NA	1.37	92.41
MW3-08	104.22	NA	NA	5.6	98.62	NA	NA	5.3	98.92
MW4-08	96.36	1.72	94.64	1.88	94.48	NA	NA	1.93	94.43
MW4-09	97.45	2.31	95.14	2.41	95.04	NA	NA	2.4	95.05
MW5-09	94.50	1.85	92.65	1.84	92.66	2.58	91.92	2.23	92.27
MW101-13	94.88	1.34	93.54	1.36	93.52	2.21	92.67	1.9	92.98
MW102-09	93.79	1.84	91.95	1.98	91.81	2.56	91.23	2.19	91.60
MW103-09	93.33	2.89	90.44	2.94	90.39	3.51	89.82	3.33	90.00
MW104-13	94.55	1.43	93.12	1.24	93.31	2.32	92.23	1.81	92.74
MW105-13	94.95	1.37	93.58	1.4	93.55	1.89	93.06	1.665	93.29
MW106-15	NS	3.58	NS	3.61	NS	4.51	NS	4.1	NS
Deep Groundwater Elevations									
TW-4	96.90	12.05	84.85	12.24	84.66	NA	NA	12.64	84.26
TW-7	92.98	4.12	88.86	4.17	88.81	NA	NA	4.52	88.46
TW-8	94.88	11.85	83.03	12.4	82.48	NA	NA	12.41	82.47
Extraction Well									
EW107-15	NS	NA	NA	2.58	NS	NA	NS	2.80	NS
Surface Water Staff Gauge Locations									
SG-1	NS	dry	dry	dry	dry	dry	dry	dry	dry
SG-2	NS	dry	dry	dry	dry	dry	dry	dry	dry
SG-3	NS	dry	dry	dry	dry	dry	dry	dry	dry
SG-4	NS	dry	dry	dry	dry	dry	dry	dry	dry

Notes:

[1]	Top of Riser for MW
[2]	Top of Cap for TW and EW
m AMSL	meters above mean sea level.
NA	No access.
NS	Not surveyed.

003242

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW1-08	MW1-08
Sample ID:			GW-45804-051716-TS-006	GW-45804-111516-TS-005
Sample Date:			5/17/2016	11/15/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	0.00186	0.00161
Boron (dissolved)	mg/L	-	0.032	0.026
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	0.00066	ND(0.00050)
Cobalt (dissolved)	mg/L	-	0.00011	ND(0.00010)
Copper (dissolved)	mg/L	-	ND(0.00020)	0.00058
Iron (dissolved)	mg/L	48.3	6.28	8.11
Lead (dissolved)	mg/L	-	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	1.26	2.09
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.00113	0.00180
Nickel (dissolved)	mg/L	-	0.00084	0.00065
Zinc (dissolved)	mg/L	-	0.0010	ND(0.0010)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	322	273
Ammonia-N	mg/L	4.0	0.803	0.917
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	35	33
Chloride	mg/L	-	97.1	101
Color (apparent)	color unit	-	260	448
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	7.3
Escherichia coli	cfu/100mL	25.6	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.010)	ND(0.050)
pH, lab	s.u.	-	7.85	8.96
Phenolics (total)	mg/L	-	0.0022	0.0024
Phosphorus	mg/L	7.2	0.118	0.147
Sulfate	mg/L	-	149	689
Total coliform bacteria	cfu/100mL	-	1	100
Total dissolved solids (TDS)	mg/L	-	727	1360
Total kjeldahl nitrogen (TKN)	mg/L	-	1.62	0.79
Total suspended solids (TSS)	mg/L	-	11.3	12.1
Turbidity	NTU	-	78.1	107
Un-ionized ammonia	mg/L	-	0.00945	0.00227
Field Parameters				
Conductivity, field	mS/cm	-	0.795	1.59
Dissolved oxygen (DO), field	mg/L	-	0	6.35
Oxidation reduction potential (ORP), field	millivolts	-	-102	-95
pH, field	s.u.	-	7.67	7
Temperature, field	Deg C	-	11.51	11.23
Turbidity, field	NTU	-	0.6	0
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

003243

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW2-08	MW2-08
Sample ID:			GW-45804-051716-TS-003	GW-45804-111616-TS-011
Sample Date:			5/17/2016	11/16/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	0.00024	0.00050
Boron (dissolved)	mg/L	-	0.011	ND(0.010)
Cadmium (dissolved)	mg/L	-	0.000035	0.000019
Chromium (dissolved)	mg/L	-	0.00063	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.00010)	0.00023
Copper (dissolved)	mg/L	-	0.00359	0.0705
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	-	0.000129	0.000149
Manganese (dissolved)	mg/L	17.1	0.00171	0.00270
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.00905	0.0218
Nickel (dissolved)	mg/L	-	0.00434	0.00526
Zinc (dissolved)	mg/L	-	0.0139	0.0034
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	284	186
Ammonia-N	mg/L	4.0	0.054	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	18	36
Chloride	mg/L	-	0.88	2.81
Color (apparent)	color unit	-	86.6	143
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.1	10.0
Escherichia coli	cfu/100mL	25.6	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	ND(2)
Nitrate (as N)	mg/L	1.3	ND(0.020)	0.226
Nitrite (as N)	mg/L	-	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	7.89	7.66
Phenolics (total)	mg/L	-	0.0024	ND(0.0013)
Phosphorus	mg/L	7.2	0.0991	0.0517
Sulfate	mg/L	-	116	135
Total coliform bacteria	cfu/100mL	-	20	300
Total dissolved solids (TDS)	mg/L	-	502	413
Total kjeldahl nitrogen (TKN)	mg/L	-	0.27	1.00
Total suspended solids (TSS)	mg/L	-	567	81.7
Turbidity	NTU	-	64.5	26.6
Un-ionized ammonia	mg/L	-	0.0064	ND(0.000060)
Field Parameters				
Conductivity, field	mS/cm	-	0.527	--
Dissolved oxygen (DO), field	mg/L	-	4.96	--
Oxidation reduction potential (ORP), field	millivolts	-	110	--
pH, field	s.u.	-	8.74	--
Temperature, field	Deg C	-	10.58	--
Turbidity, field	NTU	-	177	--
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW3-08	MW3-08
Sample ID:			GW-45804-051816-TS-017	GW-45804-111616-TS-014
Sample Date:			5/18/2016	11/16/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.00026
Boron (dissolved)	mg/L	-	ND(0.10)	0.022
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.000013
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.00010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.00065)
Iron (dissolved)	mg/L	48.3	ND(0.10)	ND(0.010)
Lead (dissolved)	mg/L	-	ND(0.00050)	0.000067
Manganese (dissolved)	mg/L	17.1	0.0386	ND(0.00050)
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.191	0.0162
Nickel (dissolved)	mg/L	-	0.0083	0.00226
Zinc (dissolved)	mg/L	-	ND(0.010)	0.0089
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	239	277
Ammonia-N	mg/L	4.0	ND(0.036)	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	14	13
Chloride	mg/L	-	64.3	56.9
Color (apparent)	color unit	-	17.1	4.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	2.9	2.4
Escherichia coli	cfu/100mL	25.6	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0
Nitrate (as N)	mg/L	1.3	0.032	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	7.93	7.24
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0068)
Phosphorus	mg/L	7.2	0.0779	0.0186
Sulfate	mg/L	-	506	361
Total coliform bacteria	cfu/100mL	-	ND(10)	30
Total dissolved solids (TDS)	mg/L	-	1080	887
Total kjeldahl nitrogen (TKN)	mg/L	-	0.25	0.24
Total suspended solids (TSS)	mg/L	-	101	11.7
Turbidity	NTU	-	70.5	15.0
Un-ionized ammonia	mg/L	-	0.0021	ND(0.000045)
Field Parameters				
Conductivity, field	mS/cm	-	0.963	0.953
Dissolved oxygen (DO), field	mg/L	-	1.26	0
Oxidation reduction potential (ORP), field	millivolts	-	78	65
pH, field	s.u.	-	8.32	6.96
Temperature, field	Deg C	-	13.77	11.08
Turbidity, field	NTU	-	21	14.8
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020) J	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050) J	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW4-08	MW4-08
Sample ID:			GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:			5/17/2016	11/15/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	ND(0.00010)	ND(0.0010)
Boron (dissolved)	mg/L	-	0.054	ND(0.10)
Cadmium (dissolved)	mg/L	-	0.000049	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.00068	ND(0.0050)
Cobalt (dissolved)	mg/L	-	0.00021	ND(0.0010)
Copper (dissolved)	mg/L	-	0.00050	0.0517
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	-	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	0.207	0.160
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0188	0.0211
Nickel (dissolved)	mg/L	-	0.00675	0.0064
Zinc (dissolved)	mg/L	-	0.0017	ND(0.010)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	336	342
Ammonia-N	mg/L	4.0	0.030	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	10
Chloride	mg/L	-	70.8	95.9
Color (apparent)	color unit	-	ND(1.0)	ND(2.0)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.5	1.1
Escherichia coli	cfu/100mL	25.6	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0
Nitrate (as N)	mg/L	1.3	0.18	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.79	7.06
Phenolics (total)	mg/L	-	ND(0.0010)	0.0020
Phosphorus	mg/L	7.2	ND(0.0030)	0.0038
Sulfate	mg/L	-	680	816
Total coliform bacteria	cfu/100mL	-	1	0
Total dissolved solids (TDS)	mg/L	-	1500	1620
Total kjeldahl nitrogen (TKN)	mg/L	-	ND(0.15)	0.15
Total suspended solids (TSS)	mg/L	-	ND(2.0)	ND(2.0)
Turbidity	NTU	-	0.16	1.21
Un-ionized ammonia	mg/L	-	0.00029	0.000194
Field Parameters				
Conductivity, field	mS/cm	-	1.22	1.69
Dissolved oxygen (DO), field	mg/L	-	5.67	0
Oxidation reduction potential (ORP), field	millivolts	-	106	77
pH, field	s.u.	-	7.58	7.24
Temperature, field	Deg C	-	11.88	10.39
Turbidity, field	NTU	-	1	2
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

003246

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW4-09	MW4-09
Sample ID:			GW-45804-051716-TS-008	GW-45804-111516-TS-007
Sample Date:			5/17/2016	11/15/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	ND(0.00010)	0.00017
Boron (dissolved)	mg/L	-	0.056	0.074
Cadmium (dissolved)	mg/L	-	0.000012	0.000021
Chromium (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	0.00023	0.00036
Copper (dissolved)	mg/L	-	0.00035	0.00287
Iron (dissolved)	mg/L	48.3	0.045	0.410
Lead (dissolved)	mg/L	-	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	0.160	0.126
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0268	0.0450
Nickel (dissolved)	mg/L	-	0.00136	0.00142
Zinc (dissolved)	mg/L	-	0.0029	ND(0.0010)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	314	313
Ammonia-N	mg/L	4.0	0.037	0.073
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	14
Chloride	mg/L	-	64.4	77.2
Color (apparent)	color unit	-	3.6	13.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	2.6	1.3
Escherichia coli	cfu/100mL	25.6	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.84	7.24
Phenolics (total)	mg/L	-	ND(0.0010)	0.0034
Phosphorus	mg/L	7.2	0.0046	0.0063
Sulfate	mg/L	-	683	710
Total coliform bacteria	cfu/100mL	-	1	0
Total dissolved solids (TDS)	mg/L	-	1420	1460
Total kjeldahl nitrogen (TKN)	mg/L	-	ND(0.15)	0.16
Total suspended solids (TSS)	mg/L	-	2.6	9.5
Turbidity	NTU	-	1.41	3.99
Un-ionized ammonia	mg/L	-	0.00058	0.000237
Field Parameters				
Conductivity, field	mS/cm	-	1.04	1.58
Dissolved oxygen (DO), field	mg/L	-	0	0.15
Oxidation reduction potential (ORP), field	millivolts	-	45	-55
pH, field	s.u.	-	7.66	7.09
Temperature, field	Deg C	-	15.72	11.96
Turbidity, field	NTU	-	6.6	1.4
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

003247

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-081616-TS-007	GW-45804-111616-TS-012
Sample Date:			2/10/2016	5/18/2016	8/16/2016	11/16/2016
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.00018	0.0020	0.00099
Boron (dissolved)	mg/L	-	ND(0.10)	0.069	0.12	0.087
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.000015	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.00063)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	0.00014	ND(0.0010)	0.00024
Copper (dissolved)	mg/L	-	ND(0.0020)	0.00034	ND(0.0020)	ND(0.00075)
Iron (dissolved)	mg/L	48.3	5.58	6.66	10.3	4.66
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	3.07	3.06	3.58	2.67
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.00771)	0.00625	0.0174	0.00993
Nickel (dissolved)	mg/L	-	ND(0.0050)	0.00154	ND(0.0050)	0.00164
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.0040)	ND(0.010)	ND(0.0010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	ND(459)	463	533	553
Ammonia-N	mg/L	4.0	18.7	15.8	17.4	14.7
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(26)	27	74	34
Chloride	mg/L	-	ND(135)	126	656	140
Color (apparent)	color unit	-	240 J	115	243	184
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(6.6)	6.7	11.4	8.7
Escherichia coli	cfu/100mL	25.6	0	0	1	0
Fecal coliform bacteria	cfu/100mL	-	0	0	23	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	-	7.76	7.88	7.54	7.18
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0019)	0.0056	ND(0.0026)
Phosphorus	mg/L	7.2	0.126	0.126	0.135	0.141
Sulfate	mg/L	-	ND(635)	749	405	504
Total coliform bacteria	cfu/100mL	-	0	0	600	0
Total dissolved solids (TDS)	mg/L	-	ND(1480)	1700	2350	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	18.6	16.2	18.4	15.1
Total suspended solids (TSS)	mg/L	-	ND(7.4)	20.4	20.2	9.0
Turbidity	NTU	-	65.8 J	76.2	136	57.2
Un-ionized ammonia	mg/L	-	0.0586	0.159	0.0669	0.0450
Field Parameters						
Conductivity, field	mS/cm	-	2.11	2.01	3.01	2.01
Dissolved oxygen (DO), field	mg/L	-	0	0	0	0
Oxidation reduction potential (ORP), field	millivolts	-	-115	-75	-82	-101
pH, field	s.u.	-	7.29	7.64	6.95	7.06
Temperature, field	Deg C	-	5.82	10.31	16.56	14.14
Turbidity, field	NTU	-	65.4	0.6	0	29.9
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

003248

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-021016-TS-006	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009
Sample Date:			2/10/2016	5/18/2016	8/16/2016	11/16/2016
Parameters	**Units**	**TLP**				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.0130	0.0087	0.00467
Boron (dissolved)	mg/L	-	ND(0.10)	0.073	0.12	0.111
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.000012	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.00058)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	0.00053	ND(0.0010)	0.00051
Copper (dissolved)	mg/L	-	ND(0.0020)	0.00068	ND(0.0020)	ND(0.00235)
Iron (dissolved)	mg/L	48.3	ND(0.10)	1.80	7.07	6.55
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.000050)	ND(0.00050)	0.000061
Manganese (dissolved)	mg/L	17.1	ND(0.0114)	1.09	1.09	0.957
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.00987)	0.0201	0.0160	0.0196
Nickel (dissolved)	mg/L	-	ND(0.0050)	0.00282	ND(0.0050)	0.00225
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.0049)	ND(0.010)	0.0015
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	ND(323)	417	533	618
Ammonia-N	mg/L	4.0	0.237	13.2	29.5	17.1
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(14)	15	ND(35)	43
Chloride	mg/L	-	ND(126)	81.3	85.7	97.2
Color (apparent)	color unit	-	ND(6.3) J	18.0	237	216
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(4.5)	5.8	9.3	10.4
Escherichia coli	cfu/100mL	25.6	0 J	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0 J	0	2	0
Nitrate (as N)	mg/L	1.3	1.99	ND(0.10)	ND(0.10)	4.41
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	0.162
pH, lab	s.u.	-	7.72	7.86	7.54	7.05
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0024)	0.0044	ND(0.0024)
Phosphorus	mg/L	7.2	ND(0.030)	0.0116	0.0969	0.0440
Sulfate	mg/L	-	ND(752)	710	528	432
Total coliform bacteria	cfu/100mL	-	ND(10) J	ND(10)	200	20
Total dissolved solids (TDS)	mg/L	-	ND(1480)	1460	1370	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	0.61	12.6	32.3	20.7
Total suspended solids (TSS)	mg/L	-	ND(8.8)	ND(9.2)	18.0	21.0
Turbidity	NTU	-	ND(2.39) J	11.8	94.5	58.3
Un-ionized ammonia	mg/L	-	0.000544	0.321	0.0906	0.0727
Field Parameters						
Conductivity, field	mS/cm	-	1.1	1.76	1.91	0.804
Dissolved oxygen (DO), field	mg/L	-	0	0	1.36	1.44
Oxidation reduction potential (ORP), field	millivolts	-	-18	-31	-89	-125
pH, field	s.u.	-	7.08	7.88	6.72	7.23
Temperature, field	Deg C	-	7.87	15.91	22.7	11.39
Turbidity, field	NTU	-	0	3.1	0	38
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	0.032	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	0.0144	0.0451	ND(0.0050)

003249

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-021016-TS-008	GW-45804-051816-TS-016	GW-45804-081616-TS-006	GW-45804-111516-TS-006
Sample Date:			2/10/2016	5/18/2016	8/16/2016	11/15/2016
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.00116	0.0016	0.00108
Boron (dissolved)	mg/L	-	ND(0.10)	0.065	0.11	0.078
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	0.00018	ND(0.0010)	0.00027
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.00020)	ND(0.0020)	0.00058
Iron (dissolved)	mg/L	48.3	8.02	7.89	4.96	4.06
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	5.16	4.72	3.37	2.50
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.00609)	0.00789	0.0107	0.00679
Nickel (dissolved)	mg/L	-	ND(0.0050)	0.00161	ND(0.0050)	0.00105
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.0012)	ND(0.010)	ND(0.0010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	ND(439)	398	518	558
Ammonia-N	mg/L	4.0	6.80	6.81	7.18	6.85
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(33)	33	ND(44)	45
Chloride	mg/L	-	ND(157)	155	148	128
Color (apparent)	color unit	-	211	200	216	196
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(8.3)	8.8	11.0	10.9
Escherichia coli	cfu/100mL	25.6	0	0	1	0
Fecal coliform bacteria	cfu/100mL	-	0	0	60	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.89	7.91	7.74	7.34
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0021)	0.0060	0.0022
Phosphorus	mg/L	7.2	0.056	0.0653	0.0820	0.0943
Sulfate	mg/L	-	ND(620)	726	580	511
Total coliform bacteria	cfu/100mL	-	0	10	3900	0
Total dissolved solids (TDS)	mg/L	-	ND(1540)	1690	1550	1560
Total kjeldahl nitrogen (TKN)	mg/L	-	6.70	7.50	7.70	5.62
Total suspended solids (TSS)	mg/L	-	ND(16.0)	27.6	6.2	2.6
Turbidity	NTU	-	87.3 J	101	60.3	50.9
Un-ionized ammonia	mg/L	-	0.0172	0.244	0.0285	0.0254
Field Parameters						
Conductivity, field	mS/cm	-	1.25	1.87	1.8	1.86
Dissolved oxygen (DO), field	mg/L	-	0	0	0	3.14
Oxidation reduction potential (ORP), field	millivolts	-	-115	-94	-91	-129
pH, field	s.u.	-	7.22	8.16	6.97	7.1
Temperature, field	Deg C	-	4.95	11.99	18.33	13.5
Turbidity, field	NTU	-	0	1.6	0	0.2
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

003250

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004
Sample Date:			2/10/2016	2/10/2016 Duplicate	5/17/2016	8/16/2016	11/15/2016
Parameters	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	0.00519	0.00527	0.00631	0.00617	0.0101
Boron (dissolved)	mg/L	-	ND(0.029)	ND(0.027)	0.030	0.046	0.044
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.00086)	ND(0.00080)	0.00063	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	0.00071	0.00067	0.00069	0.00194	0.00022
Copper (dissolved)	mg/L	-	ND(0.00067) J	ND(0.00020) J	ND(0.00020)	ND(0.00020)	0.0403
Iron (dissolved)	mg/L	48.3	3.73	3.81	5.32	5.83	8.40
Lead (dissolved)	mg/L	-	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000107
Manganese (dissolved)	mg/L	17.1	2.58	2.58	2.95	3.79	4.29
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.00388)	ND(0.00379)	0.00372	0.00983	0.00371
Nickel (dissolved)	mg/L	-	ND(0.00178)	ND(0.00158)	0.00142	0.00436	0.00078
Zinc (dissolved)	mg/L	-	0.0069 J	ND(0.0022) J	0.0015	0.0124	0.0024
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	ND(249)	ND(253)	292	322	329
Ammonia-N	mg/L	4.0	0.867	0.909	1.19	1.34	1.43
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(29)	ND(28)	32	ND(39)	44
Chloride	mg/L	-	ND(43.4)	ND(44.2)	80.4	101	83.5
Color (apparent)	color unit	-	189 J	191 J	233	260	343
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(6.5)	ND(6.5)	9.6	11.5	10.3
Escherichia coli	cfu/100mL	25.6	0	0	0	6	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	50	0
Nitrate (as N)	mg/L	1.3	ND(0.025)	ND(0.024)	ND(0.020)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)	ND(0.010)
pH, lab	s.u.	-	7.82	7.80	7.90	7.63	7.11
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0021	0.0032	0.0011
Phosphorus	mg/L	7.2	ND(0.030)	ND(0.030)	0.0261	0.0156	0.0243
Sulfate	mg/L	-	ND(197)	ND(176)	144	223	283
Total coliform bacteria	cfu/100mL	-	ND(100)	ND(100)	10	3200	100
Total dissolved solids (TDS)	mg/L	-	ND(489)	ND(488)	711	810	897
Total kjeldahl nitrogen (TKN)	mg/L	-	1.35	1.36	1.83	2.07	2.62
Total suspended solids (TSS)	mg/L	-	ND(3.4)	ND(3.5)	20.1	9.0	10.3
Turbidity	NTU	-	ND(33.5) J	ND(31.4) J	61.1	66.0	111
Un-ionized ammonia	mg/L	-	0.00287	0.00301	0.0130	0.00369	0.00431
Field Parameters							
Conductivity, field	mS/cm	-	0.843	--	0.695	0.826	1.02
Dissolved oxygen (DO), field	mg/L	-	0	--	0.12	0	0
Oxidation reduction potential (ORP), field	millivolts	-	-73	--	-67	-72	-107
pH, field	s.u.	-	7.3	--	7.7	6.81	7.06
Temperature, field	Deg C	-	6.17	--	9.63	16.38	11.98
Turbidity, field	NTU	-	17.6	--	6.7	0	4.9
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010
Sample Date:			2/10/2016	5/18/2016	8/16/2016	11/16/2016
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	0.0019	0.0014	0.0035	0.00226
Boron (dissolved)	mg/L	-	ND(0.10)	0.11	0.10	0.126
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	0.0022	0.0020	0.0020	0.00090
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00304
Iron (dissolved)	mg/L	48.3	7.75	6.27	14.5	6.05
Lead (dissolved)	mg/L	-	0.00088	ND(0.00050)	ND(0.00050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	7.40	6.02	8.13	4.01
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.0101)	0.0146	0.0130	0.0132
Nickel (dissolved)	mg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00183
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	0.012	ND(0.0010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	ND(373)	380	415	364
Ammonia-N	mg/L	4.0	1.72	3.87	5.41	1.20
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(25)	27	ND(48)	25
Chloride	mg/L	-	ND(87.8)	134	61.3	54.3
Color (apparent)	color unit	-	163	102	141	103
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(5.9)	6.7	9.2	7.3
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0
Nitrate (as N)	mg/L	1.3	2.55	ND(0.10)	10.6	2.98
Nitrite (as N)	mg/L	-	0.011	ND(0.050)	ND(0.050)	0.037
pH, lab	s.u.	-	7.75	7.86	7.68	7.18
Phenolics (total)	mg/L	-	0.0010	ND(0.0012)	0.0042	ND(0.0023)
Phosphorus	mg/L	7.2	ND(0.030)	0.0291	0.0449	0.0066
Sulfate	mg/L	-	ND(552)	966	519	454
Total coliform bacteria	cfu/100mL	-	ND(10)	ND(10)	100	0
Total dissolved solids (TDS)	mg/L	-	ND(1370)	1760	1300	1120
Total kjeldahl nitrogen (TKN)	mg/L	-	2.18	4.56	5.97	2.30
Total suspended solids (TSS)	mg/L	-	28.5	40.3	104	23.5
Turbidity	NTU	-	80.9 J	77.5	91.5	57.3
Un-ionized ammonia	mg/L	-	0.00335	0.0906	0.0766	0.0196
Field Parameters						
Conductivity, field	mS/cm	-	0.888	1.94	1.87	1.21
Dissolved oxygen (DO), field	mg/L	-	2.75	0	0.79	1.21
Oxidation reduction potential (ORP), field	millivolts	-	91	-73	-124	93
pH, field	s.u.	-	6.77	7.8	7.42	7.89
Temperature, field	Deg C	-	14.98	16.4	21.68	9.26
Turbidity, field	NTU	-	28.5	20.1	0	129
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	330	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	0.0051	0.0127	0.0554	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-021016-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-081616-TS-002	GW-45804-111516-TS-001
Sample Date:			2/10/2016	5/18/2016	8/16/2016	8/16/2016 Duplicate	11/15/2016
Parameters	**Units**	**TLP[1]**					
Metals							
Arsenic (dissolved)	mg/L	-	ND(0.0014)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	0.0045	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0303
Iron (dissolved)	mg/L	48.3	5.77	4.45	4.08	4.13	2.20
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	0.567	0.637	0.536	0.534	0.852
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.0187)	0.0101	0.00807	0.00831	0.00710
Nickel (dissolved)	mg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	-	0.011	ND(0.010)	ND(0.010)	0.412	ND(0.010)
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	ND(371)	376	449	451	406
Ammonia-N	mg/L	4.0	5.95	4.86	16.1	16.0	11.9
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(16)	16	ND(18)	ND(18)	20
Chloride	mg/L	-	ND(128)	141	81.3	87.7	94.1
Color (apparent)	color unit	-	100	79.3	107	88.0	56.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(5.6)	4.2	5.4	5.1	3.8
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	4	3	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.72	7.88	7.60	7.60	6.94
Phenolics (total)	mg/L	-	0.0011	ND(0.0015)	ND(0.0016) J	0.0034 J	0.0016
Phosphorus	mg/L	7.2	ND(0.030)	0.0234	0.0381	0.0393	0.0306
Sulfate	mg/L	-	ND(822)	965	671	722	947
Total coliform bacteria	cfu/100mL	-	ND(10)	ND(10)	100	100	200
Total dissolved solids (TDS)	mg/L	-	ND(1720)	1840	1530	1520	1790
Total kjeldahl nitrogen (TKN)	mg/L	-	5.70	5.35	16.4	16.4	12.8
Total suspended solids (TSS)	mg/L	-	ND(10.5)	22.7	15.5	6.1	8.3
Turbidity	NTU	-	68.1 J	50.0	52.6	49.6	28.8
Un-ionized ammonia	mg/L	-	0.0226	0.321	0.0476	0.0475	0.0256
Field Parameters							
Conductivity, field	mS/cm	-	2.13	2.25	1.93	--	2.1
Dissolved oxygen (DO), field	mg/L	-	0	3.07	0	--	0
Oxidation reduction potential (ORP), field	millivolts	-	-103	-115	-90	--	-107
pH, field	s.u.	-	7.07	8.22	6.72	--	6.7
Temperature, field	Deg C	-	14.71	16.12	21.89	--	16.57
Turbidity, field	NTU	-	30.5	0.4	0	--	41.3
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-021016-TS-009	GW-45804-051816-TS-011	GW-45804-081616-TS-008	GW-45804-111616-TS-013
Sample Date:			2/10/2016	5/18/2016	8/16/2016	11/16/2016
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	ND(0.0010)	0.00107	0.00074	0.00082
Boron (dissolved)	mg/L	-	ND(0.13)	0.129	0.160	0.198
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.000010)	0.000018
Chromium (dissolved)	mg/L	-	ND(0.0050)	ND(0.00068)	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	0.00025	0.00039	0.00099
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.00020)	ND(0.00056)	ND(0.00069)
Iron (dissolved)	mg/L	48.3	3.60	4.66	0.838	2.19
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.000050)	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	17.1	1.94	1.96	1.06	2.62
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	ND(0.0121)	0.0108	0.0170	0.0180
Nickel (dissolved)	mg/L	-	ND(0.0050)	0.00124	0.00222	0.00174
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.0013)	0.0037	0.0023
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	ND(474)	443	467	497
Ammonia-N	mg/L	4.0	4.79	4.18	3.26	1.91
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(36)	36	ND(39)	48
Chloride	mg/L	-	ND(109)	101	107	112
Color (apparent)	color unit	-	150 J	132	63.1	114
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	ND(10.1)	9.9	12.7	13.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	15	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	0.24	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	-	7.88	7.89	7.69	7.26
Phenolics (total)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0039	ND(0.0053)
Phosphorus	mg/L	7.2	0.055	0.101	0.0684	0.0341
Sulfate	mg/L	-	ND(495)	542	503	387
Total coliform bacteria	cfu/100mL	-	0	0	200	0
Total dissolved solids (TDS)	mg/L	-	ND(1350)	1390	1370	1230
Total kjeldahl nitrogen (TKN)	mg/L	-	4.48	4.12	3.43	2.27
Total suspended solids (TSS)	mg/L	-	21.0	30.0	22.3	4.6
Turbidity	NTU	-	89.0 J	84.5	30.5	34.5
Un-ionized ammonia	mg/L	-	0.0176	0.159	0.0190	0.00827
Field Parameters						
Conductivity, field	mS/cm	-	1.04	1.52	1.57	1.63
Dissolved oxygen (DO), field	mg/L	-	0	1.42	0	0.33
Oxidation reduction potential (ORP), field	millivolts	-	-114	-97	-69	-13
pH, field	s.u.	-	7.25	8.22	7.26	7.14
Temperature, field	Deg C	-	8.88	10.63	14.6	14.3
Turbidity, field	NTU	-	212	41.2	0	8.7
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	400	290	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	400	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			EW107-15	EW107-15
Sample ID:			GW-45804-051816-TS-014	GW-45804-111616-TS-017
Sample Date:			5/18/2016	11/16/2016
Parameters	**Units**	**TLP[1]**		
Metals				
Arsenic (dissolved)	mg/L	-	0.00018	ND(0.0010)
Boron (dissolved)	mg/L	-	0.070	ND(0.10)
Cadmium (dissolved)	mg/L	-	ND(0.000010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.00069)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	-	0.00020	ND(0.0020)
Iron (dissolved)	mg/L	48.3	0.022	2.56
Lead (dissolved)	mg/L	-	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	0.0650	1.01
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0150	0.00507
Nickel (dissolved)	mg/L	-	0.00084	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.0013)	0.168
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	153	354
Ammonia-N	mg/L	4.0	0.123	14.1
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	16	23
Chloride	mg/L	-	45.3	111
Color (apparent)	color unit	-	27.3	102
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.2	6.3
Escherichia coli	cfu/100mL	25.6	4	0
Fecal coliform bacteria	cfu/100mL	-	5	0
Nitrate (as N)	mg/L	1.3	0.112	ND(0.10)
Nitrite (as N)	mg/L	-	0.015	ND(0.050)
pH, lab	s.u.	-	8.34	6.92
Phenolics (total)	mg/L	-	ND(0.0020)	ND(0.0033)
Phosphorus	mg/L	7.2	0.0099	0.118
Sulfate	mg/L	-	304	945
Total coliform bacteria	cfu/100mL	-	50	1
Total dissolved solids (TDS)	mg/L	-	673	1680
Total kjeldahl nitrogen (TKN)	mg/L	-	0.26	14.0
Total suspended solids (TSS)	mg/L	-	27.0	5.1
Turbidity	NTU	-	47.9	36.1
Un-ionized ammonia	mg/L	-	0.0223	0.0412
Field Parameters				
Conductivity, field	mS/cm	-	0.769	2.14
Dissolved oxygen (DO), field	mg/L	-	1.56	4.41
Oxidation reduction potential (ORP), field	millivolts	-	-113	-63
pH, field	s.u.	-	8.65	6.84
Temperature, field	Deg C	-	19.81	16.26
Turbidity, field	NTU	-	7.2	30.1
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J Estimated concentration.
ND Non-detect at associated value.
U Not present at or above the associated value.
R Rejected.
-- Not analyzed.
321 Exceedance of the Tier I Trigger Level

003256

Table 4.2a

MW103-09 Analytical Results- PWQO Comparison
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004
Sample Date:			2/10/2016	2/10/2016 Duplicate	5/17/2016	8/16/2016	11/15/2016
Parameters	**Units**	PWQO[1]					
Metals							
Arsenic (dissolved)	mg/L	0.005	0.00519	0.00527	0.00631	0.00817	0.0101
Boron (dissolved)	mg/L	0.2	ND(0.029)	ND(0.027)	0.030	0.046	0.044
Cadmium (dissolved)	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	ND(0.00086)	ND(0.00080)	0.00063	ND(0.00050)	ND(0.00050)
Cobalt (dissolved)	mg/L	0.0009	0.00071	0.00067	0.00069	0.00194	0.00022
Copper (dissolved)	mg/L	0.005	ND(0.00067) J	ND(0.00020) J	ND(0.00020)	ND(0.00020)	0.00403
Iron (dissolved)	mg/L	0.3	3.70	3.81	5.32	5.90	6.46
Lead (dissolved)	mg/L	0.025 (c)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000107
Manganese (dissolved)	mg/L	-	2.58	2.58	2.95	3.79	4.29
Mercury (dissolved)	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.04	ND(0.00388)	ND(0.00379)	0.00372	0.00983	0.00371
Nickel (dissolved)	mg/L	0.025	ND(0.00178)	ND(0.00158)	0.00142	0.00436	0.00078
Zinc (dissolved)	mg/L	0.03	0.0069 J	ND(0.0022) J	0.0015	0.0124	0.0024
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	-	ND(249)	ND(253)	292	322	329
Ammonia-N	mg/L	-	0.867	0.909	1.19	1.34	1.43
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(29)	ND(28)	32	ND(39)	44
Chloride	mg/L	-	ND(43.4)	ND(44.2)	80.4	101	83.5
Color (apparent)	color unit	-	189 J	191 J	233	260	343
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	ND(8.5)	ND(8.5)	9.6	11.5	10.3
Escherichia coli	cfu/100mL	100	0	0	0	6	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	50	0
Nitrate (as N)	mg/L	-	ND(0.025)	ND(0.024)	ND(0.020)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)	ND(0.010)
pH, lab	s.u.	6.5-8.5	7.82	7.80	7.90	7.63	7.11
Phenolics (total)	mg/L	0.001	ND(0.0010)	ND(0.0010)	0.0021	0.0022	0.0011
Phosphorus	mg/L	0.01	ND(0.030)	ND(0.030)	0.0361	0.0156	0.0243
Sulfate	mg/L	-	ND(197)	ND(176)	144	223	283
Total coliform bacteria	cfu/100mL	-	ND(100)	ND(100)	10	3200	100
Total dissolved solids (TDS)	mg/L	-	ND(489)	ND(488)	711	810	897
Total kjeldahl nitrogen (TKN)	mg/L	-	1.35	1.36	1.83	2.07	2.62
Total suspended solids (TSS)	mg/L	-	ND(3.4)	ND(3.5)	20.1	9.0	10.3
Turbidity	NTU	-	ND(33.5) J	ND(31.4) J	61.1	66.0	111
Un-ionized ammonia	mg/L	0.02	0.00287	0.00301	0.0130	0.00369	0.00431
Field Parameters							
Conductivity, field	mS/cm	-	0.843	–	0.695	0.826	1.02
Dissolved oxygen (DO), field	mg/L	<4 (f)	0	–	0.32	0	0
Oxidation reduction potential (ORP), field	millivolts	-	-73	–	-67	-72	-107
pH, field	s.u.	6.5-8.5	7.3	–	7.7	6.81	7.06
Temperature, field	Deg C	-	6.17	–	9.63	18.38	11.98
Turbidity, field	NTU	-	17.6	–	6.7	0	4.9

Table 4.2a

MW103-09 Analytical Results- PWQO Comparison
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004
Sample Date:			2/10/2016	2/10/2016 Duplicate	5/17/2016	8/16/2016	11/15/2016
Parameters	**Units**	**PWQO[1]**					
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	ug/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	ug/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	ug/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles							
Anthracene	ug/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	ug/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
(a) Geometric mean number of counts per 100 mL determined from a minimum of 5 samples. As of May 1, 1994, MOEE staff were advised to base all new compliance, enforcement and monitoring activities on the E. coli test. As such, Fecal Coliform and Total Coliform exceedances are not highlighted
(b) PWQO for Cr (III); PWQO for Cr (VI) is 0.001 mg/L.
(c) Lead objective is alkalinity dependent. For alkalinity <20 mg/L the PWQO is 5 µg/L, for alkalinity between 40 and 80 mg/L, the PWQO is 20 µg/L, and for alkalinity > 80 mg/L the PWQO is 25 µg/L.
(d) Unionized ammonia is calculated based on pH, temperature, and total ammonia concentration.
(e) No firm objective. Proposed objective is for protection against aesthetic deterioration and excessive plant growth in rivers and streams.
(f) Dissolved oxygen is temperature dependent. Value should not be less than the range of 7 mg/L (0 °C) to 4 mg/L (25 °C) for warm water biota.
(g) An interim PWQO of 0.02 mg/L has been set for zinc. The established PWQO for zinc is 0.03 mg/L.
J Estimated concentration.
ND Non-detect at associated value.
U Not present at or above the associated value.
R Rejected.
- Not analyzed.
Exceedence of the PWQO

Deep Bedrock Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				TW-4	TW-4
Sample ID:				GW-45804-051716-TS-009	GW-45804-111616-TS-016
Sample Date:				5/17/2016	11/16/2016
Parameters	**Units**	**TLP[1]**	**ODWQS[2]**		
Metals		**a**	**b**		
Arsenic (dissolved)	mg/L	-	0.025	ND(0.0010)	0.00013
Boron (dissolved)	mg/L	-	5.0	0.12	0.132
Cadmium (dissolved)	mg/L	-	0.005	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	0.05	ND(0.0050)	ND(0.00050)
Cobalt (dissolved)	mg/L	-	/	ND(0.0010)	0.00019
Copper (dissolved)	mg/L	-	1.0	0.0147	0.00871
Iron (dissolved)	mg/L	10.6	0.30	0.67b	0.025
Lead (dissolved)	mg/L	-	0.01	ND(0.00050)	0.000089
Manganese (dissolved)	mg/L	2.1	0.05	1.55b	1.69b
Mercury (dissolved)	mg/L	-	0.001	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	/	0.00438	0.00404
Nickel (dissolved)	mg/L	-	/	0.0075	0.00661
Zinc (dissolved)	mg/L	-	5.0	0.013	0.0043
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	580b	547b
Ammonia-N	mg/L	0.2	/	0.795a	0.570a
Biochemical oxygen demand (carbonaceous)	mg/L	-	/	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	/	28	26
Chloride	mg/L	-	250	566b	512b
Color (apparent)	color unit	-	/	34.2	25.1
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	/	7.6	4.8
Escherichia coli	cfu/100mL	5	0	0	0
Fecal coliform bacteria	cfu/100mL	-	/	0	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.10)	0.14
Nitrite (as N)	mg/L	-	1.0	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	6.5-8.5	7.71	6.99
Phenolics (total)	mg/L	-	/	0.0025	ND(0.0034)
Phosphorus	mg/L	0.5	/	0.0037	0.0041
Sulfate	mg/L	-	500	312	308
Total coliform bacteria	cfu/100mL	-	0	1b	0
Total dissolved solids (TDS)	mg/L	-	500	1830b	1820b
Total kjeldahl nitrogen (TKN)	mg/L	-	/	1.08	1.05
Total suspended solids (TSS)	mg/L	-	/	5.5	4.1
Turbidity	NTU	-	5.0	3.20b	10.2b
Un-ionized ammonia	mg/L	-	/	0.0107	0.00145
Field Parameters					
Conductivity, field	mS/cm	-	/	2.43	2.61
Dissolved oxygen (DO), field	mg/L	-	/	6.23	4.21
Oxidation reduction potential (ORP), field	millivolts	-	/	51	149
pH, field	s.u.	-	6.5-8.5	7.7	6.88
Temperature, field	Deg C	-	15	12.35	13.02
Turbidity, field	NTU	-	5.0	1.4	5.7b
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	/	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	/	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	/	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	/	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	/	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	-	/	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	0.01	ND(0.0050)	ND(0.0050)

Deep Bedrock Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				TW-7	TW-7
Sample ID:				GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:				5/17/2016	11/15/2016
Parameters	**Units**	**TLP[1]**	**ODWQS[2]**		
Metals		**a**	**b**		
Arsenic (dissolved)	mg/L	-	0.025	ND(0.00010)	0.00017
Boron (dissolved)	mg/L	-	5.0	0.022	0.023
Cadmium (dissolved)	mg/L	-	0.005	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	-	0.05	0.00056	ND(0.00050)
Cobalt (dissolved)	mg/L	-	/	ND(0.00010)	ND(0.00010)
Copper (dissolved)	mg/L	-	1.0	0.00047	0.0539
Iron (dissolved)	mg/L	10.6	0.30	1.08[b]	0.199
Lead (dissolved)	mg/L	-	0.01	ND(0.000050)	0.000078
Manganese (dissolved)	mg/L	2.1	0.05	0.218[b]	0.0486
Mercury (dissolved)	mg/L	-	0.001	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	/	0.000422	0.00131
Nickel (dissolved)	mg/L	-	/	ND(0.00050)	ND(0.00050)
Zinc (dissolved)	mg/L	-	5.0	0.0031	0.0021
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	173	102
Ammonia-N	mg/L	0.2	/	0.083	0.033
Biochemical oxygen demand (carbonaceous)	mg/L	-	/	ND(2.0)	5.2
Chemical oxygen demand (COD)	mg/L	-	/	13	21
Chloride	mg/L	-	250	75.0	86.5
Color (apparent)	color unit	-	/	48.2	31.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	/	3.8	4.5
Escherichia coli	cfu/100mL	5	0	0	0
Fecal coliform bacteria	cfu/100mL	-	/	0	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	-	1.0	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	6.5-8.5	8.33	8.82[b]
Phenolics (total)	mg/L	-	/	0.0035	0.0025
Phosphorus	mg/L	0.5	/	0.0096	0.0060
Sulfate	mg/L	-	500	42.1	0.34
Total coliform bacteria	cfu/100mL	-	0	2[b]	186[b]
Total dissolved solids (TDS)	mg/L	-	500	349	241
Total kjeldahl nitrogen (TKN)	mg/L	-	/	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L	-	/	45.2	5.1
Turbidity	NTU	-	5.0	161[b]	12.3[b]
Un-ionized ammonia	mg/L	-	/	0.0318	0.0029
Field Parameters					
Conductivity, field	mS/cm	-	/	0.422	0.379
Dissolved oxygen (DO), field	mg/L	-	/	1.85	0
Oxidation reduction potential (ORP), field	millivolts	-	/	-260	-148
pH, field	s.u.	-	6.5-8.5	8.38[b]	8.57[b]
Temperature, field	Deg C	-	15	10.47	11.36
Turbidity, field	NTU	-	5.0	27[b]	12.9[b]
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	/	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	/	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	/	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	/	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	/	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	-	/	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	0.01	ND(0.0050)	ND(0.0050)

Deep Bedrock Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				TW-8	TW-8	TW-8
Sample ID:				GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:				5/17/2016	5/17/2016 Duplicate	11/15/2016
Parameters	**Units**	**TLP[1]**	**ODWQS[2]**			
Metals		**a**	**b**			
Arsenic (dissolved)	mg/L	-	0.025	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	5.0	0.13	0.14	0.27
Cadmium (dissolved)	mg/L	-	0.005	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.05	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	/	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	1.0	ND(0.0020)	ND(0.0020)	0.0607
Iron (dissolved)	mg/L	10.6	0.30	1.49[b]	1.56[b]	ND(0.10)
Lead (dissolved)	mg/L	-	0.01	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	2.1	0.05	0.425[b]	0.434[b]	0.0256
Mercury (dissolved)	mg/L	-	0.001	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	/	0.242	0.247	0.0847
Nickel (dissolved)	mg/L	-	/	ND(0.0050)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	-	5.0	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	996	30-500	259	257	301
Ammonia-N	mg/L	0.2	/	0.581[a]	0.581[a]	0.057
Biochemical oxygen demand (carbonaceous)	mg/L	-	/	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	/	69 J	19 J	13
Chloride	mg/L	-	250	92.7	91.6	81.2
Color (apparent)	color unit	-	/	47.7	66.3	38.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	/	4.4	3.9	1.9
Escherichia coli	cfu/100mL	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	/	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)	0.487
Nitrite (as N)	mg/L	-	1.0	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.	-	6.5-8.5	7.89	7.90	7.39
Phenolics (total)	mg/L	-	/	0.0023 J	0.0034 J	0.0048
Phosphorus	mg/L	0.5	/	0.0408	0.0390	0.0160
Sulfate	mg/L	-	500	213	211	271
Total coliform bacteria	cfu/100mL	-	0	49[b]	40[b]	100[b]
Total dissolved solids (TDS)	mg/L	-	500	728[b]	712[b]	777[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	/	0.70	0.68	0.30
Total suspended solids (TSS)	mg/L	-	/	23.3 J	86.0 J	8.7
Turbidity	NTU	-	5.0	29.4[b]	28.6[b]	43.9[b]
Un-ionized ammonia	mg/L	-	/	0.0571	0.0543	0.00036
Field Parameters						
Conductivity, field	mS/cm	-	/	0.802	--	0.926
Dissolved oxygen (DO), field	mg/L	-	/	1.56	--	0
Oxidation reduction potential (ORP), field	millivolts	-	/	-49	--	-29
pH, field	s.u.	-	6.5-8.5	8.58[b]	--	7.43
Temperature, field	Deg C	-	15	13.8	--	10.39
Turbidity, field	NTU	-	5.0	3.7	--	18.7[b]
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	/	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	/	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	/	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	/	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	/	ND(380)	ND(380)	ND(380)
Semi-Volatiles						
Anthracene	µg/L	-	/	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	0.01	ND(0.0050)	ND(0.0050)	ND(0.0050)

Deep Bedrock Aquifer Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards. Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006)

J Estimated concentration.
ND Non-detect at associated value.
U Not present at or above the associated value.
R Data rejected due to analytical integrity issues (see QA/QC in the body of the text).
-- Not analyzed.
- No data.
321[a] Exceedence of the ODWQS
321[b] Exceedence of the Tier I Trigger Level

Surface Water Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			SW1-09	SW1-09
Sample ID:			SW-45804-051616-TS-002	SW-45804-111416-TS-003
Sample Date:			5/16/2016	11/14/2016
Parameters	**Units**	**PWQO[1]**		
Metals				
Arsenic	mg/L	0.005	ND(0.0010)	0.00031
Boron	mg/L	0.2	ND(0.10)	0.095
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00020)
Chromium	mg/L	0.001	ND(0.0050)	ND(0.00050)
Cobalt	mg/L	0.0009	ND(0.0010)	0.00079
Copper	mg/L	0.005	ND(0.010)	0.0011
Iron	mg/L	0.3	ND(0.50)	ND(0.050)
Lead	mg/L	0.005	ND(0.0010)	0.00016
Manganese	mg/L	-	0.0273	0.0314
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)
Molybdenum	mg/L	0.04	0.230	0.276
Nickel	mg/L	0.025	0.0071	0.00955
Zinc	mg/L	0.03	ND(0.030)	0.0068
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	-	213	238
Ammonia-N	mg/L	-	0.028	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	19	130
Chloride	mg/L	-	177	163
Color (apparent)	color unit	-	5.9	5.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	4.9	3.0
Escherichia coli	cfu/100mL	100	4	2
Fecal coliform bacteria	cfu/100mL	-	30	10
Nitrate (as N)	mg/L	-	1.85	1.03
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.010)
pH, lab	s.u.	6.5-8.5	8.08	7.63
Phenolics (total)	mg/L	0.001	0.0017	0.0017
Phosphorus	mg/L	0.01	0.0070	0.0044
Sulfate	mg/L	-	684	683
Total coliform bacteria	cfu/100mL	-	800	1000
Total dissolved solids (TDS)	mg/L	-	1430	1280
Total kjeldahl nitrogen (TKN)	mg/L	-	0.51	0.39
Total suspended solids (TSS)	mg/L	-	2.4	3.0
Turbidity	NTU	-	0.93	1.04
Un-ionized ammonia	mg/L	0.02	0.0029	ND(0.000051)
Field Parameters				
Conductivity, field	mS/cm	-	1.26	1.78
Dissolved oxygen (DO), field	mg/L	-	3.45	8.1
Oxidation reduction potential (ORP), field	millivolts	-	124	183
pH, field	s.u.	6.5-8.5	8.82	7.11
Temperature, field	Deg C	-	12.51	8.23
Turbidity, field	NTU	-	0.4	0.8
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

Surface Water Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			SW2-09	SW2-09
Sample ID:			SW-45804-051616-TS-003	SW-45804-111416-TS-004
Sample Date:			5/16/2016	11/14/2016
Parameters	**Units**	**PWQO[1]**		
Metals				
Arsenic	mg/L	0.005	0.00042	0.00030
Boron	mg/L	0.2	0.026	0.044
Cadmium	mg/L	0.0002	ND(0.000010)	ND(0.000010)
Chromium	mg/L	0.001	0.00097	ND(0.00050)
Cobalt	mg/L	0.0009	0.00035	0.00025
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	0.444	0.186
Lead	mg/L	0.005	0.00018	0.00010
Manganese	mg/L	-	0.161	0.0837
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)
Molybdenum	mg/L	0.04	0.00719	0.00887
Nickel	mg/L	0.025	0.0022	0.00263
Zinc	mg/L	0.03	ND(0.0030)	ND(0.0030)
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	-	217	236
Ammonia-N	mg/L	-	0.059	0.064
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	30	22
Chloride	mg/L	-	145	141
Color (apparent)	color unit	-	33.0	26.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	8.8	7.3
Escherichia coli	cfu/100mL	100	28	23
Fecal coliform bacteria	cfu/100mL	-	80	50
Nitrate (as N)	mg/L	-	ND(0.10)	0.280
Nitrite (as N)	mg/L	-	ND(0.050)	0.017
pH, lab	s.u.	6.5-8.5	8.32	7.98
Phenolics (total)	mg/L	0.001	0.0018	0.0044
Phosphorus	mg/L	0.01	0.301	0.0141
Sulfate	mg/L	-	180	276
Total coliform bacteria	cfu/100mL	-	1200	2000
Total dissolved solids (TDS)	mg/L	-	683	798
Total kjeldahl nitrogen (TKN)	mg/L	-	0.52	0.42
Total suspended solids (TSS)	mg/L	-	19.0	8.1
Turbidity	NTU	-	5.50	4.41
Un-ionized ammonia	mg/L	0.02	0.0170	0.00032
Field Parameters				
Conductivity, field	mS/cm	-	0.803	1.02
Dissolved oxygen (DO), field	mg/L	-	4.51	12.75
Oxidation reduction potential (ORP), field	millivolts	-	191	203
pH, field	s.u.	6.5-8.5	8.19	7.47
Temperature, field	Deg C	-	10.91	6.47
Turbidity, field	NTU	-	1	5.2
Petroleum Products				
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)
Semi-Volatiles				
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)

Surface Water Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-051616-TS-004	SW-45804-051616-TS-005	SW-45804-111416-TS-005
Sample Date:			5/16/2016	5/16/2016 Duplicate	11/14/2016
Parameters	**Units**	**PWQO[1]**			
Metals					
Arsenic	mg/L	0.005	0.00043	0.00038	0.00031
Boron	mg/L	0.2	0.032	0.031	0.049
Cadmium	mg/L	0.0002	0.000013	0.000012	ND(0.000030)
Chromium	mg/L	0.001	0.00069	0.00071	ND(0.00050)
Cobalt	mg/L	0.0009	0.00035	0.00035	0.00031
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	0.280	0.272	0.177
Lead	mg/L	0.005	0.00017	0.00016	0.00012
Manganese	mg/L	-	0.157	0.154	0.0848
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum	mg/L	0.04	0.0247	0.0234	0.0515
Nickel	mg/L	0.025	0.0031	0.0030	0.00370
Zinc	mg/L	0.03	ND(0.0030)	0.0033	ND(0.0030)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	225	230	244
Ammonia-N	mg/L	-	ND(0.020)	ND(0.020)	0.041
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	23	23	18
Chloride	mg/L	-	160	153	141
Color (apparent)	color unit	-	31.2	30.9	22.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	8.7	8.9	6.2
Escherichia coli	cfu/100mL	100	26	21	29
Fecal coliform bacteria	cfu/100mL	-	70	80	40
Nitrate (as N)	mg/L	-	0.29	0.27	0.359
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	0.015
pH, lab	s.u.	6.5-8.5	8.34	8.34	7.99
Phenolics (total)	mg/L	0.001	0.0023	0.0020	0.0035
Phosphorus	mg/L	0.01	0.0219	0.0214	0.0125
Sulfate	mg/L	-	247	237	332
Total coliform bacteria	cfu/100mL	-	1200	1400	2000
Total dissolved solids (TDS)	mg/L	-	791	805	882
Total kjeldahl nitrogen (TKN)	mg/L	-	0.54	0.54	0.36
Total suspended solids (TSS)	mg/L	-	6.4	7.4	3.6
Turbidity	NTU	-	4.81	4.23	2.31
Un-ionized ammonia	mg/L	0.02	ND(0.012)	ND(0.012)	0.00029
Field Parameters					
Conductivity, field	mS/cm	-	0.871	--	1.07
Dissolved oxygen (DO), field	mg/L	-	6.86	--	10.41
Oxidation reduction potential (ORP), field	millivolts	-	169	--	214
pH, field	s.u.	6.5-8.5	8.65	--	7.66
Temperature, field	Deg C	-	11.34	--	5.59
Turbidity, field	NTU	-	2.5	--	0.9
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)

Surface Water Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-051616-TS-001	SW-45804-111416-TS-001	SW-45804-111416-TS-002
Sample Date:			5/16/2016	11/14/2016	11/14/2016 Duplicate
Parameters	**Units**	**PWQO[1]**			
Metals					
Arsenic	mg/L	0.005	0.00057	0.00070	0.00075
Boron	mg/L	0.2	0.031	0.030	0.031
Cadmium	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium	mg/L	0.001	0.00067	0.00150	0.00166
Cobalt	mg/L	0.0009	0.00015	0.00053	0.00056
Copper	mg/L	0.005	ND(0.0010)	0.0015	0.0015
Iron	mg/L	0.3	0.059	0.646	0.710
Lead	mg/L	0.005	ND(0.00010)	0.00036	0.00036
Manganese	mg/L	-	0.0663	0.291	0.322
Mercury	mg/L	0.0002	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum	mg/L	0.04	0.00765	0.00388	0.00409
Nickel	mg/L	0.025	0.0017	0.00212	0.00216
Zinc	mg/L	0.03	ND(0.0030)	0.0036	0.0038
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	-	194	176	174
Ammonia-N	mg/L	-	0.026	1.26	1.25
Biochemical oxygen demand (carbonaceous)	mg/L	-	2.9	10.6	10.1
Chemical oxygen demand (COD)	mg/L	-	61	67	71
Chloride	mg/L	-	96.6	57.3	57.6
Color (apparent)	color unit	-	39.0	98.4	91.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	12.6	12.6	14.1
Escherichia coli	cfu/100mL	100	9	20	30
Fecal coliform bacteria	cfu/100mL	-	40	60	90
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	-	ND(0.050)	0.023	0.023
pH, lab	s.u.	6.5-8.5	8.24	8.12	8.08
Phenolics (total)	mg/L	0.001	0.0022	0.0051	0.0067
Phosphorus	mg/L	0.01	0.0627	0.215	0.234
Sulfate	mg/L	-	290	149	149
Total coliform bacteria	cfu/100mL	-	700	2000	1000
Total dissolved solids (TDS)	mg/L	-	760	507	424
Total kjeldahl nitrogen (TKN)	mg/L	-	1.40	4.52	3.76
Total suspended solids (TSS)	mg/L	-	6.5	24.6	33.3
Turbidity	NTU	-	4.55	19.4	20.9
Un-ionized ammonia	mg/L	0.02	0.0075	0.00659	0.00650
Field Parameters					
Conductivity, field	mS/cm	-	0.772	0.643	--
Dissolved oxygen (DO), field	mg/L	-	3.87	8.24	--
Oxidation reduction potential (ORP), field	millivolts	-	159	224	--
pH, field	s.u.	6.5-8.5	8.11	7.43	--
Temperature, field	Deg C	-	13.38	8.1	--
Turbidity, field	NTU	-	2.9	33.1	--
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	0.0008	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)

Surface Water Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
(a) Geometric mean number of counts per 100 mL determined from a minimum of 5 samples. As of May 1, 1994, MOEE staff were advised to base all new compliance, enforcement and monitoring activities on the E. coli test. As such, Fecal Coliform and Total Coliform exceedances are not highlighted
(b) PWQO for Cr (III); PWQO for Cr (VI) is 0.001 mg/L.
(c) Lead objective is alkalinity dependent. For alkalinity <20 mg/L the PWQO is 5 µg/L, for alkalinity between 40 and 80 mg/L, the PWQO is 20 µg/L, and for alkalinity > 80 mg/L the PWQO is 25 µg/L.
(d) Unionized ammonia is calculated based on pH, temperature, and total ammonia concentration.
(e) No firm objective. Proposed objective is for protection against aesthetic deterioration and excessive plant growth in rivers and streams.
(f) Dissolved oxygen is temperature dependent. Value should not be less than the range of 7 mg/L (0 °C) to 4 mg/L (25 °C) for warm water biota.
(g) An interim PWQO of 0.02 mg/L has been set for zinc. The established PWQO for zinc is 0.03 mg/L.
J Estimated concentration.
ND Non-detect at associated value.
U Not present at or above the associated value.
R Rejected.
- Not analyzed.
Exceedence of the PWQO

Table 4.5

SW4-09 Monthly Sampling Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-051616-TS-001	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	Storm Water Pond	SW-45804-111416-TS-001	SW-45804-111416-TS-002
Sample Type Code:			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	Duplicate
Sample Date:			3/16/2016	4/15/2016	5/11/2016	5/16/2016	6/16/2016	7/13/2016	8/10/2016	9/6/2016	10/31/2016	11/14/2016	11/14/2016	11/14/2016
Sampler:			Orgaworld	Orgaworld	Orgaworld	GHD	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	Orgaworld	GHD	GHD
Parameters	**Units**	**PWQO[1]**												
Metals														
Arsenic	mg/L	0.005	0.00052	0.00052	0.00052	0.00057	0.00059	ND(0.0010)	0.00132	0.00113	0.00096	0.00070	0.00070	0.00075
Boron	mg/L	0.2	0.015	0.031	0.032	0.031	0.033	ND(0.10)	0.046	0.039	0.029	0.032	0.030	0.031
Cadmium	mg/L	0.0002	0.000013	0.000011	ND(0.00001)	ND(0.000010)	ND(0.000010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	0.000014	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium	mg/L	0.001	0.00072	ND(0.0005)	ND(0.0005)	0.00067	ND(0.0005)	ND(0.0050)	0.00153	0.00093	0.00791	0.00216	0.00150	0.00188
Cobalt	mg/L	0.0009	0.0043	0.00021	0.00022	0.00015	0.00018	ND(0.0010)	0.00044	0.00039	0.00195	0.00062	0.00053	0.00056
Copper	mg/L	0.005	0.0022	ND(0.001)	ND(0.001)	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0044	0.0017	0.0015	0.0015
Iron	mg/L	0.3	-	-	-	0.059	-	-	-	-	-	-	0.546	0.748
Lead	mg/L	0.005	0.00038	0.00011	0.00013	ND(0.00010)	ND(0.00010)	ND(0.0010)	0.00056	0.00019	0.00120	0.00043	0.00036	0.00036
Manganese	mg/L	-	-	-	-	0.0663	-	-	-	-	-	-	0.291	0.322
Mercury	mg/L	0.0002	ND(0.00001)	ND(0.00001)	ND(0.00001)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum	mg/L	0.04	-	-	-	0.00765	-	-	-	-	-	-	0.00388	0.00409
Nickel	mg/L	0.025	0.0014	0.0023	0.0019	0.0017	0.0013	ND(0.0050)	0.00196	0.00152	0.00570	0.00233	0.00212	0.00216
Zinc	mg/L	0.03	0.0090	0.0068	ND(0.003)	ND(0.0030)	ND(0.0030)	ND(0.030)	0.0044	0.0030	0.0140	0.0049	0.0036	0.0038
General Chemistry														
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	194	-	-	-	-	-	-	176	174
Ammonia-N	mg/L	-	0.814	0.338	0.154	0.026	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.434	1.33	1.26	1.25
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.3	4.1	ND(2.0)	2.9	5.3	6.3	5.5	15.9	19.9	8.8	10.6	10.1
Chemical oxygen demand (COD)	mg/L	-	38	47	38	61	43	69	82	68	86	69	67	71
Chloride	mg/L	-	-	-	-	96.6	-	-	-	-	-	-	57.3	57.6
Color (apparent)	color unit	-	-	-	-	39.0	-	-	-	-	-	-	98.4	91.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	11.0	14.9	12.5	12.6	13.3	14.5	17.6	15.4	13.7	13.8	12.6	14.1
Escherichia coli	cfu/100mL	100	24	8	2	9	8	50	60	50	360	40	20	30
Fecal coliform bacteria	cfu/100mL	-	-	-	-	40	-	-	-	-	-	-	60	90
Nitrate (as N)	mg/L	-	0.048	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	-	0.013	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.023	0.023
pH, lab	s.u.	6.5-8.5	7.80	8.42	8.17	8.24	8.64	8.31	8.01	7.82	7.79	7.78	8.12	8.08
Phenolics (total)	mg/L	0.001	0.0064	ND(0.0010)	0.0027	0.0022	0.0025	0.0022	0.0019	0.0034	0.0012	0.0037	0.0051	0.0057
Phosphorus	mg/L	0.01	0.294	0.0998	0.0477	0.0627	0.0723	0.101	0.183	0.174	0.421	0.259	0.215	0.231
Sulfate	mg/L	-	-	-	-	290	-	-	-	-	-	-	149	149
Total coliform bacteria	cfu/100mL	-	-	-	-	700	-	-	-	-	-	-	2000	1000
Total dissolved solids (TDS)	mg/L	-	-	-	-	760	-	-	-	-	-	-	507	424
Total kjeldahl nitrogen (TKN)	mg/L	-	1.86	1.99	1.21	1.40	1.38	1.72	2.56	1.95	4.76	4.49	4.52	3.76
Total suspended solids (TSS)	mg/L	-	6.5	6.7	5.2	6.5	11.3	15.5	42.5	21.0	96.7	27.9	24.6	33.3
Turbidity	NTU	-	-	-	-	4.55	-	-	-	-	-	-	19.4	20.9
Un-ionized ammonia	mg/L	0.02	0.00431	0.00802	0.00316	0.0075	ND(0.0050)	ND(0.0020)	ND(0.00050)	ND(0.00040)	0.0239	0.0179	0.00659	0.00650
Field Parameters														
Conductivity, field	mS/cm	-	-	-	-	--	-	-	-	-	-	-	0.643	--
Dissolved oxygen (DO), field	mg/L	-	-	-	-	--	-	-	-	-	-	-	8.24	--
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	--	-	-	-	-	-	-	224	--
pH, field	s.u.	6.5-8.5	-	-	-	-	-	-	-	-	-	-	7.43 D 7.43	7.43
Temperature, field	Deg C	-	-2.0	-1.0	4.0	13.4	16.0	26.0	13.4	16.3	28.0	10.0	8.1 D 8.1	8.1
Turbidity, field	NTU	-	-	-	-	--	-	-	-	-	-	-	33.1	--
Petroleum Products														
Petroleum hydrocarbons F1 (C6-C10)	ug/L	-	-	-	-	ND(100)	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	-	-	-	-	ND(100)	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	ug/L	-	-	-	-	ND(250)	-	-	-	-	-	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	ug/L	-	-	-	-	ND(250)	-	-	-	-	-	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	ug/L	-	-	-	-	ND(380)	-	-	-	-	-	-	ND(380)	ND(380)
Semi-Volatiles														
Anthracene	ug/L	0.0008	-	-	-	ND(0.020)	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	ug/L	-	-	-	-	ND(0.0050)	-	-	-	-	-	-	ND(0.0050)	ND(0.0050)

Note:

ND - Not detected at the associated reporting limit.

003268

EW107-15 Daily Pumping Log
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m3)	Average Daily Volume Pumped (m^3)
10/04/16	1	2,360.2	2.360	2,360.2	2.360	2.360
10/05/16	2	764.6	0.765	3,124.8	3.125	1.562
10/06/16	3	764.6	0.765	3,889.3	3.889	1.296
10/07/16	4	764.6	0.765	4,653.9	4.654	1.163
10/08/16	-	-	-	-	-	-
10/09/16	-	-	-	-	-	-
10/10/16	5	764.6	0.765	5,418.4	5.418	1.084
10/11/16	6	764.5	0.764	6,182.9	6.183	1.030
10/12/16	7	764.7	0.765	6,947.6	6.948	0.993
10/13/16	8	764.6	0.765	7,712.1	7.712	0.964
10/14/16	9	764.6	0.765	8,476.7	8.477	0.942
10/15/16	-	-	-	-	-	-
10/16/16	-	-	-	-	-	-
10/17/16	10	764.6	0.765	9,241.2	9.241	0.924
10/18/16	11	764.6	0.765	10,005.8	10.006	0.910
10/19/16	12	764.6	0.765	10,770.4	10.770	0.898
10/20/16	13	764.6	0.765	11,534.9	11.535	0.887
10/21/16	14	764.6	0.765	12,299.5	12.299	0.879
10/22/16	-	-	-	-	-	-
10/23/16	-	-	-	-	-	-
10/24/16	15	5,351.9	5.352	17,651.4	17.651	1.177
10/25/16	16	1,926.7	1.927	19,578.1	19.578	1.224
10/26/16	17	1,926.7	1.927	21,504.7	21.505	1.265
10/27/16	18	1,926.7	1.927	23,431.4	23.431	1.302
10/28/16	19	1,926.7	1.927	25,358.0	25.358	1.335
10/29/16	-	-	-	-	-	-
10/30/16	-	-	-	-	-	-
10/31/16	20	0.0	0.000	25,358.0	25.358	1.268
11/01/16	21	0.7	0.001	25,358.7	25.359	1.208
11/02/16	22	0.0	0.000	25,358.7	25.359	1.153
11/03/16	23	0.0	0.000	25,358.7	25.359	1.103
11/04/16	24	0.0	0.000	25,358.7	25.359	1.057
11/05/16	-	-	-	-	-	-
11/06/16	-	-	-	-	-	-
11/07/16	25	0.0	0.000	25,358.7	25.359	1.014
11/08/16	26	0.0	0.000	25,358.7	25.359	0.975
11/09/16	27	0.0	0.000	25,358.7	25.359	0.939
11/10/16	28	0.0	0.000	25,358.7	25.359	0.906
11/11/16	29	0.0	0.000	25,358.7	25.359	0.874
11/12/16	-	-	-	-	-	-
11/13/16	-	-	-	-	-	-
11/14/16	30	0.0	0.000	25,358.7	25.359	0.845
11/15/16	31	1,328.1	1.328	26,686.8	26.687	0.861
11/16/16	32	0.0	0.000	26,686.8	26.687	0.834
11/17/16	33	224.5	0.225	26,911.3	26.911	0.815
11/18/16	34	0.0	0.000	26,911.3	26.911	0.792
11/19/16	-	-	-	-	-	-
11/20/16	-	-	-	-	-	-
11/21/16	35	0.0	0.000	26,911.3	26.911	0.769
11/22/16	36	149.5	0.150	27,060.8	27.061	0.752
11/23/16	37	0.0	0.000	27,060.8	27.061	0.731
11/24/16	38	0.0	0.000	27,060.8	27.061	0.712
11/25/16	39	6.2	0.006	27,067.0	27.067	0.694
11/26/16	-	-	-	-	-	-
11/27/16	-	-	-	-	-	-
11/28/16	40	0.0	0.000	27,067.0	27.067	0.677
11/29/16	41	0.0	0.000	27,067.0	27.067	0.660
11/30/16	42	2.1	0.002	27,069.1	27.069	0.645
12/01/16	43	6.7	0.007	27,075.8	27.076	0.630
12/02/16	44	0.0	0.000	27,075.8	27.076	0.615
12/03/16	-	-	-	-	-	-
12/04/16	-	-	-	-	-	-

EW107-15 Daily Pumping Log
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Date	Pumping Day#	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m3)	Average Daily Volume Pumped (m^3)
12/05/16	45	0.0	0.000	27,075.8	27.076	0.602
12/06/16	46	17.3	0.017	27,093.1	27.093	0.589
12/07/16	47	0.0	0.000	27,093.1	27.093	0.576
12/08/16	48	0.0	0.000	27,093.1	27.093	0.564
12/09/16	49	54.9	0.055	27,148.0	27.148	0.554
12/10/16	-	-	-	-	-	-
12/11/16	-	-	-	-	-	-
12/12/16	50	12,745.0	12.745	39,893.0	39.893	0.798
12/13/16	51	10,918.2	10.918	50,811.2	50.811	0.996
12/14/16	52	23.7	0.024	50,834.9	50.835	0.978
12/15/16	53	0.0	0.000	50,834.9	50.835	0.959
12/16/16	54	334.8	0.335	51,169.7	51.170	0.948
12/17/16	-	-	-	-	-	-
12/18/16	-	-	-	-	-	-
12/19/16	55	6.6	0.007	51,176.3	51.176	0.930
12/20/16	56	0.0	0.000	51,176.3	51.176	0.914
12/21/16	57	0.0	0.000	51,176.3	51.176	0.898
12/22/16	58	11.4	0.011	51,187.7	51.188	0.883
12/23/16	59	0.0	0.000	51,187.7	51.188	0.868
12/24/16	-	-	-	-	-	-
12/25/16	-	-	-	-	-	-
12/26/16	60	0.0	0.000	51,187.7	51.188	0.853
12/27/16	61	0.0	0.000	51,187.7	51.188	0.839
12/28/16	62	0.0	0.000	51,187.7	51.188	0.826
12/29/16	63	6.0	0.006	51,193.7	51.194	0.813
12/30/16	64	0.0	0.000	51,193.7	51.194	0.800
12/31/16	-	-	-	-	-	-
	Total Available Pumping Days	**Total Days Pumping**	**Percent of Days with pumping**	**Total Volume Pumped (L)**	**Total Volume Pumped (m3)**	**Average Daily Volume Pumped (m^3)**
2016 TOTALS	**64**	**35**	**54.69%**	**51,193.7**	**51.194**	**0.800**

Appendices

Appendix A
Environmental Compliance Approval
(No. 7251 8GKRPD)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part 1 Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

CONTENT COPY OF ORIGINAL

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate.*

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any

CONTENT COPY OF ORIGINAL

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

CONTENT COPY OF ORIGINAL

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner*shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works*, the *Owner*shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works*prepared in accordance with Condition (8) is submitted to the *District Manager*for comments and concurrance;

(2) Upon commencement of operation of the *Works*, the *Owner*shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works*and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

(4) The *Owner* shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner*shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner*shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works*to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works*, the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,*the *Owner*shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

CONTENT COPY OF ORIGINAL

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit:

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works*, the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works,* on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

CONTENT COPY OF ORIGINAL

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2844-9YNGZC
Issue Date: February 1, 2017

Orgaworld Canada Ltd.
150 Kent Street
London, Ontario
N6A 1L3

Site Location: Source Separated Organics Processing Facility
5123 Hawthorne Road South
Part of West Half of Lot 27, Concession 6
City of Ottawa
K1G 3Y3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters

below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	**Elevation** (metre)	**Storage Volume** (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

    - inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

    - overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide

over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water

and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

all in accordance with supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Application" means the application for an environmental compliance approval submitted to the Ministry for approval by or on behalf of the Owner and dated March 11, 2015;

"Approval" means this entire document and any schedules attached to it, and the Application;

"BOD_5"(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"$CBOD_5$"means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"COD" means Chemical Oxygen Demand;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"DOC" means Dissolved Organic Carbon;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the *Environmental Protection Act, R.S.O. 1990, c.E.19* , as amended;

"Leachate Contaminated Sewage"means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Orgaworld Canada Ltd., and its successors and assignees;

"OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

"Substantial Completion" has the same meaning as "substantial performance" in the *Construction Lien Act* ; and

"Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these terms and conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with this Approval.

(3) Where there is a conflict between a provision of this environmental compliance approval and any document submitted by the Owner, the conditions in this environmental compliance approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Owner, the Application shall take precedence unless it is clear that the purpose of the document was to amend the Application

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The terms and conditions of this Approval are severable. If any term and condition of this environmental compliance approval, or the application of any requirement of this environmental compliance approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation

to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of address of Owner or operating authority;

(b) change of Owner or operating authority or both, including address of new Owner or operating authority, or both;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* ; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the "Initial Return" or "Notice of Change" filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this environmental compliance approval.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the Substantial Completion of the Works,a set of as-built drawings showing the Works as "constructed" shall be completed and submitted by the Owner to the District Manager.These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works or at operational office of the Owner for the operational life of the Works.

(2) The Owner shall inform in writing to the District Manager when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The Owner shall inform the District Manager of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after **two (2) years** of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

5. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the Owner shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 4.(2). The Owner shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the Owner shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 5.(2) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the Owner shall ensure that the contents of the SWM Pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner.

(8) The Owner shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to.

(9) Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

(10) The Owner shall notify the District Manager orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(13) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or Owner's operational headquarters for inspection by the Ministry.The logbook shall include the following:

(a) the name of the Works;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The Owner shall not store any end-product, including leaves and yard waste outdoors until the Owner prepares a Conditions Assessment and implementation plan approved by the District Manager. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

PART IV - GENERAL

7. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall

include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the Owner.

9. GROUNDWATER MONITORING

Groundwater Monitoring Program

(1) The Owner shall, upon the issuance of this Approval, carry out the following groundwater monitoring program. Samples shall be collected from the specified groundwater monitoring wells at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Groundwater Monitoring

Unconfined Shallow Aquifer

MW1-08*, MW2-08*, MW3-08*, MW4-09*, & MW103-09*.

MW5-09**, MW101-13**, MW102-09**, MW104-13**, MW105-13**, MW106-15** & EW107-15**.

Deep Bedrock Aquifer

TW-4*, TW-7* & TW-8*.

Frequency	*Semi Annual (i.e. two times in a year) ** Tri-Annual (i.e. three time in a year)
Sample Type	Grab
Parameters	Alkalinity, Total Ammonia Nitrogen, Dissolved Organic Carbon, *E-coli* , Iron, Manganese, Nitrate-N, and Total Phosphorous.

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after three (3) years of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall compare analytical monitoring results obtained pursuant to Subsection (1) Table 3 - Groundwater Monitoring with the trigger level concentrations for the trigger parameter listed in Tables 4 and 5.

Table 4
Trigger Level Concentrations
Unconfined Shallow Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	633
Total Ammonia Nitrogen	4.0
Dissolved Organic Carbon	34.6
E-coli	25.6 CFU/100 mL
Iron	48.3
Manganese	17.1
Nitrate-N	1.3
Total Phosphorous	7.2

Table 5
Trigger Parameters
Deep Bedrock Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	996
Total Ammonia Nitrogen	0.2
Dissolved Organic Carbon	18.4
E-coli	5.0 CFU/100 mL
Iron	10.6
Manganese	2.1
Nitrate-N	0.5
Total Phosphorous	0.5

(5) The trigger level program shall be implemented using the following three (3) Tiers to verify the results and direct potential contingency implementation:

Tier I (Routine Monitoring Program)

Tier I Routine Monitoring Program (RMP) involves the sampling of all on-site groundwater monitoring wells at the frequency specified in Table 3. All groundwater monitoring activities completed at the site will be considered Tier I RMP unless two (2) or more trigger parameters exceed there respective trigger levels in a simple sample.

Tier II (Confirmation Monitoring Program)

If during a single monitoring event, two (2) or more trigger parameters exceed the established (see Tables 4 and 5) Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring Program (CMP) shall be implemented.

The Tier II CMP consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next schedule monitoring event in order to confirm the Tier I exceedance of the two (2) or more trigger parameters.

If the concentrations reported in the duplicate sample return to below their respective trigger levels, then Tier I RMP will resume.

If the Tier I exceedance is confirmed, then the next step shall be a re-evaluation of the degree, nature, and potential source(s) of the trigger level impact(s) identified in Tier I including the implication of the exceedance in terms of the potential for impacts to down-gradient off-site water users.

If the Tier II CMP and the subsequent evaluation indicate that the facility operations are having a detrimental effect on water quality migrating off-site, then Tier III Contingency Measures and Compliance Monitoring Program shall be implemented.

Tier III (Contingency Measures and Compliance Monitoring Program)

Tier III Contingency Measures and Compliance Monitoring Program (CMCMP) involves assessment and implementation of contingency measures in the event of imminent off-site groundwater quality impairment.

Contingency measures to be evaluated should include extraction of impacted groundwater and/or surface water for on-site treatment or off-site disposal, or acquisition of groundwater rights and registration of a contaminated attenuation zone (CAZ) on title of adjacent lands.

Tier III CMCMP should also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented.

The Tier III CMCMP details should be determined in conjunction with the development and implementation of preferred contingency measure(s).

The compliance monitoring parameters, locations, and monitoring frequency should be determined at the time of implementation of contingency measures.

Lastly, appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed.

(6) The Owner shall notify the District Manager orally, as soon as possible, and in writing within

seven (7) days in the event a trigger exceedance occurs.

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the District Manager requires from time to time.

SCHEDULE 'A'

1. Environmental Compliance Approval Application for Industrial Sewage Works submitted by Ben Constable, Conestoga-Rovers & Associates (CRA), and signed by Mike Rooke, Compliance Officer, Orgaworld Canada Ltd., dated March 11, 2015, and all supporting documentation and information.

2. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

3. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

4. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

5. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

6. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

7. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

8. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

9. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

10. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

11. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla,

P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

12. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

13. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

14. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

15. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

16. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.(6) is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works"as constructed" are maintained for future references.

4. Conditions 4 and 8 are included to enable the Owner to evaluate and demonstrate the performance of the Works,on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

5. Conditions 5, 6 and 7 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry.

6. Condition 9 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7251-8GKRPD issued on May 30, 2011.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2017

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AA/
c: District Manager, MOECC Ottawa District Office
Ben Constable, Conestoga-Rovers & Associates (CRA)

Appendix B
Background Correspondence

Appendix B1
Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Appendix B2
Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

ISO 9001

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

Location	Field Test Parameters			Laboratory Test Parameters							Collection Method
	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3,4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4[8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

003318

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3/4]	*Bacteriological Components* [5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix B3
Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

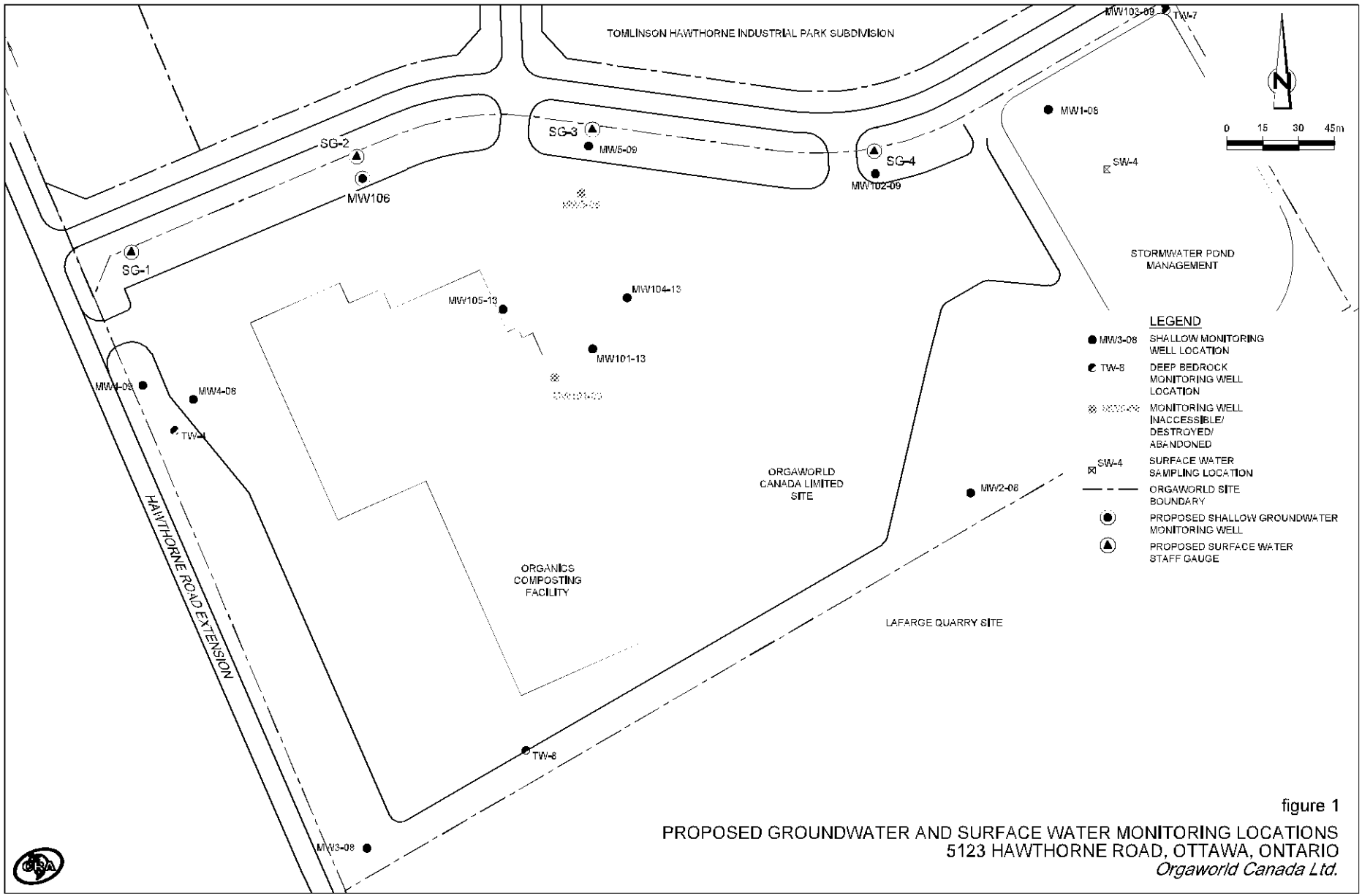


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

003326

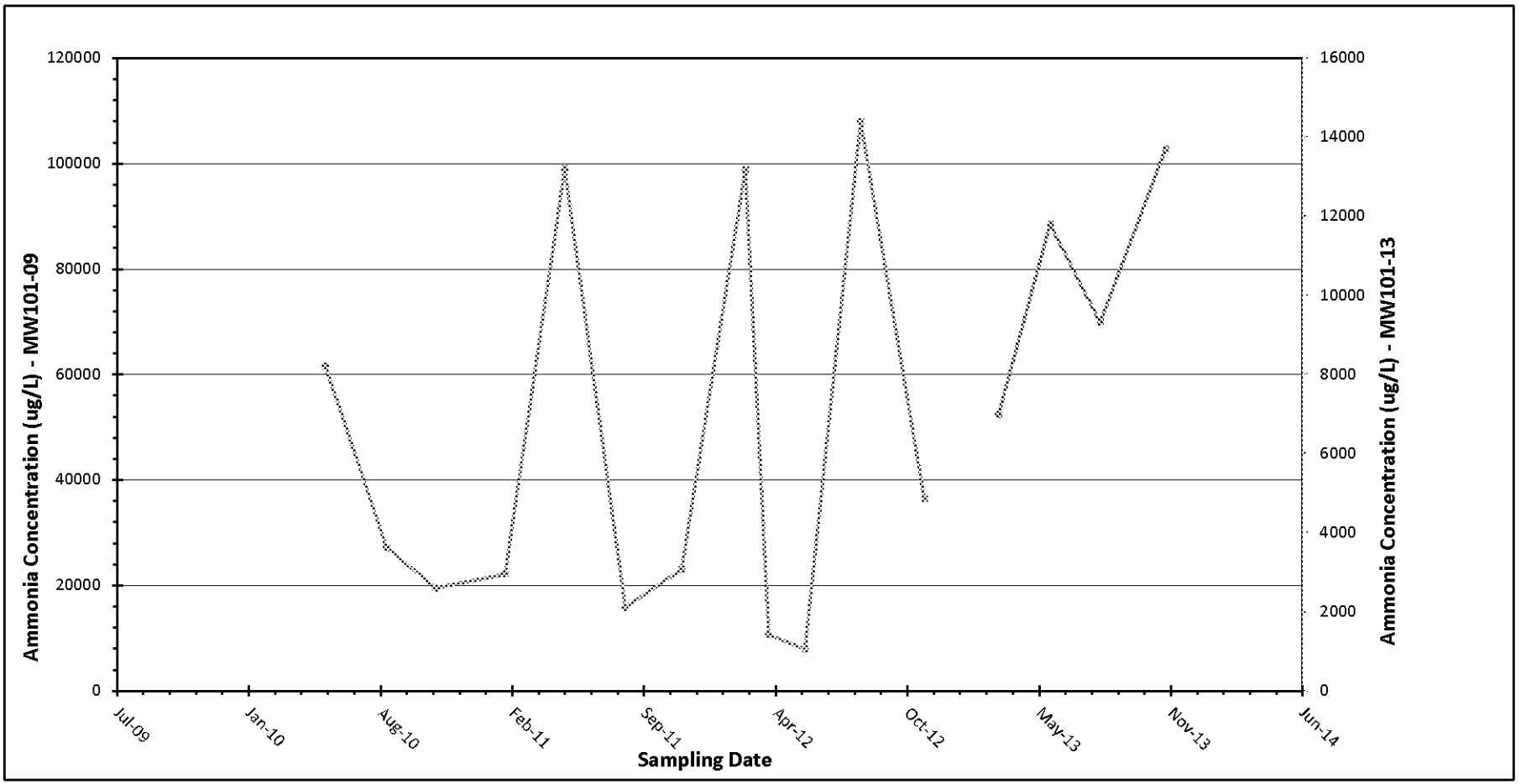


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

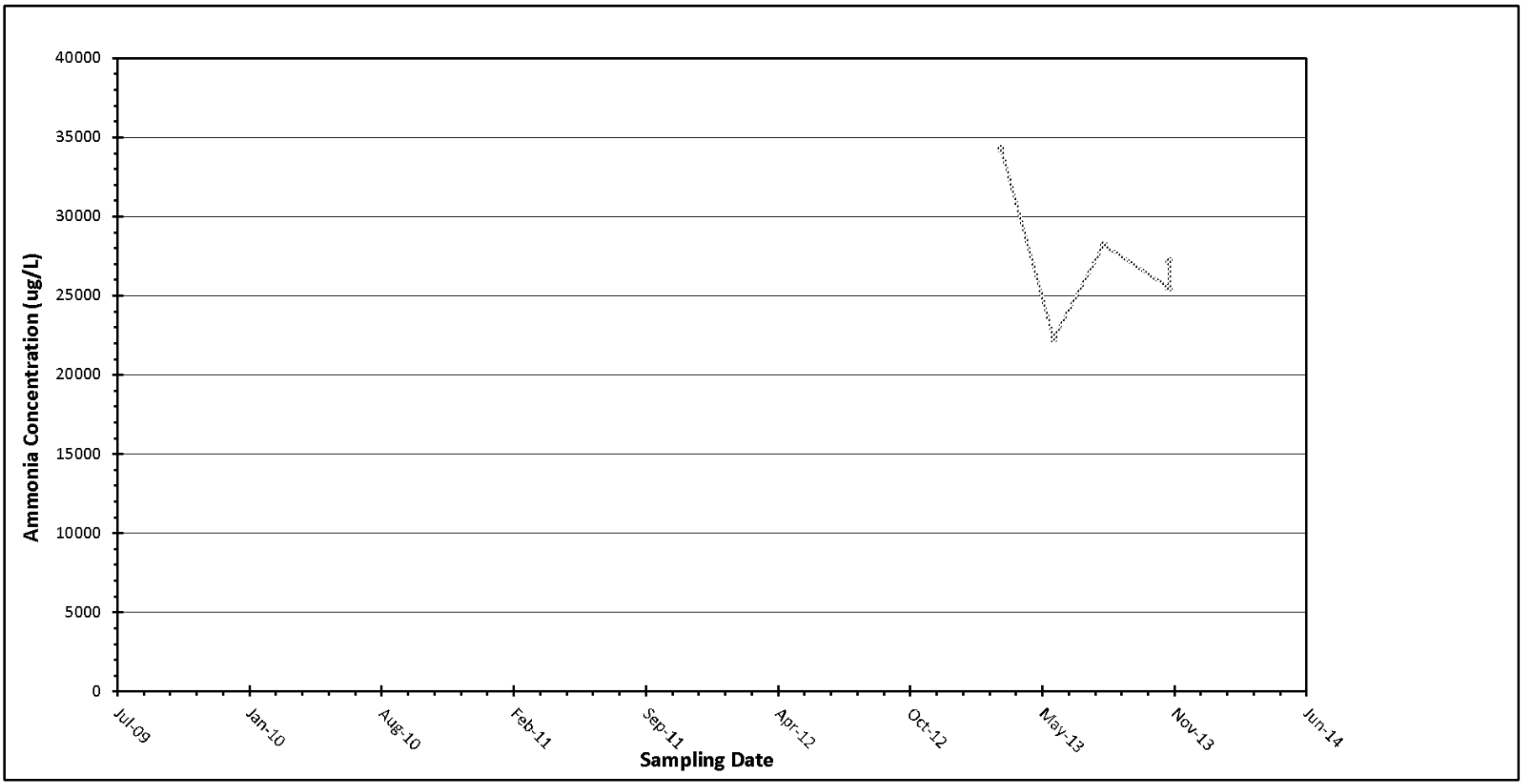


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

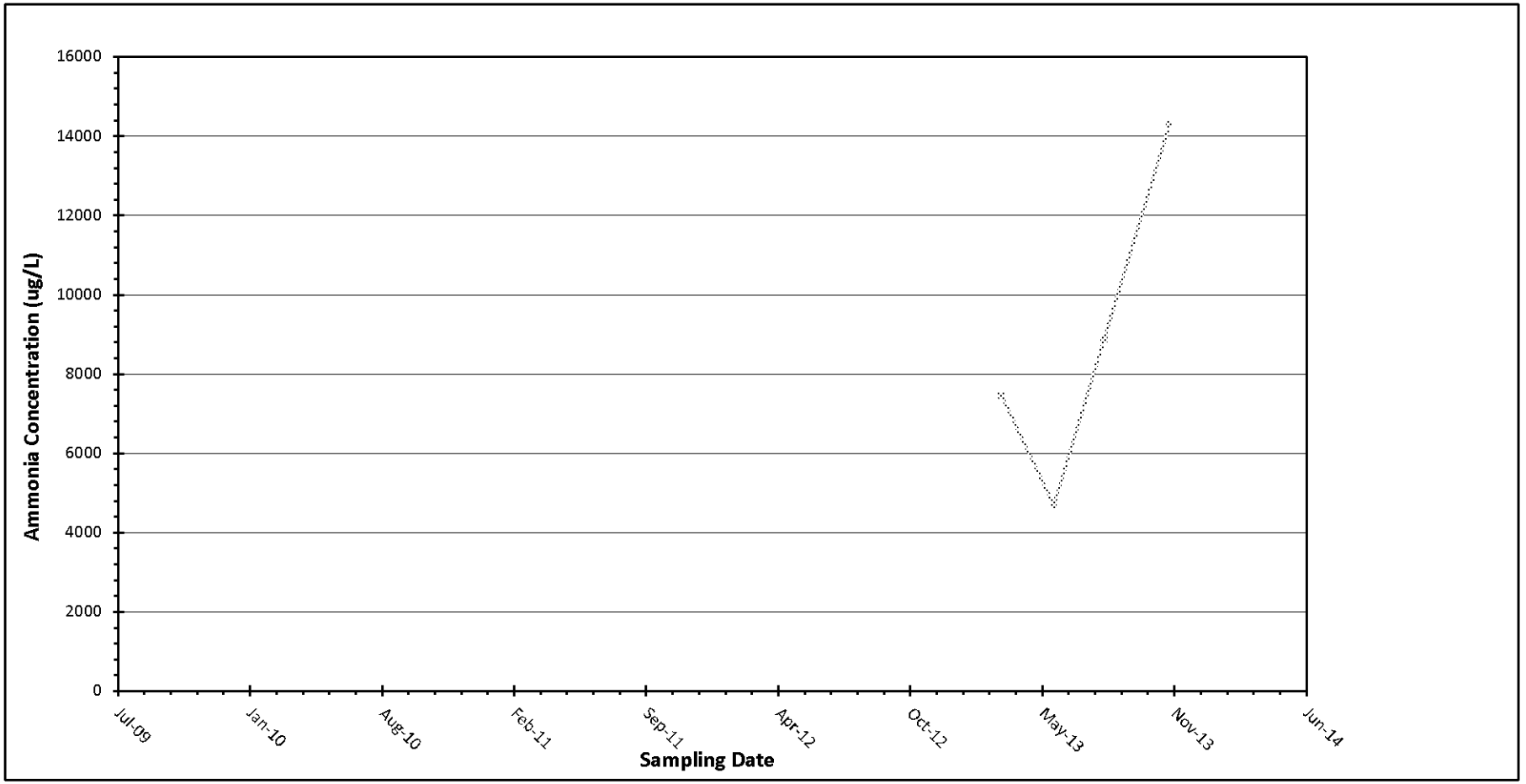


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

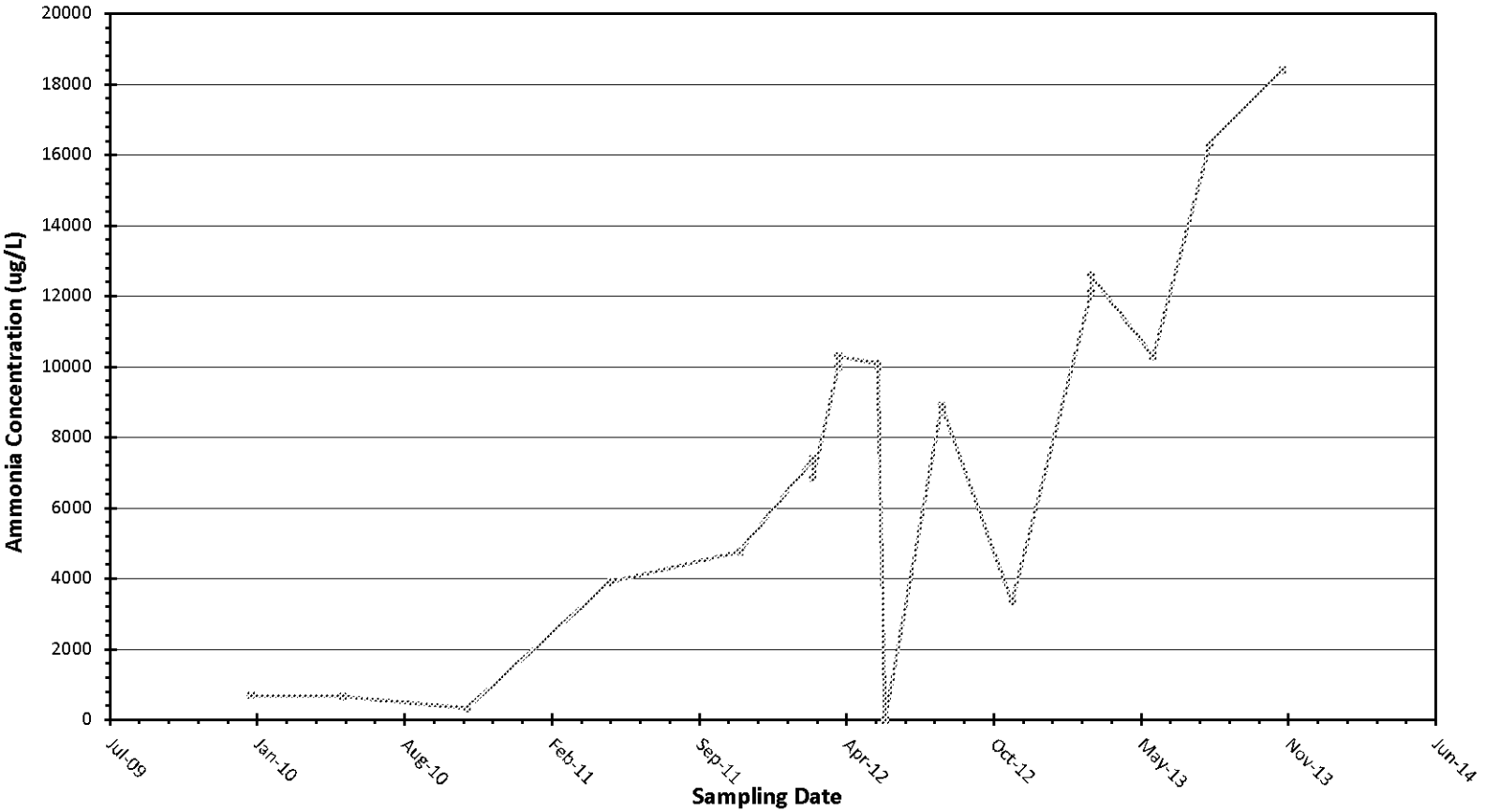


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

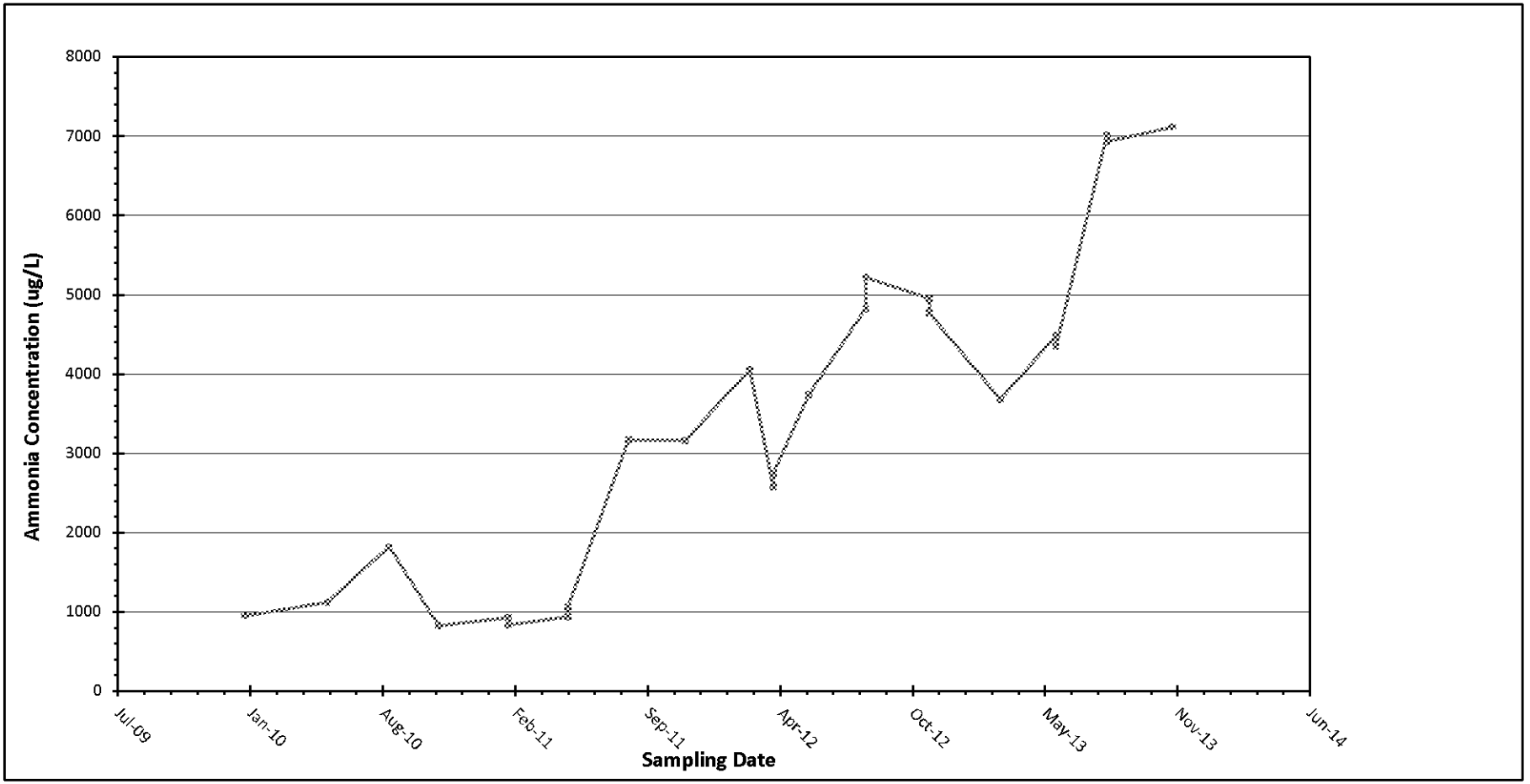


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

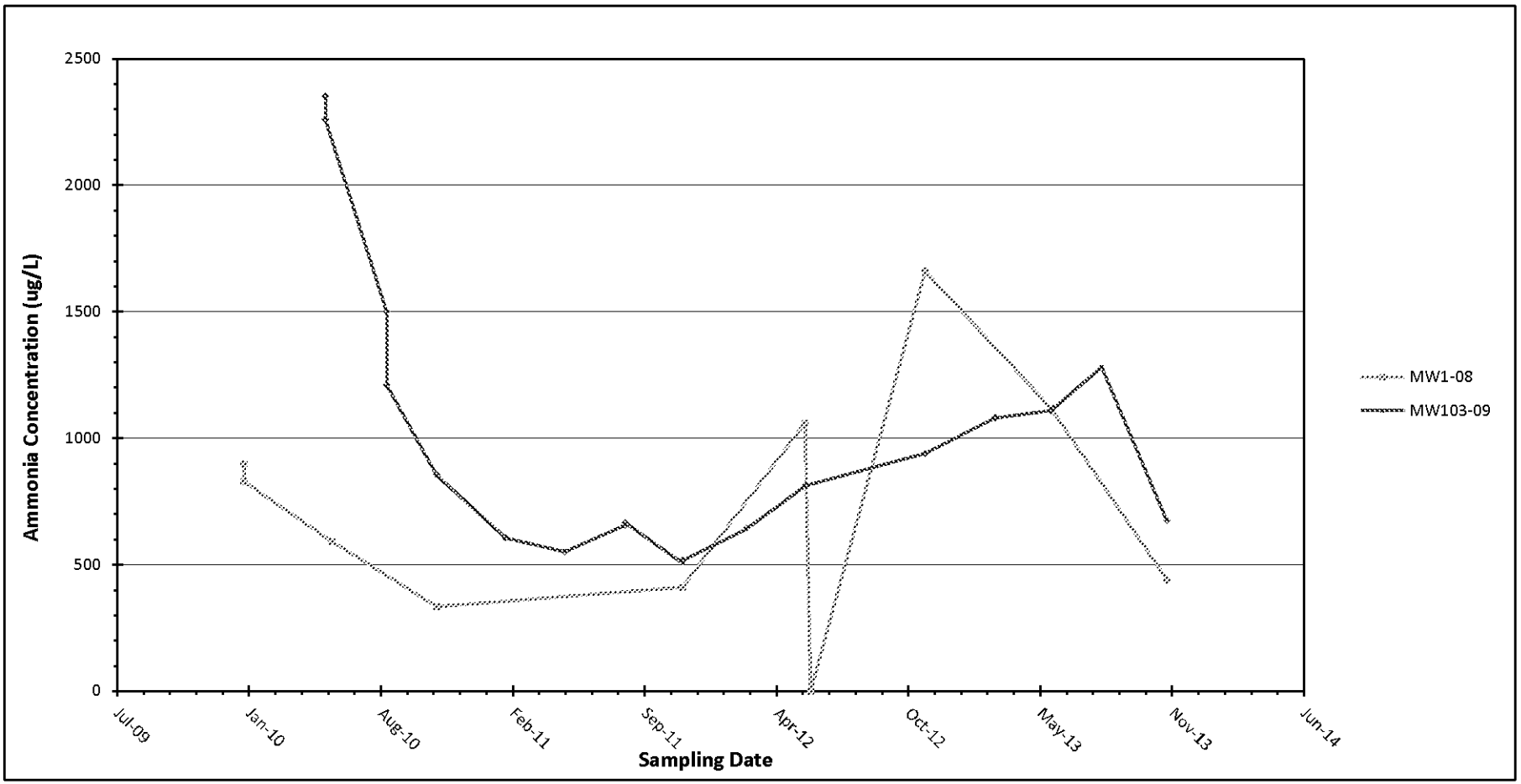


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

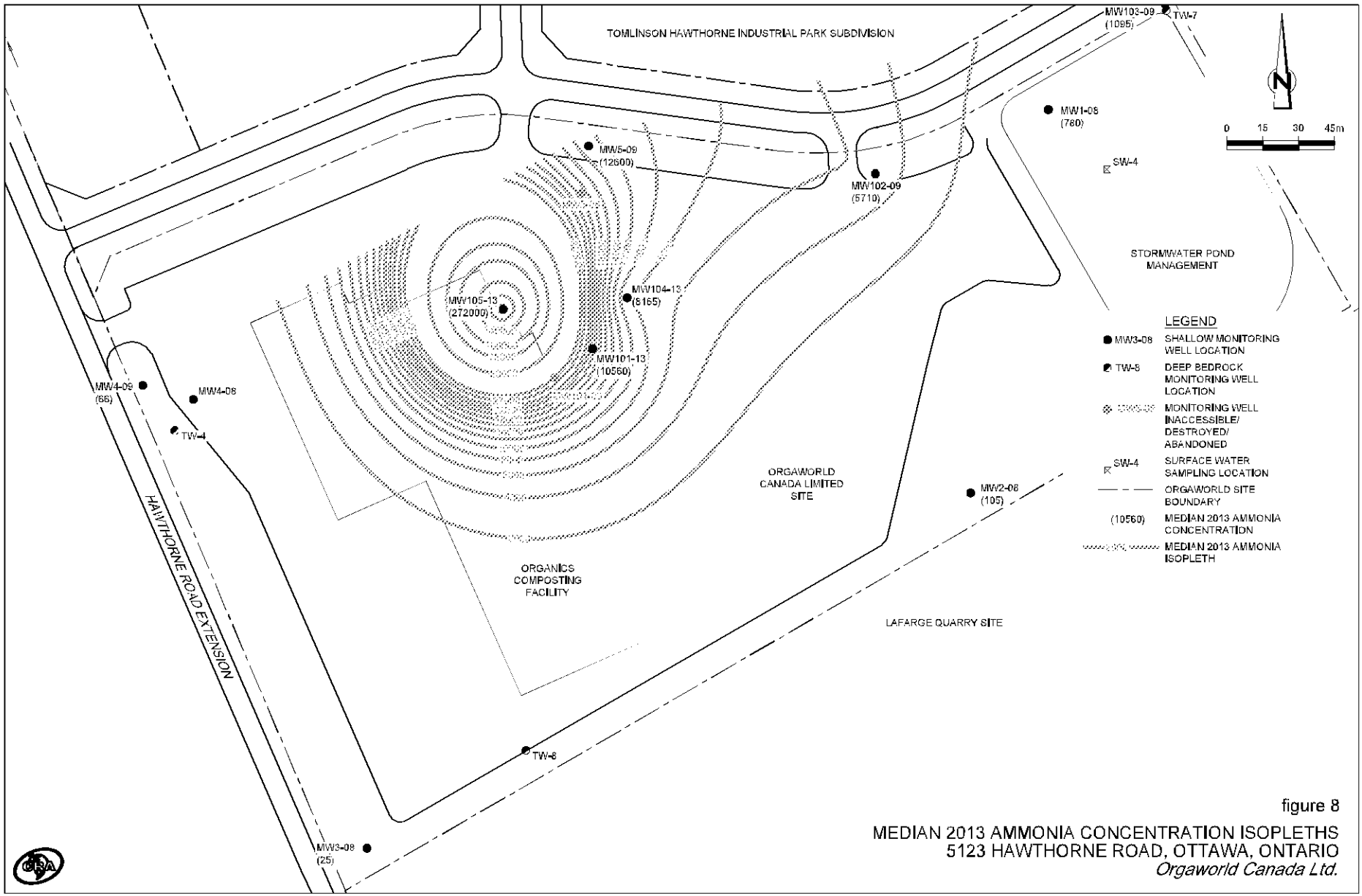


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

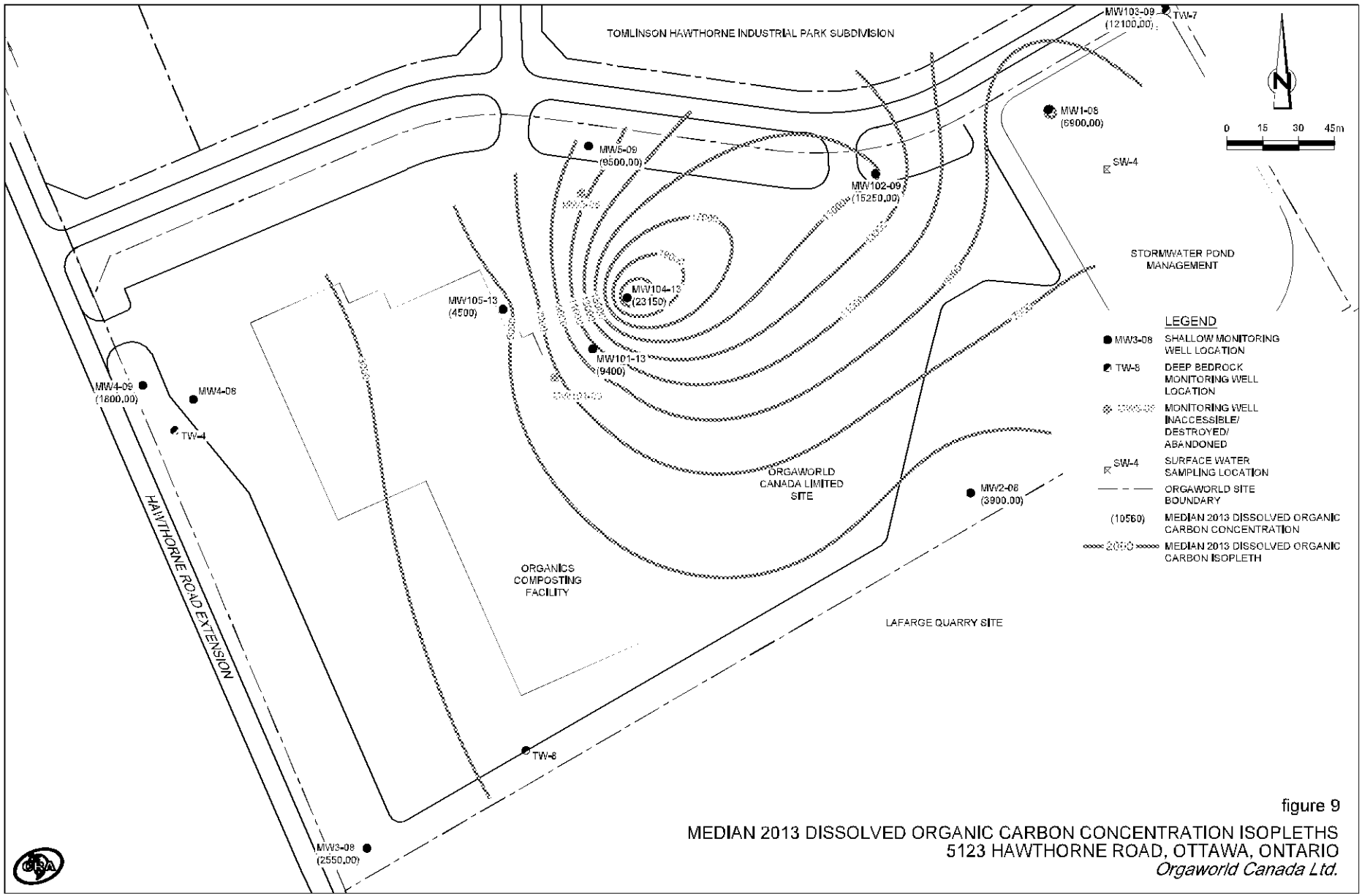


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

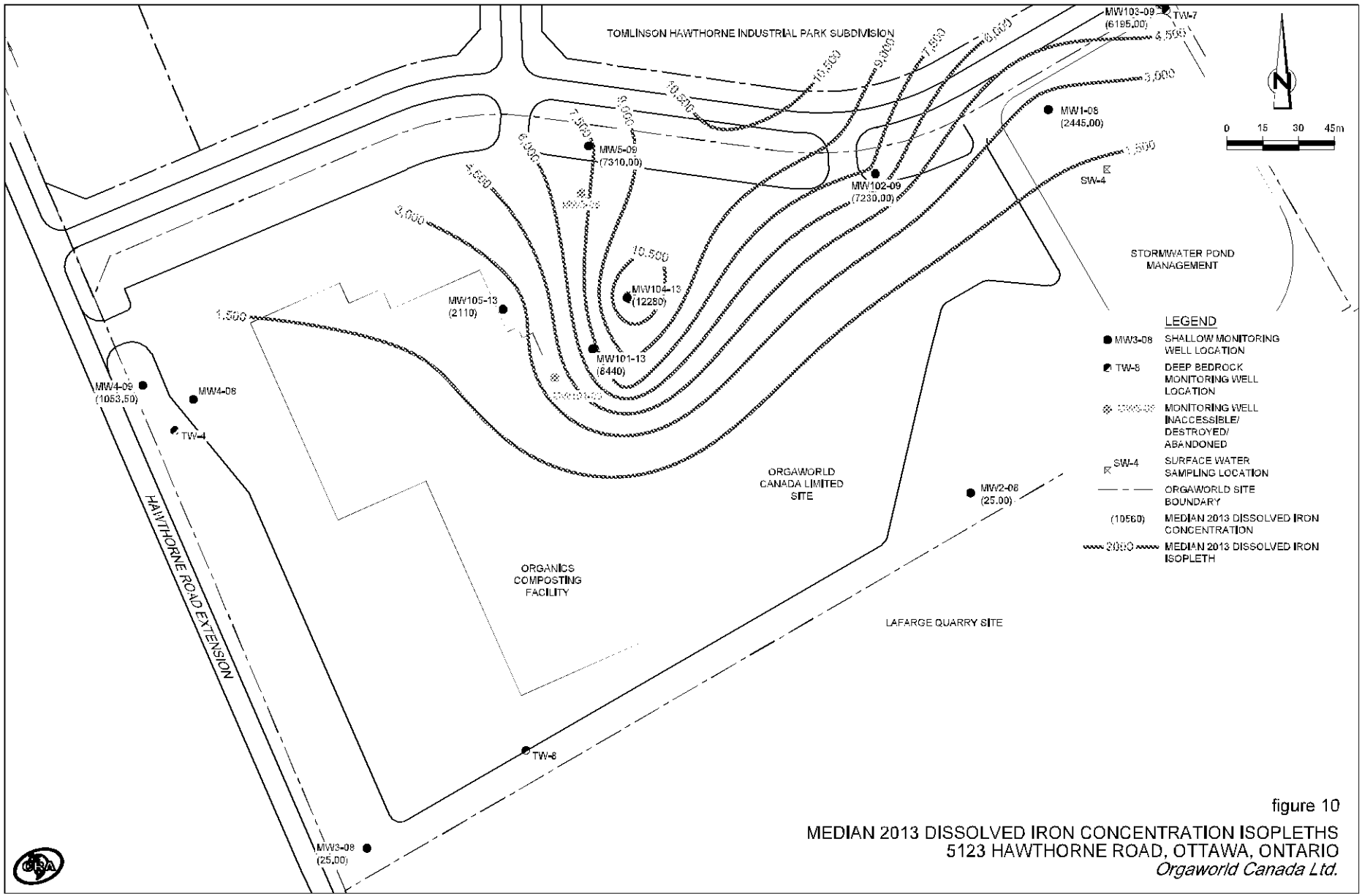


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

003335

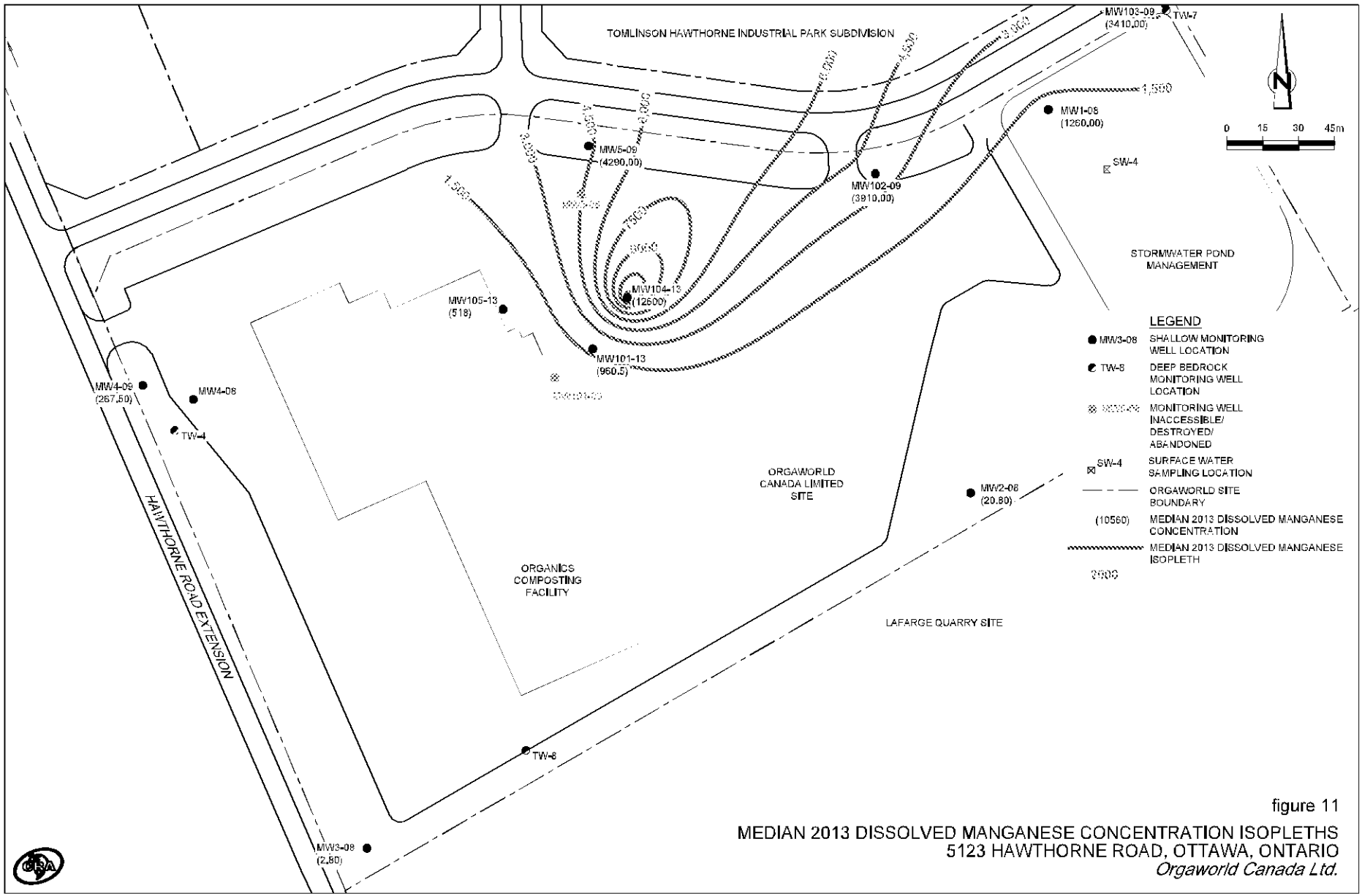


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

Appendix C
Stratigraphic and Instrumentation Logs

Appendix C1
Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.06 93.00 91.89						
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug					
1	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS1	X	35		0.0
2				SS2	X	27		0.0
3	END OF BOREHOLE @ 2.97m BGS	88.92	Well Screen					
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

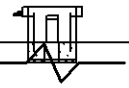
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17					
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS						
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.99	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40	WELL DETAILS Screened interval: 92.54 to 90.40m 0.63 to 2.77m BGS Length: 2.13m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.02 to 92.71m 0.15 to 0.46m BGS Material: Bentonite Sand Pack: 92.71 to 90.40m 0.46 to 2.77m BGS Material: Silica Sand			
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

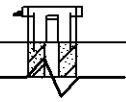
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.55					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

1 2 3 4 5 6 7 8 9 10 11

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug				
	BEDROCK - fractured limestone						
1							
2							
3							
4							
5							
6							
7							
8							
9			Filter Sand				
10			Well Screen				

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %	
12							
13							
14							
15							
16							
17							
	END OF BOREHOLE @ 17.37m BGS	86.18					
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand				
19							
20							
21							
22							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS		Bentonite Hole Plug	SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84					
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
2	- becoming very dense at 1.68m BGS	93.28	Filter Sand Well Screen	RC1	93	63
	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth					
3	END OF BOREHOLE @ 2.84m BGS	92.22				
4						
5						
6						
7						
8						
9						
10						
11						
12						

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 97.54 TOP OF RISER 97.45 GROUND SURFACE 96.58							
0	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist		BENTONITE SAND	1SS		33		0.
0.5								
1.0			5.08cm PVC WELL CASING	2SS		33	11	10.0
1.5	- coarse sand, wood pieces, roots at 1.12m BGS		15.24cm BOREHOLE					
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS		BENTONITE	3SS		54	86	0.1
2.5	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	94.29		4SS		67	55	0.2
3.0								
3.5	- REFUSAL at 3.50m BGS BEDROCK	93.07	5.08cm PVC WELL SCREEN	5SS		8		0.1
4.0	END OF BOREHOLE @ 4.11m BGS	92.46	SAND PACK					
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.99 to 92.46m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack:
94.29 to 92.46m
2.29 to 4.11m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21	Bentonite Hole Plug	SS1		54	13
1	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist			SS2		83	74
2			Filter Sand Well Screen	SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4			WELL DETAILS Screened interval: 93.12 to 91.59m 1.24 to 2.77m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 94.06 to 93.42m 0.30 to 0.94m BGS Material: Bentonite Sand Pack: 93.42 to 91.59m 0.94 to 2.77m BGS Material: Silica Sand				
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING 94.57 TOP OF RISER 94.50 GROUND SURFACE 93.36							
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay		BENTONITE SAND 5.08cm PVC WELL CASING 15.24cm BOREHOLE	1SS		54	14	0.0
0.5								
1.0				2SS		54	12	0.1
1.5	- red silty sand (or covered brick) at 1.68m BGS - spoon wet at 1.83m BGS			3SS		29	13	0.0
2.0								
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92	BENTONITE	4SS		71	25	0.1
3.0								
3.5	- increasing clay, becoming wet at 3.51m BGS		5.08cm PVC WELL SCREEN	5SS		25	8	0.0
4.0			SAND PACK	6SS		29	6	0.0
4.5	- cobble, rootmat, black at 4.24m BGS END OF BOREHOLE @ 4.42m BGS	88.94						
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.23 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	94.98						
	GROUND SURFACE	93.83						
	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist							
	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07	Bentonite Hole Plug	SS1		83	43	13.1
				SS2		86		17.1
				SS3		75	29	21.3
				SS4		33	16	23.9
			Filter Sand	SS5		17	7	2.3
	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	89.26	Well Screen	SS6		100	20	0.0
				SS7		83	26	0.0
	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.89		SS8		57		0.0
	END OF BOREHOLE @ 7.62m BGS	86.21						

WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	94.82 93.81						
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist			SS1		50	38	0.0
1			Bentonite Hole Plug	SS2		35		4.6
2				SS3		50	13	0.0
3				SS4		25	15	4.3
3.65	- becoming wet at 3.65m BGS			SS5		100		
4			Filter Sand Well Screen					
5				SS6		42	54	0.0
5.50	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32		SS7		50	15	0.0
6				SS8		100		1.5
6.98	END OF BOREHOLE @ 6.98m BGS	86.83		SS9		100		0.0
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
90.75 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS4)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
5	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
89.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.96						
	GROUND SURFACE	82.94						
	TOPSOIL	82.79						
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64						
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft		Bentonite Hole Plug	SS1		75	8	0.0
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand	SS2		100	3	0.0
2			Well Screen					
3				SS3		100		0.0
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS1)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	84.00 83.10						
0	TOPSOIL	82.95	Bentonite Hole Plug					
1	SM - SILTY SAND, fine to medium grained, grey, compact, moist - trace clay at 0.91m BGS			SS1		83	15	0.0
2	ML - SAND AND SILT, very fine grained, compact, grey, wet - becoming saturated at 1.98m BGS	81.42	Filter Sand Well Screen	SS2		50	25	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20		SS3		100	27	0.0

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS (SS3)

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.23 96.15 95.67						
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE	1SS		58	7	0.1
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND					
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE					
2.0			BENTONITE	3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0			WELL DETAILS Screened interval: 93.54 to 92.01m 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 0.010 Material: PVC Seal: 94.15 to 93.84m 1.52 to 1.83m BGS Material: BENTONITE Sand Pack: 93.84 to 92.01m 1.83 to 3.66m BGS Material: #2 SAND					
4.5								
5.0								
5.5								
6.0								
6.5								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
	ASPHALT on surface	94.86					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.90 93.79 92.99						
0.5	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick)		BENTONITE SAND	1SS		25		0.0
1.0	- increasing sand at 0.66m BGS		5.08cm PVC WELL CASING	2SS		75	24	0.1
1.5			15.24cm BOREHOLE BENTONITE					
2.0	- 0.43m coarse beige sand at 1.98m BGS - wet at 2.29m BGS			3SS		67	19	0.1
2.5	- ~2.54cm root mat at 2.74m BGS			4SS		83	24	0.1
3.0	CL/ML-SILTY CLAY, soft, grey, wet	90.09	5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		63	4	0.2
4.0	END OF BOREHOLE @ 3.66m BGS	89.33						
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.45m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.15 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.42 93.33 92.38						
0	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist		BENTONITE 5.08cm PVC WELL CASING SAND	1SS		29	6	0.1
0.5								
1.0			BENTONITE	2SS		38	16	0.1
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	91.29						
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	91.01	15.24cm BOREHOLE	3SS		83	26	0.0
2.0								
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS		5.08cm PVC WELL SCREEN	4SS		50		0.2
3.0	- REFUSAL at 3.05m BGS	89.33	SAND PACK					
	END OF BOREHOLE @ 3.05m BGS			5SS		4		0.1
3.5								
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

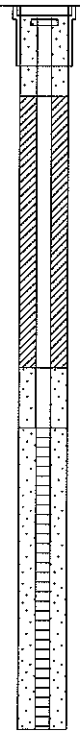
OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.63					
	TOP OF RISER	94.55					
	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0							
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							



WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0			WELL DETAILS Screened interval: 92.92 to 91.40m m AMSL 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.23 to 94.60m m AMSL 1.83 to 0.46m BGS Material: Bentonite Sand Pack: 93.23 to 91.40m m AMSL 1.83 to 3.66m BGS Material: No. 3 Silica Sand				
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

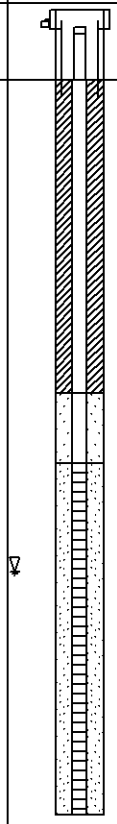
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOP OF RISER	-0.46
	TOP OF CASING	-0.61
0	GRASS AND TOPSOIL	0.05
	FILL - concrete, red brick, ashphalt, sand, gravel, moist	
1		
2		
3		
4	- wet at 4.27m BGS	
5	- concrete at 4.95m BGS	
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18
6		
	END OF BOREHOLE @ 6.38m BGS	6.38
7		
8		
9		
10		
11		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

SAMPLE			
NUMBER	INTERVAL	REC (%)	'N' VALUE
1		12	
2		10	64
3		15	13
4		4	
5		13	38
6		13	59
7		12	
8		14	26
9		6	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-GT006.GPJ CRA_CORP.GDT 3/10/15

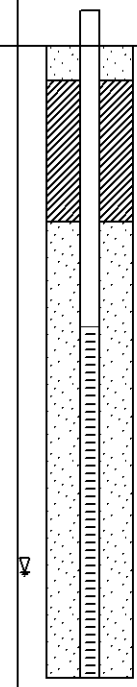
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS
	TOPSOIL - sandy, medium brown, dry	
1	rock fragments	1.07
	SILTY SAND - medium brown	1.22
	CLEARSTONE - dry	1.37
2	rock fragments	1.68
	LIMESTONE - grey	2.13
3		
4		
5	- highly fractured at 5.18m BGS	
	END OF BOREHOLE @ 5.49m BGS	5.49
6		
7		
8		
9		
10		
11		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

SAMPLE				
NUMBER	INTERVAL	REC (%)	'N' VALUE	

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

Appendix C2
Deep Bedrock Water Well and Stratigraphic Logs

OCT 07 '93 08:09 BEAVER ROAD BUILDERS

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

1. PRINT ONLY (in ink) IN SPACES PROVIDED
2. CHECK ☑ CORRECT BOX WHERE APPLICABLE

SURVEY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
Ottawa Carleton	Gloucester	6		26

OVERBURDEN CONTRACTOR'S NAME	ADDRESS	DATE COMPLETED
ver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DAY 19 MO. 4 YR. 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
y	Hardpan	Boulders		9	15
Gray	Limestone		Soft	15	33
White & Gray	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	DEPTH - FEET FROM	TO
☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS		
☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS		
☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS		
☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS		
☐ FRESH ☐ SALTY ☐ SULPHUR ☐ MINERAL ☐ GAS		

CASING & OPEN HOLE RECORD

INSIDE DIAM. (INCHES)	MATERIAL	WALL THICKNESS (INCHES)	DEPTH - FEET FROM	TO
6 1/4	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE ☐ PLASTIC	.188	0	31
6 1/8	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		31	75
6	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE ☐ PLASTIC		75	135

SCREEN

TYPE OF SCREEN (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN	FEET

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT CLAY PACKER, ETC.)
31	0	Grouted - Cement (18)

METHOD OF CONSTRUCTION	WELL USE	STATUS OF WELL
☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL	☒ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER	☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED ☐ DEWATERING
☐ COMMERCIAL ☐ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED		
☐ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ BOREAU (AIR) ☒ AIR PERCUSSION	☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING ☐ DIGGING ☐ OTHER	

METHOD OF LAST WELL TEST	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	15-20 GPM	1 HOURS MINUTES

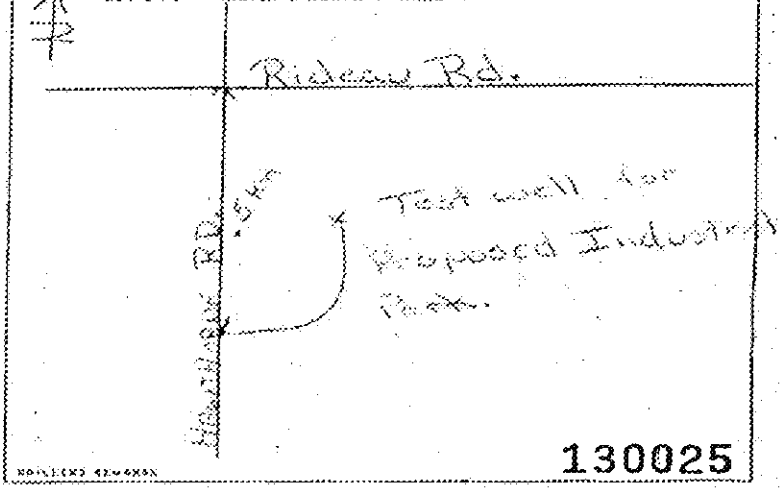
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☐ PUMPING ☒ RECOVERY			
		10 MINUTES	20 MINUTES	45 MINUTES	60 MINUTES
31 FEET	130 FEET	40 FEET	33 FEET	31 FEET	31 FEET

IF FLOWING GIVE RATE	WATER AT END OF TEST	
GPM		☐ CLEAR ☐ CLOUDY

PUMP INTAKE SET AT	ALLOWANCE MADE FOR SEASONAL USE	RECOMMENDED PUMPING RATE
☐ SHALLOW ☒ DEEP	125 FEET	5 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1556

ADDRESS OF WELL CONTRACTOR	
P.O. Box 450 Stittsville, Ontario	K2S 1A5

NAME OF WELL TECHNICIAN (PLEASE PRINT)	WELL TECHNICIAN'S LICENCE NUMBER
S. Miller	10087

SIGNATURE OF TECHNICIAN/CONTRACTOR	SUBMISSION DATE
	DAY 20 MO. 7 YR. 93

OFFICE USE

WHITE - MINISTRY COPY YELLOW - CONTRACTOR'S COPY PINK - OWNER'S COPY

FORM NO. 0506 (11/86) FORM 9

003364

OCT 07 '93 08:12 BEAVER ROAD BUILDERS P.3/4

Ministry of the Environment Ontario

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-2

County or District: Ottawa Carleton
Township, Borough, City or Town: Gloucester
Lot: 6
Concession: 26
Name of Owner: Beaver Road Builders
Address: P.O. Box 4208 stn. "E" Ottawa, Ontario K1S 5B2
Date Completed: 16 / 8 / 93

LOG OF OVERBURDEN AND BEDROCK MATERIALS (See Instructions)

General Colour	Most common material	Other materials	General Description	Depth From	Depth To
Brown	Sand	Stone		0	5
Gray	Hardpan	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

Kind of Water: NOT TESTED

CASING & OPEN HOLE RECORD

Inside Diameter	Material and Type	Wall Thickness	Depth From	Depth To
6 1/4	Steel	.188	0	39
5 15/16	Steel		39	100

SCREEN

PLUGGING & SEALING RECORD

Depth Set at From	To	Material and Type
37.5	0	Cement - Grouted

Test Method: Pump
Duration of Pumping: 1 hr
Final Water Level: 20
Static Level: 7'6"
Water Level End of Pumping: 14'6"
Recommended Pump Rate: 50 GPM
Recommended Pump Setting: 14'6"

LOCATION OF WELL

Overburden and Bedrock Materials Penetrated: 135946

Proposed Use of Well: Water Supply
Type of Well: Test Hole
Method of Construction: Air Percussion

Well Contractor: Capital Water Supply Ltd.
Well Contractor's Licence Number: 1558
Address: 490 Russellville, Ontario K2S 1A6
Name of Well Technician: Miller/T. Harrison
Well Technician's Licence Number: T0097/T2251
Date: Oct 7 / 93

OFFICE USE ONLY

Owner's Copy

FORM NO. 0506 (11/87) FORM 6

003365

Ontario Ministry of the Environment

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton	Gloucester	6	26
Beaver Road Builders	P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2	Oct 16 / 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Gray & White	Sandstone		Hard	0	100

WATER RECORD

KIND OF WATER: FRESH / SALTY / UNKNOWN / UNUSED / MINERAL / GAS

NOT TESTED

CASING & OPEN HOLE RECORD

INSIDE DIAM.	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	Steel	.188	0	22
6 1/16	Open hole		22	100

SCREEN

PLUGGING & SEALING RECORD

DIAMETER	DEPTH FROM	MATERIAL AND TYPE
20'8"	0	Grouted cement (3)

PUMP	BAILER	15-20	3
STATIC LEVEL	WATER LEVEL END OF PUMPING	PUMPING RATE	DURATION OF PUMPING
21'6"	24'4"	23'6" / 24	24'4" / 24'4"
RECOMMENDED PUMP TYPE: SHALLOW / DEEP		RECOMMENDED PUMP SETTING	RECOMMENDED PUMP RATE
		40 / 50	CLOUDY

LOCATION OF WELL

Rideau Road

Hawthorne Road

250 meters

135944

FINAL STATUS OF WELL	WATER SUPPLY; OBSERVATION WELL; TEST HOLE; RECHARGE WELL; ABANDONED, INSUFFICIENT SUPPLY; ABANDONED, POOR QUALITY; DEWATERING
WATER USE	DOMESTIC; STOCK; IRRIGATION; INDUSTRIAL; COMMERCIAL; MUNICIPAL; PUBLIC SUPPLY; COOLING OR AIR CONDITIONING; NOT USED
METHOD OF CONSTRUCTION	CABLE TOOL; ROTARY (CONVENTIONAL); ROTARY (REVERSE); ROTARY (AIR); AIR PERCUSSION; BORING; DIAMOND; JETTING; DRIVING

NAME OF WELL CONTRACTOR: Capital Water Supply Ltd. — WELL CONTRACTOR'S LICENCE NUMBER: 1550

ADDRESS: Box 490 Stittsville, Ontario K2S 1A6

NAME OF WELL TECHNICIAN: S. Miller/T. Harrison — WELL TECHNICIAN'S LICENCE NUMBER: 0097/T2251

SIGNATURE OF TECHNICIAN/CONTRACTOR

DATE SUBMITTED: Oct 18 / 93

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO. 0506 (3) '90

003366

Ontario Ministry of the Environment

Well Record
Regulation 903 Ontario Water Resources Act

Page ____ of ____

Measurements recorded in: ☒ Metric ☐ Imperial

Well Tag No. *(Place Sticker and/or Print Below)*: A068332

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 651 Colby Drive	Waterloo	Ontario	N2V1C2	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☒ Rotary (Reverse Air) ☐ Driving ☐ Boring ☐ Digging ☒ Air percussion ☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☒ Industrial ☐ Other, specify: Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	13.10

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	
26.51	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	
	☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify	

Hole Diameter

Depth (m/ft) From	Depth (m/ft) To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

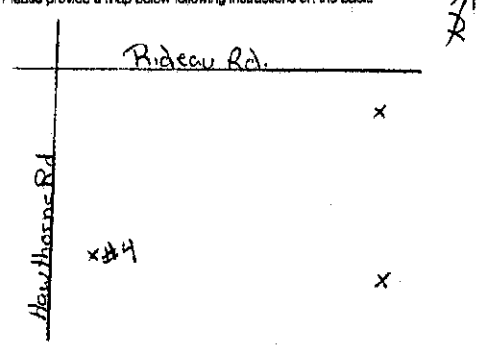
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15			
1	15.97	1	16.76	
2	16.98	2	15.74	
3	17.30	3	15.20	
4	17.43	4	15.	
5	17.50	5	14.91	
10	17.88	10	14.71	
15		15		
20	18.16	20	14.54	
25	18.23	25	14.51	
30	18.26	30	14.47	
40	18.34	40	14.41	
50	18.39	50	14.38	
60	18.41	60	14.35	

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2008 09 08

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only
Audit No: 8041 11
Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

003367

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: [X] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below) A068335 **A 068336**

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K 2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457043	5016848		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

[ ] Cable Tool [ ] Diamond
[ ] Rotary (Conventional) [ ] Jetting
[X] Rotary (Reverse) Air [ ] Driving
[ ] Boring [ ] Digging
[X] Air percussion
[ ] Other, specify

Well Use

[ ] Public [X] Commercial [ ] Not used
[X] Domestic [ ] Municipal [ ] Dewatering
[ ] Livestock [ ] Test Hole [ ] Monitoring
[ ] Irrigation [ ] Cooling & Air Conditioning
[X] Industrial
[ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
15.86	Steel	.48	+.45	12.80

Status of Well

[X] Water Supply
[ ] Replacement Well
[ ] Test Hole
[ ] Recharge Well
[ ] Dewatering Well
[ ] Observation and/or Monitoring Hole
[ ] Alteration (Construction)
[ ] Abandoned, Insufficient Supply
[ ] Abandoned, Poor Water Quality
[ ] Abandoned, other, specify
[ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Water Details

Water found at Depth	Kind of Water	Hole Diameter Depth (m/ft) From	To	Diameter (cm/in)
27.12 (m/ft) [ ] Gas	[ ] Fresh [X] Untested [ ] Other, specify			
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	0	12.80	15.7
(m/ft) [ ] Gas	[ ] Fresh [ ] Untested [ ] Other, specify	12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
[X] Clear and sand free
[ ] Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

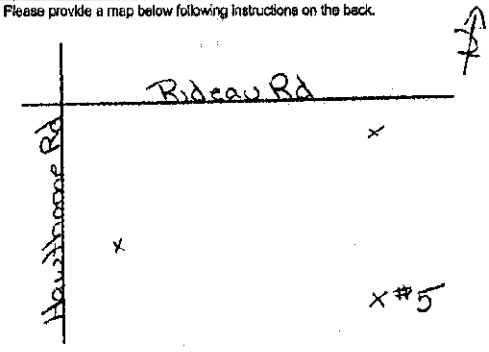
Well production (l/min / GPM)

Disinfected? [X] Yes [ ] No

	Drew Down Time (min)	Drew Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		6.85		
1		8.03	1	8.97
2		8.35	2	8.69
3		8.60	3	8.55
4		8.76	4	8.46
5		8.88	5	8.40
10		9.20	10	8.23
15			15	
20		9.49	20	8.04
25		9.62	25	7.99
30		9.68	30	7.93
40		9.82	40	7.84
50		9.91	50	7.77
60		9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Miller, Stephen	0097		2008 10 10

Well owner's information package delivered: [ ] Yes [X] No

Date Package Delivered: 2008 10 10

Date Work Completed: 2008 09 26

Ministry Use Only
Audit No. Z 844140
Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

003368

Ontario | Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below): A068344 **A 068344**

Well Record

...ulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Steacie Drive	Kanata	Ontario	K2K2A9	613 592 6600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD	83	18457102501760			

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium-Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) Air ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☒ Industrial
☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

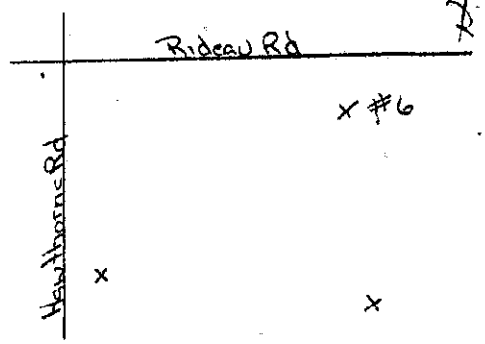
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
	Static Level	3.18		
	1	3.24	1	
	2	4.23	2	
	3	5.19	3	
	4		4	
	5	6.53	5	
	10	8.06	10	
	15	9.99	15	22.80
	20	11.53	20	19.40
	25	12.92	25	17.12
	30	14.08	30	15.13
	40		40	11.82
	50		50	9.47
	60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361765	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2008/09/26

Well owner's information package delivered	Date Package Delivered	Ministry Use Only
☐ Yes ☒ No	2008/09/26	Audit No. Z 084110
	Date Work Completed	
	2008/09/26	Received

0506E (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	92.98 92.46					
0	FILL, sand and gravel, packed, brown		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
1.52	SANDSTONE, very hard, grey and white	90.94					
29.87	END OF BOREHOLE @ 29.87m BGS	62.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER GROUND SURFACE	94.88 94.46					
0	LIMESTONE, grey, broken rock		18cm BOREHOLE CEMENT GROUT STEEL CASING Ø 15.86cm 15.23cm BOREHOLE				
1.52	SANDSTONE, very hard, grey and white	92.94					
29.87	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix D
QA/QC Assessment Memorandum and Laboratory Analytical Reports

Memorandum

March 17, 2017

To:	Ron Cherkewski, Ben Kempel, Allan Molenhuis	Ref. No.:	045804-58
From:	Airesse MacPhee/al/8		604-248-3661

Subject: Data Quality Assessment and Validation

Laboratory:	ALS Canada Ltd	Date(s) Sampled:	February 10 – November 16, 2016
Lab Job No.:	L1733803, L1769313, L1770123, L1771020, L1814405 , L1857475 , L1858227 , L1858871		
Sampled By:	Trevor Saunders		
Media Sampled:	Groundwater, Surface Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☐	☒	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐	Initial: AM			

The following results are qualified due to holding time exceedance:

Lab Sample ID	Field Sample ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-003	Color (apparent)	1.0	J	color unit
L1733803	GW-45804-021016-TS-004	Color (apparent)	1.0	J	color unit
L1733803	GW-45804-021016-TS-006	Color (apparent)	6.3	UJ	color unit
L1733803	GW-45804-021016-TS-007	Color (apparent)	1.0	J	color unit
L1733803	GW-45804-021016-TS-009	Color (apparent)	1.0	J	color unit
L1733803	GW-45804-021016-TS-006	Escherichia coli	0	J	cfu/100mL
L1733803	GW-45804-021016-TS-006	Fecal coliform bacteria	0	J	cfu/100mL
L1733803	GW-45804-021016-TS-006	Total coliform bacteria	10	UJ	cfu/100mL
L1733803	GW-45804-021016-TS-003	Turbidity	0.10	J	NTU
L1733803	GW-45804-021016-TS-004	Turbidity	33.5	UJ	NTU
L1733803	GW-45804-021016-TS-005	Turbidity	0.10	J	NTU
L1733803	GW-45804-021016-TS-006	Turbidity	2.39	UJ	NTU
L1733803	GW-45804-021016-TS-007	Turbidity	31.4	UJ	NTU

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-008	Turbidity	0.10	J	NTU
L1733803	GW-45804-021016-TS-009	Turbidity	0.10	J	NTU
L1733803	GW-45804-021016-TS-010	Turbidity	0.10	J	NTU

The following results are qualified based on surrogate recovery acceptance violations:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1771020	GW-45804-051816-TS-017	Anthracene	0.020	UJ	µg/L
L1771020	GW-45804-051816-TS-017	Benzo(a)pyrene	0.0050	UJ	µg/L

The following results are qualified based on field blank detections:

Lab Sample ID	Sample ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-010	Arsenic (dissolved)	0.0014	U	mg/L
L1733803	GW-45804-021016-TS-004	Boron (dissolved)	0.029	U	mg/L
L1733803	GW-45804-021016-TS-007	Boron (dissolved)	0.027	U	mg/L
L1733803	GW-45804-021016-TS-009	Boron (dissolved)	0.13	U	mg/L
L1733803	GW-45804-021016-TS-004	Chromium (dissolved)	0.00086	U	mg/L
L1733803	GW-45804-021016-TS-007	Chromium (dissolved)	0.00080	U	mg/L
L1733803	GW-45804-021016-TS-004	Copper (dissolved)	0.00067	UJ	mg/L
L1733803	GW-45804-021016-TS-006	Manganese (dissolved)	0.0114	U	mg/L
L1733803	GW-45804-021016-TS-003	Molybdenum (dissolved)	0.00771	U	mg/L
L1733803	GW-45804-021016-TS-004	Molybdenum (dissolved)	0.00388	U	mg/L
L1733803	GW-45804-021016-TS-005	Molybdenum (dissolved)	0.0101	U	mg/L
L1733803	GW-45804-021016-TS-006	Molybdenum (dissolved)	0.00987	U	mg/L
L1733803	GW-45804-021016-TS-007	Molybdenum (dissolved)	0.00379	U	mg/L
L1733803	GW-45804-021016-TS-008	Molybdenum (dissolved)	0.00609	U	mg/L
L1733803	GW-45804-021016-TS-009	Molybdenum (dissolved)	0.0121	U	mg/L
L1733803	GW-45804-021016-TS-010	Molybdenum (dissolved)	0.0187	U	mg/L
L1733803	GW-45804-021016-TS-004	Nickel (dissolved)	0.00178	U	mg/L
L1733803	GW-45804-021016-TS-007	Nickel (dissolved)	0.00158	U	mg/L
L1733803	GW-45804-021016-TS-007	Zinc (dissolved)	0.0022	UJ	mg/L
L1733803	GW-45804-021016-TS-003	Alkalinity, total (as CaCO3)	459	U	mg/L
L1733803	GW-45804-021016-TS-004	Alkalinity, total (as CaCO3)	249	U	mg/L
L1733803	GW-45804-021016-TS-005	Alkalinity, total (as CaCO3)	373	U	mg/L
L1733803	GW-45804-021016-TS-006	Alkalinity, total (as CaCO3)	323	U	mg/L
L1733803	GW-45804-021016-TS-007	Alkalinity, total (as CaCO3)	253	U	mg/L
L1733803	GW-45804-021016-TS-008	Alkalinity, total (as CaCO3)	439	U	mg/L

Lab Sample ID	Client ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-009	Alkalinity, total (as CaCO3)	474	U	mg/L
L1733803	GW-45804-021016-TS-010	Alkalinity, total (as CaCO3)	371	U	mg/L
L1733803	GW-45804-021016-TS-003	Chemical oxygen demand (COD)	26	U	mg/L
L1733803	GW-45804-021016-TS-004	Chemical oxygen demand (COD)	29	U	mg/L
L1733803	GW-45804-021016-TS-005	Chemical oxygen demand (COD)	25	U	mg/L
L1733803	GW-45804-021016-TS-006	Chemical oxygen demand (COD)	14	U	mg/L
L1733803	GW-45804-021016-TS-007	Chemical oxygen demand (COD)	28	U	mg/L
L1733803	GW-45804-021016-TS-008	Chemical oxygen demand (COD)	33	U	mg/L
L1733803	GW-45804-021016-TS-009	Chemical oxygen demand (COD)	36	U	mg/L
L1733803	GW-45804-021016-TS-010	Chemical oxygen demand (COD)	16	U	mg/L
L1733803	GW-45804-021016-TS-003	Chloride	135	U	mg/L
L1733803	GW-45804-021016-TS-004	Chloride	43.4	U	mg/L
L1733803	GW-45804-021016-TS-005	Chloride	87.8	U	mg/L
L1733803	GW-45804-021016-TS-006	Chloride	126	U	mg/L
L1733803	GW-45804-021016-TS-007	Chloride	44.2	U	mg/L
L1733803	GW-45804-021016-TS-008	Chloride	157	U	mg/L
L1733803	GW-45804-021016-TS-009	Chloride	109	U	mg/L
L1733803	GW-45804-021016-TS-010	Chloride	128	U	mg/L
L1733803	GW-45804-021016-TS-006	Color (apparent)	6.3	UJ	color unit
L1733803	GW-45804-021016-TS-003	Dissolved organic carbon (DOC) (dissolved)	6.6	U	mg/L
L1733803	GW-45804-021016-TS-004	Dissolved organic carbon (DOC) (dissolved)	8.5	U	mg/L
L1733803	GW-45804-021016-TS-005	Dissolved organic carbon (DOC) (dissolved)	5.9	U	mg/L
L1733803	GW-45804-021016-TS-006	Dissolved organic carbon (DOC) (dissolved)	4.5	U	mg/L
L1733803	GW-45804-021016-TS-007	Dissolved organic carbon (DOC) (dissolved)	8.5	U	mg/L
L1733803	GW-45804-021016-TS-008	Dissolved organic carbon (DOC) (dissolved)	8.3	U	mg/L
L1733803	GW-45804-021016-TS-009	Dissolved organic carbon (DOC) (dissolved)	10.1	U	mg/L

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-010	Dissolved organic carbon (DOC) (dissolved)	5.6	U	mg/L
L1733803	GW-45804-021016-TS-004	Nitrate (as N)	0.025	U	mg/L
L1733803	GW-45804-021016-TS-007	Nitrate (as N)	0.024	U	mg/L
L1733803	GW-45804-021016-TS-003	Sulfate	635	U	mg/L
L1733803	GW-45804-021016-TS-004	Sulfate	197	U	mg/L
L1733803	GW-45804-021016-TS-005	Sulfate	552	U	mg/L
L1733803	GW-45804-021016-TS-006	Sulfate	752	U	mg/L
L1733803	GW-45804-021016-TS-007	Sulfate	176	U	mg/L
L1733803	GW-45804-021016-TS-008	Sulfate	620	U	mg/L
L1733803	GW-45804-021016-TS-009	Sulfate	495	U	mg/L
L1733803	GW-45804-021016-TS-010	Sulfate	822	U	mg/L
L1733803	GW-45804-021016-TS-003	Total dissolved solids (TDS)	1490	U	mg/L
L1733803	GW-45804-021016-TS-004	Total dissolved solids (TDS)	489	U	mg/L
L1733803	GW-45804-021016-TS-005	Total dissolved solids (TDS)	1370	U	mg/L
L1733803	GW-45804-021016-TS-006	Total dissolved solids (TDS)	1480	U	mg/L
L1733803	GW-45804-021016-TS-007	Total dissolved solids (TDS)	488	U	mg/L
L1733803	GW-45804-021016-TS-008	Total dissolved solids (TDS)	1540	U	mg/L
L1733803	GW-45804-021016-TS-009	Total dissolved solids (TDS)	1350	U	mg/L
L1733803	GW-45804-021016-TS-010	Total dissolved solids (TDS)	1720	U	mg/L
L1733803	GW-45804-021016-TS-003	Total suspended solids (TSS)	7.4	U	mg/L
L1733803	GW-45804-021016-TS-004	Total suspended solids (TSS)	3.4	U	mg/L
L1733803	GW-45804-021016-TS-006	Total suspended solids (TSS)	8.8	U	mg/L
L1733803	GW-45804-021016-TS-007	Total suspended solids (TSS)	3.5	U	mg/L
L1733803	GW-45804-021016-TS-008	Total suspended solids (TSS)	16.0	U	mg/L
L1733803	GW-45804-021016-TS-010	Total suspended solids (TSS)	10.5	U	mg/L
L1733803	GW-45804-021016-TS-004	Turbidity	33.5	UJ	NTU
L1733803	GW-45804-021016-TS-006	Turbidity	2.39	UJ	NTU

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-007	Turbidity	31.4	UJ	NTU
L1771020	GW-45804-051816-TS-011	Chromium (dissolved)	0.00068	U	mg/L
L1771020	GW-45804-051816-TS-012	Chromium (dissolved)	0.00058	U	mg/L
L1771020	GW-45804-051816-TS-014	Chromium (dissolved)	0.00069	U	mg/L
L1771020	GW-45804-051816-TS-015	Chromium (dissolved)	0.00063	U	mg/L
L1771020	GW-45804-051816-TS-011	Zinc (dissolved)	0.0013	U	mg/L
L1771020	GW-45804-051816-TS-012	Zinc (dissolved)	0.0049	U	mg/L
L1771020	GW-45804-051816-TS-014	Zinc (dissolved)	0.0013	U	mg/L
L1771020	GW-45804-051816-TS-015	Zinc (dissolved)	0.0040	U	mg/L
L1771020	GW-45804-051816-TS-016	Zinc (dissolved)	0.0012	U	mg/L
L1771020	GW-45804-051816-TS-017	Ammonia-N	0.036	U	mg/L
L1771020	GW-45804-051816-TS-010	Phenolics (total)	0.0015	U	mg/L
L1771020	GW-45804-051816-TS-011	Phenolics (total)	0.0010	U	mg/L
L1771020	GW-45804-051816-TS-012	Phenolics (total)	0.0024	U	mg/L
L1771020	GW-45804-051816-TS-013	Phenolics (total)	0.0012	U	mg/L
L1771020	GW-45804-051816-TS-014	Phenolics (total)	0.0020	U	mg/L
L1771020	GW-45804-051816-TS-015	Phenolics (total)	0.0019	U	mg/L
L1771020	GW-45804-051816-TS-016	Phenolics (total)	0.0021	U	mg/L
L1771020	GW-45804-051816-TS-012	Total suspended solids (TSS)	9.2	U	mg/L
L1814405	GW-45804-081616-TS-008	Copper (dissolved)	0.00056	U	mg/L
L1814405	GW-45804-081616-TS-001	Chemical oxygen demand (COD)	18	U	mg/L
L1814405	GW-45804-081616-TS-002	Chemical oxygen demand (COD)	18	U	mg/L
L1814405	GW-45804-081616-TS-003	Chemical oxygen demand (COD)	35	U	mg/L
L1814405	GW-45804-081616-TS-004	Chemical oxygen demand (COD)	48	U	mg/L
L1814405	GW-45804-081616-TS-005	Chemical oxygen demand (COD)	39	U	mg/L
L1814405	GW-45804-081616-TS-006	Chemical oxygen demand (COD)	44	U	mg/L
L1814405	GW-45804-081616-TS-008	Chemical oxygen demand (COD)	39	U	mg/L
L1814405	GW-45804-081616-TS-001	Phenolics (total)	0.0016	UJ	mg/L
L1858871	GW-45804-111616-TS-009	Copper (dissolved)	0.00235	U	mg/L
L1858871	GW-45804-111616-TS-012	Copper (dissolved)	0.00075	U	mg/L
L1858871	GW-45804-111616-TS-013	Copper (dissolved)	0.00069	U	mg/L
L1858871	GW-45804-111616-TS-014	Copper (dissolved)	0.00065	U	mg/L

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L1858871	GW-45804-111616-TS-009	Phenolics (total)	0.0024	U	mg/L
L1858871	GW-45804-111616-TS-010	Phenolics (total)	0.0023	U	mg/L
L1858871	GW-45804-111616-TS-011	Phenolics (total)	0.0013	U	mg/L
L1858871	GW-45804-111616-TS-012	Phenolics (total)	0.0026	U	mg/L
L1858871	GW-45804-111616-TS-013	Phenolics (total)	0.0053	U	mg/L
L1858871	GW-45804-111616-TS-014	Phenolics (total)	0.0068	U	mg/L
L1858871	GW-45804-111616-TS-016	Phenolics (total)	0.0034	U	mg/L
L1858871	GW-45804-111616-TS-017	Phenolics (total)	0.0033	U	mg/L

The following results are qualified based on field duplicate variability:

Lab Sample ID	Field ID	Analyte	Result	Qualifier	Units
L1733803	GW-45804-021016-TS-004	Copper (dissolved)	0.00067	UJ	mg/L
L1733803	GW-45804-021016-TS-007	Copper (dissolved)	0.00020	UJ	mg/L
L1733803	GW-45804-021016-TS-004	Zinc (dissolved)	0.0010	J	mg/L
L1733803	GW-45804-021016-TS-007	Zinc (dissolved)	0.0022	UJ	mg/L
L1770123	GW-45804-051716-TS-001	Chemical oxygen demand (COD)	10	J	mg/L
L1770123	GW-45804-051716-TS-002	Chemical oxygen demand (COD)	10	J	mg/L
L1770123	GW-45804-051716-TS-001	Phenolics (total)	0.0010	J	mg/L
L1770123	GW-45804-051716-TS-002	Phenolics (total)	0.0010	J	mg/L
L1770123	GW-45804-051716-TS-001	Total suspended solids (TSS)	2.0	J	mg/L
L1770123	GW-45804-051716-TS-002	Total suspended solids (TSS)	4.0	J	mg/L
L1814405	GW-45804-081616-TS-001	Phenolics (total)	0.0016	UJ	mg/L
L1814405	GW-45804-081616-TS-002	Phenolics (total)	0.0010	J	mg/L

Notes:

J - Estimated concentration
U - Not Detected
UJ - Non-detect with an Estimated Report Limit
N - Nitrogen
CFU – Colony Forming Units
NTU - Nephelometric Turbidity Units

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 10-FEB-16
Report Date: 19-FEB-16 14:09 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1733803
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-1 GW-45804-021016-TS-001 Sampled By: T. SAUNDERS on 10-FEB-16 Matrix: WATER							
Physical Tests							
Color, Apparent	13.8	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	8.34		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	3.4		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	807	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	8.49	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	202		10	mg/L		12-FEB-16	R3402245
Ammonia, Total (as N)	0.028		0.020	mg/L		16-FEB-16	R3402428
Chloride (Cl)	44.1		0.50	mg/L		16-FEB-16	R3403246
Nitrate (as N)	0.069		0.020	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.010		0.010	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	0.22		0.15	mg/L	16-FEB-16	16-FEB-16	R3402450
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	367		0.30	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.5		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	0.00030		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	0.077		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	0.000010		0.000010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	0.00050		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	0.00011		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	0.00041		0.00020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	0.016		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	0.0710		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.0297		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	0.00142		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	0.0012		0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	13		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-1 GW-45804-021016-TS-001 Sampled By: T. SAUNDERS on 10-FEB-16 Matrix: WATER							
Hydrocarbons							
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	17-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	17-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	111.9		60-140	%	12-FEB-16	17-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	84.2		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	104.4		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	97.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	108.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	100.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	106.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-2 GW-45804-021016-TS-003 Sampled By: T. SAUNDERS on 10-FEB-16 @ 12:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.29		0.10	pH		12-FEB-16	R3400683
Temperature, Client	5.8		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	240	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	7.76		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	7.4		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	1490	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	65.8	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	459		20	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.0588		0.0013	mg/L		18-FEB-16	
Ammonia, Total (as N)	18.7	DLHC	0.40	mg/L		17-FEB-16	R3404078
Chloride (Cl)	135	DLDS	2.5	mg/L		16-FEB-16	R3403246
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	18.6	DLHC	1.5	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	0.126		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	635	DLDS	1.5	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.6		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-2 GW-45804-021016-TS-003 Sampled By: T. SAUNDERS on 10-FEB-16 @ 12:15 Matrix: WATER							
Bacteriological Tests							
Total Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	5.58	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	3.07	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.00771	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	26		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	12-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	12-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	108.6		60-140	%	12-FEB-16	12-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	76.5		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	101.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	76.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	109.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	97.7		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	102.3		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-3 GW-45804-021016-TS-004 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-3 GW-45804-021016-TS-004 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.30		0.10	pH		12-FEB-16	R3400683
Temperature, Client	6.2		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	189	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	7.82		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	3.4		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	489	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	33.5	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	249		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.00287		0.000066	mg/L		16-FEB-16	
Ammonia, Total (as N)	0.867		0.020	mg/L		16-FEB-16	R3402428
Chloride (Cl)	43.4		0.50	mg/L		16-FEB-16	R3403246
Nitrate (as N)	0.025		0.020	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.010		0.010	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	1.35		0.15	mg/L	16-FEB-16	16-FEB-16	R3402450
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	197		0.30	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.5		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	<100	DLM	100	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	0.00519		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	0.029		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	0.00086		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	0.00071		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	0.00067		0.00020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	3.73		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	2.58	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.00388		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	0.00178		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	0.0069		0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-3 GW-45804-021016-TS-004 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Aggregate Organics							
COD	29		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	17-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	17-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	106.8		60-140	%	12-FEB-16	17-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	80.9		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	101.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	69.2		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	104.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	97.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	104.5		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-4 GW-45804-021016-TS-005 Sampled By: T. SAUNDERS on 10-FEB-16 @ 15:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.77		0.10	pH		12-FEB-16	R3400683
Temperature, Client	15.0		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	163		1.0	C.U.		12-FEB-16	R3402487
pH	7.75		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	28.5		2.0	mg/L	13-FEB-16	17-FEB-16	R3403206
Total Dissolved Solids	1370	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	80.9	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	373		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.00335		0.000078	mg/L		16-FEB-16	
Ammonia, Total (as N)	1.72	DLHC	0.040	mg/L		16-FEB-16	R3402428
Chloride (Cl)	87.8		0.50	mg/L		16-FEB-16	R3403246
Nitrate (as N)	2.55		0.020	mg/L		16-FEB-16	R3403246
Nitrite (as N)	0.011		0.010	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	2.18		0.15	mg/L	16-FEB-16	16-FEB-16	R3402450
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	552		0.30	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-4 GW-45804-021016-TS-005 Sampled By: T. SAUNDERS on 10-FEB-16 @ 15:00 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.9		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	<10	DLM	10	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	0.0019	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	0.0022	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	7.75	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	0.00088	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	7.40	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.0101	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	25		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	12-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	12-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	112.9		60-140	%	12-FEB-16	12-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	67.1		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	0.0051		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	99.2		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	77.5		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	106.8		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	95.3		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	100.5		60-140	%	16-FEB-16	18-FEB-16	R3403954

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-4 GW-45804-021016-TS-005 Sampled By: T. SAUNDERS on 10-FEB-16 @ 15:00 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1733803-5 GW-45804-021016-TS-006 Sampled By: T. SAUNDERS on 10-FEB-16 @ 10:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.08		0.10	pH		12-FEB-16	R3400683
Temperature, Client	7.9		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	6.3	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	7.72		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	8.8		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	1480	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	2.39	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	323		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.000544		0.000046	mg/L		16-FEB-16	
Ammonia, Total (as N)	0.237		0.020	mg/L		16-FEB-16	R3402428
Chloride (Cl)	126	DLDS	2.5	mg/L		16-FEB-16	R3403246
Nitrate (as N)	1.90	DLDS	0.10	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	0.61		0.15	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	752	DLDS	1.5	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.5		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0	RRR	0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0	RRR	0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	<10	DLM	10	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	0.0114	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.00987	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-5 GW-45804-021016-TS-006 Sampled By: T. SAUNDERS on 10-FEB-16 @ 10:15 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	14		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	17-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	17-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	105.3		60-140	%	12-FEB-16	17-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	66.4		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	105.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	80.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	108.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	100.2		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	107.8		60-140	%	16-FEB-16	18-FEB-16	R3403954
Report Remarks : TC/EC/FC prep time was 10:50am (48.5hr after sampling).							
L1733803-6 GW-45804-021016-TS-007 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.30		0.10	pH		12-FEB-16	R3400683
Temperature, Client	6.2		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	191	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	7.80		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	3.5		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	488	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	31.4	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	253		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.00301		0.000066	mg/L		16-FEB-16	
Ammonia, Total (as N)	0.909		0.020	mg/L		16-FEB-16	R3402428
Chloride (Cl)	44.2		0.50	mg/L		16-FEB-16	R3403246
Nitrate (as N)	0.024		0.020	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.010		0.010	mg/L		16-FEB-16	R3403246

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-6 GW-45804-021016-TS-007 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	1.36		0.15	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	176		0.30	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.5		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	<100	DLM	100	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	0.00527		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	0.027		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	0.00080		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	0.00067		0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	3.81		0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	2.58	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.00379		0.000050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	0.00158		0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	0.0022		0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	28		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	12-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	12-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	115.5		60-140	%	12-FEB-16	12-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	76.4		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	92.8		60-140	%	16-FEB-16	18-FEB-16	R3403954

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-6 GW-45804-021016-TS-007 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:00 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	75.4		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	101.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	88.4		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	95.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-7 GW-45804-021016-TS-008 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.22		0.10	pH		12-FEB-16	R3400683
Temperature, Client	5.0		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	211		1.0	C.U.		12-FEB-16	R3402487
pH	7.89		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	16.0		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	1540	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	87.3	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	439		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.0172		0.00050	mg/L		16-FEB-16	
Ammonia, Total (as N)	6.90	DLHC	0.20	mg/L		16-FEB-16	R3402428
Chloride (Cl)	157	DLDS	2.5	mg/L		16-FEB-16	R3403246
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	6.70		0.15	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	0.056		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	620	DLDS	1.5	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.3		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	8.02	DLHC	0.10	mg/L	12-FEB-16	16-FEB-16	R3402240

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-7 GW-45804-021016-TS-008 Sampled By: T. SAUNDERS on 10-FEB-16 @ 13:45 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	5.16	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.00609	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	33		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	17-FEB-16	R3403682
F3 (C16-C34)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	17-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	17-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	103.3		60-140	%	12-FEB-16	17-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	73.6		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	86.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	75.0		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	104.2		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	82.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	88.6		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-8 GW-45804-021016-TS-009 Sampled By: T. SAUNDERS on 10-FEB-16 @ 11:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.25		0.10	pH		12-FEB-16	R3400683
Temperature, Client	8.9		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	150	PEHT	1.0	C.U.		12-FEB-16	R3402487
pH	7.88		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	21.0		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	1350	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	89.0	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	474		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.0176		0.00073	mg/L		16-FEB-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-8 GW-45804-021016-TS-009 Sampled By: T. SAUNDERS on 10-FEB-16 @ 11:30 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	4.79	DLHC	0.20	mg/L		16-FEB-16	R3402428
Chloride (Cl)	109	DLDS	2.5	mg/L		16-FEB-16	R3403246
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	4.48		0.15	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	0.055		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	495	DLDS	1.5	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.1		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Boron (B)-Dissolved	0.13	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	12-FEB-16	R3402240
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	12-FEB-16	R3402240
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	12-FEB-16	12-FEB-16	R3402240
Iron (Fe)-Dissolved	3.60	DLHC	0.10	mg/L	12-FEB-16	12-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Manganese (Mn)-Dissolved	1.94	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.0121	DLHC	0.00050	mg/L	12-FEB-16	12-FEB-16	R3402240
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	12-FEB-16	R3402240
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	12-FEB-16	12-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	36		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	12-FEB-16	12-FEB-16	R3403682
F3 (C16-C34)	400		250	ug/L	12-FEB-16	12-FEB-16	R3403682
F4 (C34-C50)	<250		250	ug/L	12-FEB-16	12-FEB-16	R3403682
Total Hydrocarbons (C6-C50)	400		380	ug/L		18-FEB-16	
Chrom. to baseline at nC50	YES				12-FEB-16	12-FEB-16	R3403682
Surrogate: 2-Bromobenzotrifluoride	116.3		60-140	%	12-FEB-16	12-FEB-16	R3403682
Surrogate: 3,4-Dichlorotoluene	71.3		60-140	%		16-FEB-16	R3402342

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-8 GW-45804-021016-TS-009 Sampled By: T. SAUNDERS on 10-FEB-16 @ 11:30 Matrix: WATER							
Hydrocarbons							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	101.2		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	80.7		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	102.3		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	97.9		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	106.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
L1733803-9 GW-45804-021016-TS-010 Sampled By: T. SAUNDERS on 10-FEB-16 @ 14:20 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.07		0.10	pH		12-FEB-16	R3400683
Temperature, Client	14.7		-50	Deg. C		12-FEB-16	R3400683
Physical Tests							
Color, Apparent	100		1.0	C.U.		12-FEB-16	R3402487
pH	7.72		0.10	pH units		14-FEB-16	R3402426
Total Suspended Solids	10.5		2.0	mg/L	12-FEB-16	13-FEB-16	R3401095
Total Dissolved Solids	1720	DLDS	20	mg/L		17-FEB-16	R3403120
Turbidity	68.1	PEHT	0.10	NTU		12-FEB-16	R3400744
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	371		10	mg/L		12-FEB-16	R3402245
Unionized ammonia	0.0226		0.00076	mg/L		16-FEB-16	
Ammonia, Total (as N)	5.95	DLHC	0.20	mg/L		16-FEB-16	R3402428
Chloride (Cl)	128	DLDS	2.5	mg/L		16-FEB-16	R3403246
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		16-FEB-16	R3403246
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		16-FEB-16	R3403246
Total Kjeldahl Nitrogen	5.70		0.15	mg/L	17-FEB-16	17-FEB-16	R3402997
Phosphorus, Total	<0.030		0.030	mg/L	18-FEB-16	18-FEB-16	R3404261
Sulfate (SO4)	822	DLDS	1.5	mg/L		16-FEB-16	R3403246
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.6		1.0	mg/L		17-FEB-16	R3403678
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3401001
Fecal Coliforms	0		0	CFU/100mL	12-FEB-16	13-FEB-16	R3400965
Total Coliforms	<10	DLM	10	CFU/100mL	12-FEB-16	13-FEB-16	R3400963
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					16-FEB-16	R3402319
Dissolved Metals Filtration Location	FIELD					12-FEB-16	R3400518
Arsenic (As)-Dissolved	0.0014	DLHC	0.0010	mg/L	12-FEB-16	16-FEB-16	R3402240
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	12-FEB-16	16-FEB-16	R3402240
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	12-FEB-16	16-FEB-16	R3402240

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1733803-9 GW-45804-021016-TS-010 Sampled By: T. SAUNDERS on 10-FEB-16 @ 14:20 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	12-FEB-16	16-FEB-16	R3402240
Copper (Cu)-Dissolved	0.0045	DLHC	0.0020	mg/L	12-FEB-16	16-FEB-16	R3402240
Iron (Fe)-Dissolved	5.77	DLHC	0.10	mg/L	12-FEB-16	16-FEB-16	R3402240
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	12-FEB-16	16-FEB-16	R3402240
Manganese (Mn)-Dissolved	0.567	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	16-FEB-16	16-FEB-16	R3402429
Molybdenum (Mo)-Dissolved	0.0187	DLHC	0.00050	mg/L	12-FEB-16	16-FEB-16	R3402240
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	12-FEB-16	16-FEB-16	R3402240
Zinc (Zn)-Dissolved	0.011	DLHC	0.010	mg/L	12-FEB-16	16-FEB-16	R3402240
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	12-FEB-16	17-FEB-16	R3403447
COD	16		10	mg/L		17-FEB-16	R3402815
Phenols (4AAP)	0.0011		0.0010	mg/L		18-FEB-16	R3404352
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-FEB-16	R3402342
F2 (C10-C16)	<100		100	ug/L	17-FEB-16	17-FEB-16	R3403715
F3 (C16-C34)	<250		250	ug/L	17-FEB-16	17-FEB-16	R3403715
F4 (C34-C50)	<250		250	ug/L	17-FEB-16	17-FEB-16	R3403715
Total Hydrocarbons (C6-C50)	<380		380	ug/L		19-FEB-16	
Chrom. to baseline at nC50	YES				17-FEB-16	17-FEB-16	R3403715
Surrogate: 2-Bromobenzotrifluoride	113.3		60-140	%	17-FEB-16	17-FEB-16	R3403715
Surrogate: 3,4-Dichlorotoluene	66.9		60-140	%		16-FEB-16	R3402342
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-FEB-16	18-FEB-16	R3403954
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Acenaphthene	102.9		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d9-Acridine (SS)	74.9		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d12-Chrysene	108.1		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d8-Naphthalene	98.7		60-140	%	16-FEB-16	18-FEB-16	R3403954
Surrogate: d10-Phenanthrene	102.5		60-140	%	16-FEB-16	18-FEB-16	R3403954

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLHC	L1733803-1, -2, -3, -5, -6, -7, -8, -9
Duplicate	Total Suspended Solids	DLHC	L1733803-4
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1733803-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1733803-2, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus, Total	MS-B	L1733803-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHT	Parameter Exceeded Recommended Holding Time Prior to Analysis
RRR	Refer to Report Remarks for issues regarding this analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent colour is determined by analysis of the decanted sample using the platinum-cobalt colourimetric method.

EC-MF-WT Water E. coli SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:

Reference Information

1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)

Reference Information

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3402245								
WG2260248-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			98.1		%		80-120	12-FEB-16
WG2260248-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			101.3		%		80-120	12-FEB-16
WG2260248-4 DUP		**L1733273-3**						
Alkalinity, Total (as CaCO3)		235	232		mg/L	1.1	20	12-FEB-16
WG2260248-8 DUP		**L1733803-5**						
Alkalinity, Total (as CaCO3)		323	312		mg/L	3.5	20	12-FEB-16
WG2260248-2 LCS								
Alkalinity, Total (as CaCO3)			101.1		%		85-115	12-FEB-16
WG2260248-6 LCS								
Alkalinity, Total (as CaCO3)			101.5		%		85-115	12-FEB-16
WG2260248-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	12-FEB-16
WG2260248-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	12-FEB-16
BOD-C-WT	Water							
Batch R3403447								
WG2260562-2 DUP		**L1733284-2**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	17-FEB-16
WG2260562-6 DUP		**L1733605-1**						
BOD Carbonaceous		119	116		mg/L	2.6	20	17-FEB-16
WG2260562-3 LCS								
BOD Carbonaceous			98.0		%		85-115	17-FEB-16
WG2260562-7 LCS								
BOD Carbonaceous			103.0		%		85-115	17-FEB-16
WG2260562-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	17-FEB-16
WG2260562-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	17-FEB-16
C-DIS-ORG-WT	Water							
Batch R3403678								
WG2262042-3 DUP		**L1733803-9**						
Dissolved Organic Carbon		5.6	4.9		mg/L	13	20	17-FEB-16
WG2262042-2 LCS								
Dissolved Organic Carbon			101.0		%		80-120	17-FEB-16
WG2262042-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	17-FEB-16

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R3403678								
WG2262042-4 MS		**L1733803-9**						
Dissolved Organic Carbon			93.8		%		70-130	17-FEB-16
CL-IC-WT	Water							
Batch R3403246								
WG2261525-4 DUP		**WG2261525-3**						
Chloride (Cl)		6.58	6.57		mg/L	0.2	25	16-FEB-16
WG2261525-2 LCS								
Chloride (Cl)			98.9		%		70-130	16-FEB-16
WG2261525-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	16-FEB-16
WG2261525-5 MS		**WG2261525-3**						
Chloride (Cl)			103.5		%		70-130	16-FEB-16
COD-WT	Water							
Batch R3402815								
WG2261393-3 DUP		**L1733672-6**						
COD		<10	<10	RPD-NA	mg/L	N/A	20	17-FEB-16
WG2261393-2 LCS								
COD			109.8		%		85-115	17-FEB-16
WG2261393-1 MB								
COD			<10		mg/L		10	17-FEB-16
WG2261393-4 MS		**L1733672-6**						
COD			102.3		%		75-125	17-FEB-16
COLOUR-WT	Water							
Batch R3402487								
WG2260794-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			97.0		%		80-120	12-FEB-16
WG2260794-4 DUP		**L1733803-1**						
Color, Apparent		13.8	13.5		C.U.	2.3	20	12-FEB-16
WG2260794-1 MB								
Color, Apparent			<1.0		C.U.		1	12-FEB-16
EC-MF-WT	Water							
Batch R3401001								
WG2260443-1 MB								
E. Coli			0		CFU/100mL		1	13-FEB-16
F1-HS-WT	Water							

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3402342								
WG2258786-4 DUP		**WG2258786-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	16-FEB-16
WG2258786-1 LCS								
F1 (C6-C10)			86.6		%		80-120	16-FEB-16
WG2258786-2 MB								
F1 (C6-C10)			<100		ug/L		100	16-FEB-16
Surrogate: 3,4-Dichlorotoluene			88.7		%		60-140	16-FEB-16
F2-F4-WT	Water							
Batch R3403682								
WG2260384-2 LCS								
F2 (C10-C16)			124.4		%		65-135	12-FEB-16
F3 (C16-C34)			111.9		%		65-135	12-FEB-16
F4 (C34-C50)			104.5		%		65-135	12-FEB-16
WG2260384-3 LCSD		**WG2260384-2**						
F2 (C10-C16)		124.4	117.6		%	5.6	50	12-FEB-16
F3 (C16-C34)		111.9	117.4		%	4.9	50	12-FEB-16
F4 (C34-C50)		104.5	109.6		%	4.8	50	12-FEB-16
WG2260384-1 MB								
F2 (C10-C16)			<100		ug/L		100	12-FEB-16
F3 (C16-C34)			<250		ug/L		250	12-FEB-16
F4 (C34-C50)			<250		ug/L		250	12-FEB-16
Surrogate: 2-Bromobenzotrifluoride			113.9		%		60-140	12-FEB-16
Batch R3403715								
WG2261902-2 LCS								
F2 (C10-C16)			116.4		%		65-135	17-FEB-16
F3 (C16-C34)			109.9		%		65-135	17-FEB-16
F4 (C34-C50)			100.5		%		65-135	17-FEB-16
WG2261902-3 LCSD		**WG2261902-2**						
F2 (C10-C16)		116.4	115.0		%	1.2	50	17-FEB-16
F3 (C16-C34)		109.9	110.5		%	0.6	50	17-FEB-16
F4 (C34-C50)		100.5	101.7		%	1.2	50	17-FEB-16
WG2261902-1 MB								
F2 (C10-C16)			<100		ug/L		100	17-FEB-16
F3 (C16-C34)			<250		ug/L		250	17-FEB-16
F4 (C34-C50)			<250		ug/L		250	17-FEB-16
Surrogate: 2-Bromobenzotrifluoride			110.1		%		60-140	17-FEB-16

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
FC-MF-WT	Water							
Batch R3400965								
WG2260439-2 DUP		**WG2260439-4**						
Fecal Coliforms		0	0		CFU/100mL	0.0	65	13-FEB-16
WG2260439-1 MB								
Fecal Coliforms			0		CFU/100mL		1	13-FEB-16
HG-D-CVAA-WT	Water							
Batch R3402429								
WG2261482-4 DUP		**WG2261482-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-FEB-16
WG2261482-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	16-FEB-16
WG2261482-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	16-FEB-16
WG2261482-6 MS		**WG2261482-5**						
Mercury (Hg)-Dissolved			92.6		%		70-130	16-FEB-16
MET-D-CCMS-WT	Water							
Batch R3402240								
WG2260498-4 DUP		**WG2260498-3**						
Arsenic (As)-Dissolved		0.00066	0.00064		mg/L	2.7	20	12-FEB-16
Boron (B)-Dissolved		0.026	0.027		mg/L	4.2	20	12-FEB-16
Cadmium (Cd)-Dissolved		0.000018	0.000021		mg/L	15	20	12-FEB-16
Chromium (Cr)-Dissolved		0.00052	0.00052		mg/L	0.9	20	12-FEB-16
Cobalt (Co)-Dissolved		0.00022	0.00023		mg/L	1.3	20	12-FEB-16
Copper (Cu)-Dissolved		0.00469	0.00474		mg/L	1.1	20	12-FEB-16
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	12-FEB-16
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	12-FEB-16
Manganese (Mn)-Dissolved		0.0323	0.0327		mg/L	1.3	20	12-FEB-16
Molybdenum (Mo)-Dissolved		0.00442	0.00404		mg/L	9.0	20	12-FEB-16
Nickel (Ni)-Dissolved		0.00109	0.00115		mg/L	4.9	20	12-FEB-16
Zinc (Zn)-Dissolved		0.0076	0.0075		mg/L	1.9	20	12-FEB-16
WG2260498-2 LCS								
Arsenic (As)-Dissolved			94.2		%		80-120	12-FEB-16
Boron (B)-Dissolved			86.9		%		80-120	12-FEB-16
Cadmium (Cd)-Dissolved			94.9		%		80-120	12-FEB-16
Chromium (Cr)-Dissolved			92.9		%		80-120	12-FEB-16
Cobalt (Co)-Dissolved			92.8		%		80-120	12-FEB-16

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3402240								
WG2260498-2 LCS								
Copper (Cu)-Dissolved			91.6		%		80-120	12-FEB-16
Iron (Fe)-Dissolved			91.8		%		80-120	12-FEB-16
Lead (Pb)-Dissolved			93.8		%		80-120	12-FEB-16
Manganese (Mn)-Dissolved			92.7		%		80-120	12-FEB-16
Molybdenum (Mo)-Dissolved			94.3		%		80-120	12-FEB-16
Nickel (Ni)-Dissolved			93.7		%		80-120	12-FEB-16
Zinc (Zn)-Dissolved			88.7		%		80-120	12-FEB-16
WG2260498-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	12-FEB-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	12-FEB-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	12-FEB-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	12-FEB-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	12-FEB-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	12-FEB-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	12-FEB-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	12-FEB-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	12-FEB-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	12-FEB-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	12-FEB-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	12-FEB-16
WG2260498-5 MS		**WG2260498-3**						
Arsenic (As)-Dissolved			102.4		%		70-130	12-FEB-16
Boron (B)-Dissolved			91.7		%		70-130	12-FEB-16
Cadmium (Cd)-Dissolved			100.3		%		70-130	12-FEB-16
Chromium (Cr)-Dissolved			96.0		%		70-130	12-FEB-16
Cobalt (Co)-Dissolved			92.7		%		70-130	12-FEB-16
Copper (Cu)-Dissolved			90.9		%		70-130	12-FEB-16
Iron (Fe)-Dissolved			111.5		%		70-130	12-FEB-16
Lead (Pb)-Dissolved			94.2		%		70-130	12-FEB-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	12-FEB-16
Molybdenum (Mo)-Dissolved			102.3		%		70-130	12-FEB-16
Nickel (Ni)-Dissolved			91.9		%		70-130	12-FEB-16
Zinc (Zn)-Dissolved			89.9		%		70-130	12-FEB-16
NH3-WT	Water							

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3402428								
WG2261378-3 DUP		**L1733803-1**						
Ammonia, Total (as N)		0.028	0.031		mg/L	11	20	16-FEB-16
WG2261378-2 LCS								
Ammonia, Total (as N)			95.1		%		85-115	16-FEB-16
WG2261378-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	16-FEB-16
WG2261378-4 MS		**L1733803-1**						
Ammonia, Total (as N)			98.9		%		75-125	16-FEB-16
Batch R3404078								
WG2262073-3 DUP		**L1734671-1**						
Ammonia, Total (as N)		0.055	0.060		mg/L	8.9	20	17-FEB-16
WG2262073-2 LCS								
Ammonia, Total (as N)			97.4		%		85-115	17-FEB-16
WG2262073-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	17-FEB-16
WG2262073-4 MS		**L1734671-1**						
Ammonia, Total (as N)			97.9		%		75-125	17-FEB-16
NO2-IC-WT	Water							
Batch R3403246								
WG2261525-4 DUP		**WG2261525-3**						
Nitrite (as N)		0.063	0.063		mg/L	0.2	25	16-FEB-16
WG2261525-2 LCS								
Nitrite (as N)			99.2		%		70-130	16-FEB-16
WG2261525-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	16-FEB-16
WG2261525-5 MS		**WG2261525-3**						
Nitrite (as N)			100.8		%		70-130	16-FEB-16
NO3-IC-WT	Water							
Batch R3403246								
WG2261525-4 DUP		**WG2261525-3**						
Nitrate (as N)		0.169	0.167		mg/L	1.1	25	16-FEB-16
WG2261525-2 LCS								
Nitrate (as N)			96.8		%		70-130	16-FEB-16
WG2261525-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	16-FEB-16
WG2261525-5 MS		**WG2261525-3**						
Nitrate (as N)			100.3		%		70-130	16-FEB-16

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3404261								
WG2262716-3 DUP		**L1733365-1**						
Phosphorus, Total		0.435	0.449		mg/L	3.2	20	18-FEB-16
WG2262716-2 LCS								
Phosphorus, Total			103.7		%		80-120	18-FEB-16
WG2262716-1 MB								
Phosphorus, Total			<0.030		mg/L		0.03	18-FEB-16
WG2262716-4 MS		**L1733365-1**						
Phosphorus, Total			N/A	MS-B	%		-	18-FEB-16
PAH-CCME-WT	Water							
Batch R3403954								
WG2261341-2 LCS								
Anthracene			103.8		%		50-140	18-FEB-16
Benzo(a)pyrene			118.3		%		60-130	18-FEB-16
WG2261341-3 LCSD		**WG2261341-2**						
Anthracene		103.8	98.1		%	5.7	50	18-FEB-16
Benzo(a)pyrene		118.3	120.8		%	2.1	50	18-FEB-16
WG2261341-1 MB								
Anthracene			<0.020		ug/L		0.02	18-FEB-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	18-FEB-16
Surrogate: d8-Naphthalene			93.1		%		60-140	18-FEB-16
Surrogate: d10-Phenanthrene			95.7		%		60-140	18-FEB-16
Surrogate: d12-Chrysene			103.8		%		60-140	18-FEB-16
Surrogate: d10-Acenaphthene			96.4		%		60-140	18-FEB-16
Surrogate: d9-Acridine (SS)			82.7		%		60-140	18-FEB-16
PH-WT	Water							
Batch R3402426								
WG2261036-3 DUP		**WG2261036-2**						
pH		8.11	8.08	J	pH units	0.03	0.2	14-FEB-16
WG2261036-1 LCS								
pH			7.03		pH units		6.9-7.1	14-FEB-16
PHENOLS-4AAP-WT	Water							
Batch R3404352								
WG2263461-3 DUP		**L1733280-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-FEB-16
WG2263461-2 LCS								
Phenols (4AAP)			103.1		%		85-115	18-FEB-16

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R3404352								
WG2263461-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-FEB-16
WG2263461-4 MS		**L1733280-2**						
Phenols (4AAP)			98.1		%		75-125	18-FEB-16
SO4-IC-N-WT	Water							
Batch R3403246								
WG2261525-4 DUP		**WG2261525-3**						
Sulfate (SO4)		9.41	9.40		mg/L	0.1	20	16-FEB-16
WG2261525-2 LCS								
Sulfate (SO4)			97.8		%		90-110	16-FEB-16
WG2261525-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	16-FEB-16
WG2261525-5 MS		**WG2261525-3**						
Sulfate (SO4)			100.5		%		75-125	16-FEB-16
SOLIDS-TDS-WT	Water							
Batch R3403120								
WG2260318-3 DUP		**L1733612-1**						
Total Dissolved Solids		334	335		mg/L	0.3	20	17-FEB-16
WG2260318-2 LCS								
Total Dissolved Solids			95.3		%		85-115	17-FEB-16
WG2260318-1 MB								
Total Dissolved Solids			<10		mg/L		10	17-FEB-16
SOLIDS-TSS-WT	Water							
Batch R3401095								
WG2260598-3 DUP		**L1733602-2**						
Total Suspended Solids		1510	1740		mg/L	14	20	13-FEB-16
WG2260598-2 LCS								
Total Suspended Solids			102.0		%		85-115	13-FEB-16
WG2260598-1 MB								
Total Suspended Solids			<2.0		mg/L		2	13-FEB-16
Batch R3403206								
WG2260900-3 DUP		**L1734038-1**						
Total Suspended Solids		122	112		mg/L	8.6	20	17-FEB-16
WG2260900-2 LCS								
Total Suspended Solids			99.0		%		85-115	17-FEB-16
WG2260900-1 MB								
Total Suspended Solids			<2.0		mg/L		2	17-FEB-16

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TC-MF-WT	Water							
Batch R3400963								
WG2260435-1 MB								
Total Coliforms			0		CFU/100mL		1	13-FEB-16
TKN-WT	Water							
Batch R3402450								
WG2261363-7 DUP		**L1733280-1**						
Total Kjeldahl Nitrogen		18.8	19.0		mg/L	0.9	20	16-FEB-16
WG2261363-6 LCS								
Total Kjeldahl Nitrogen			87.1		%		75-125	16-FEB-16
WG2261363-5 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	16-FEB-16
WG2261363-8 MS		**L1733280-1**						
Total Kjeldahl Nitrogen			88.2		%		70-130	16-FEB-16
Batch R3402997								
WG2261950-3 DUP		**L1733617-1**						
Total Kjeldahl Nitrogen		0.24	0.26		mg/L	5.2	20	17-FEB-16
WG2261950-2 LCS								
Total Kjeldahl Nitrogen			88.9		%		75-125	17-FEB-16
WG2261950-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	17-FEB-16
WG2261950-4 MS		**L1733617-1**						
Total Kjeldahl Nitrogen			95.2		%		70-130	17-FEB-16
TURBIDITY-WT	Water							
Batch R3400744								
WG2260559-3 DUP		**L1733803-9**						
Turbidity		68.1	67.0		NTU	1.6	15	12-FEB-16
WG2260559-2 LCS								
Turbidity			101.0		%		85-115	12-FEB-16
WG2260559-1 MB								
Turbidity			<0.10		NTU		0.1	12-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1733803 Report Date: 19-FEB-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Colour							
	1	10-FEB-16	12-FEB-16 13:45	48	50	hours	EHT
	2	10-FEB-16 12:15	12-FEB-16 13:45	48	49	hours	EHT
	3	10-FEB-16 13:00	12-FEB-16 13:45	48	49	hours	EHT
	5	10-FEB-16 10:15	12-FEB-16 13:45	48	52	hours	EHT
	6	10-FEB-16 13:00	12-FEB-16 13:45	48	49	hours	EHT
	8	10-FEB-16 11:30	12-FEB-16 13:45	48	50	hours	EHT
Turbidity							
	1	10-FEB-16	12-FEB-16 16:00	48	52	hours	EHT
	2	10-FEB-16 12:15	12-FEB-16 16:00	48	52	hours	EHT
	3	10-FEB-16 13:00	12-FEB-16 16:00	48	51	hours	EHT
	4	10-FEB-16 15:00	12-FEB-16 16:00	48	49	hours	EHT
	5	10-FEB-16 10:15	12-FEB-16 16:00	48	54	hours	EHT
	6	10-FEB-16 13:00	12-FEB-16 16:00	48	51	hours	EHT
	7	10-FEB-16 13:45	12-FEB-16 16:00	48	50	hours	EHT
	8	10-FEB-16 11:30	12-FEB-16 16:00	48	53	hours	EHT
	9	10-FEB-16 14:20	12-FEB-16 16:00	48	50	hours	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1733803 were received on 10-FEB-16 15:30.

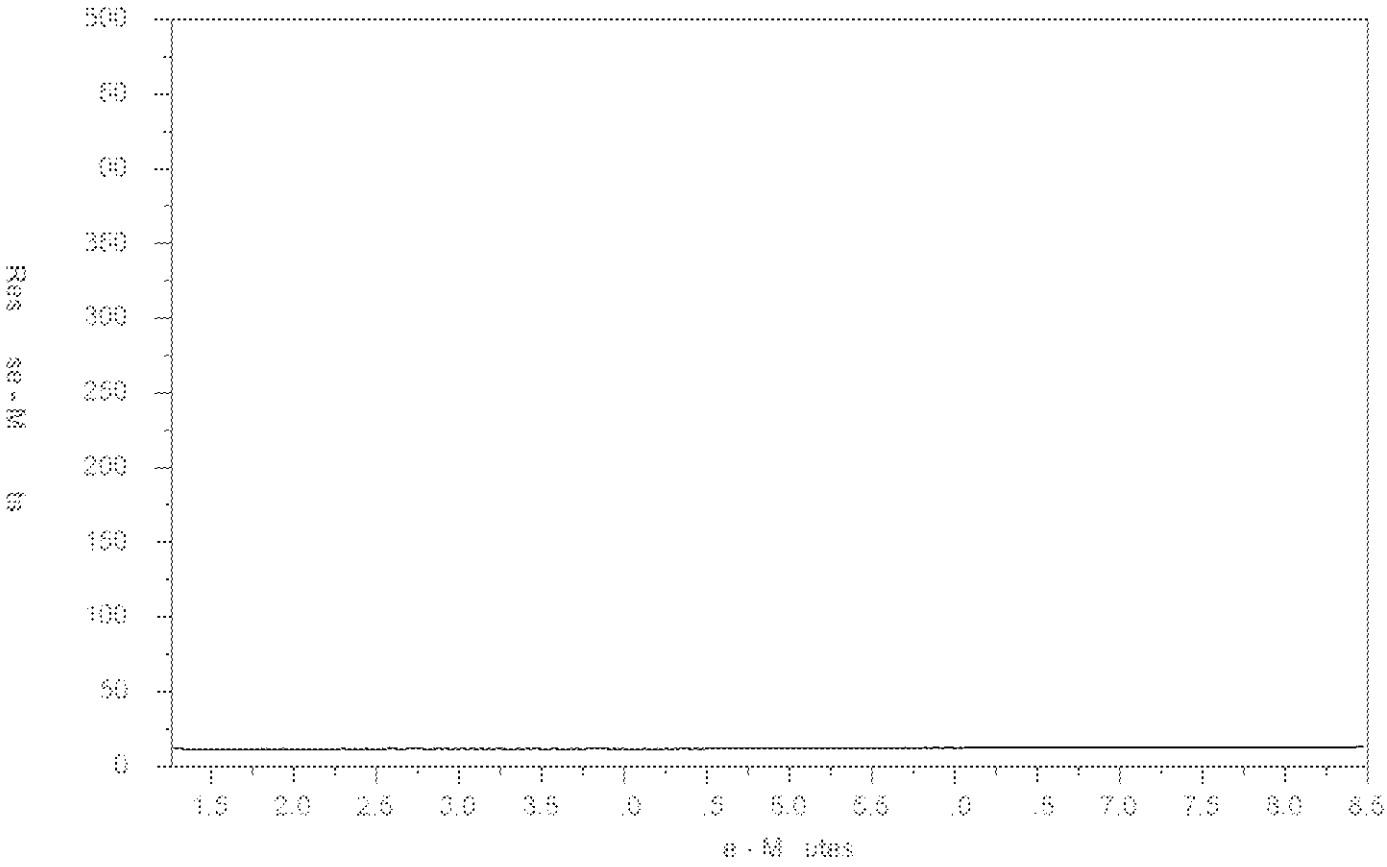
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-1
Client Sample ID: GW-45804-021016-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

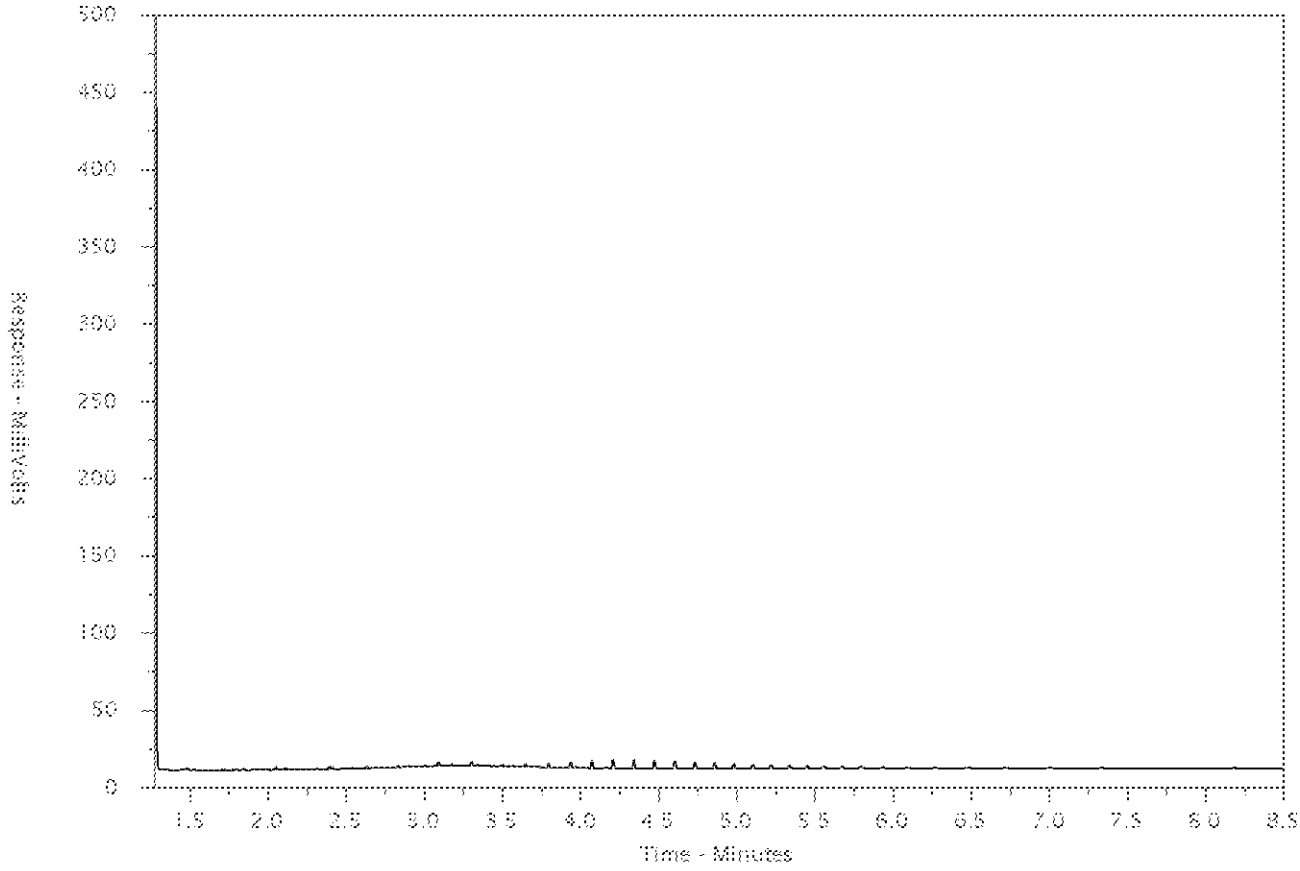
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-2
Client Sample ID: GW-45804-021016-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

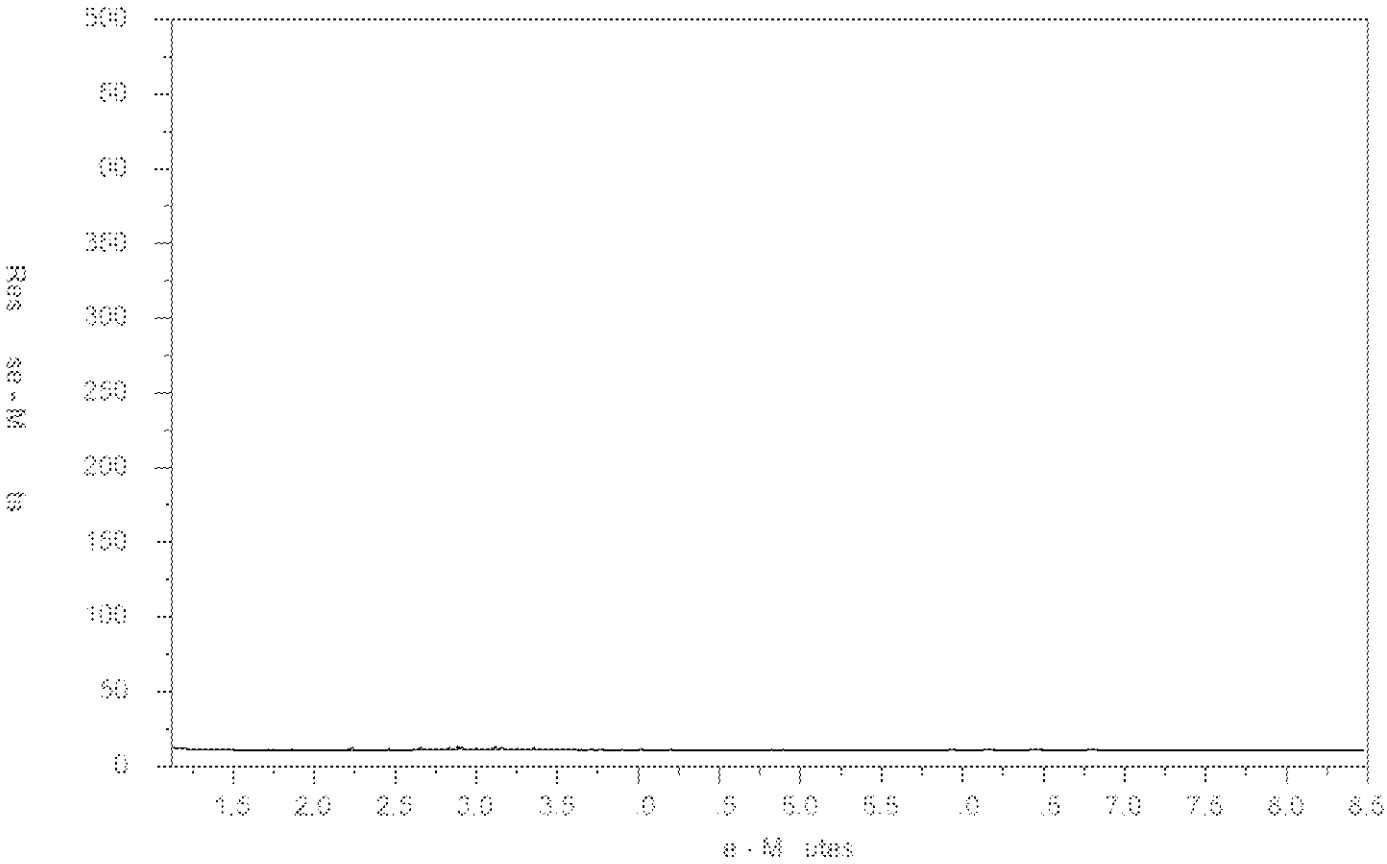
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-3
Client Sample ID: GW-45804-021016-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

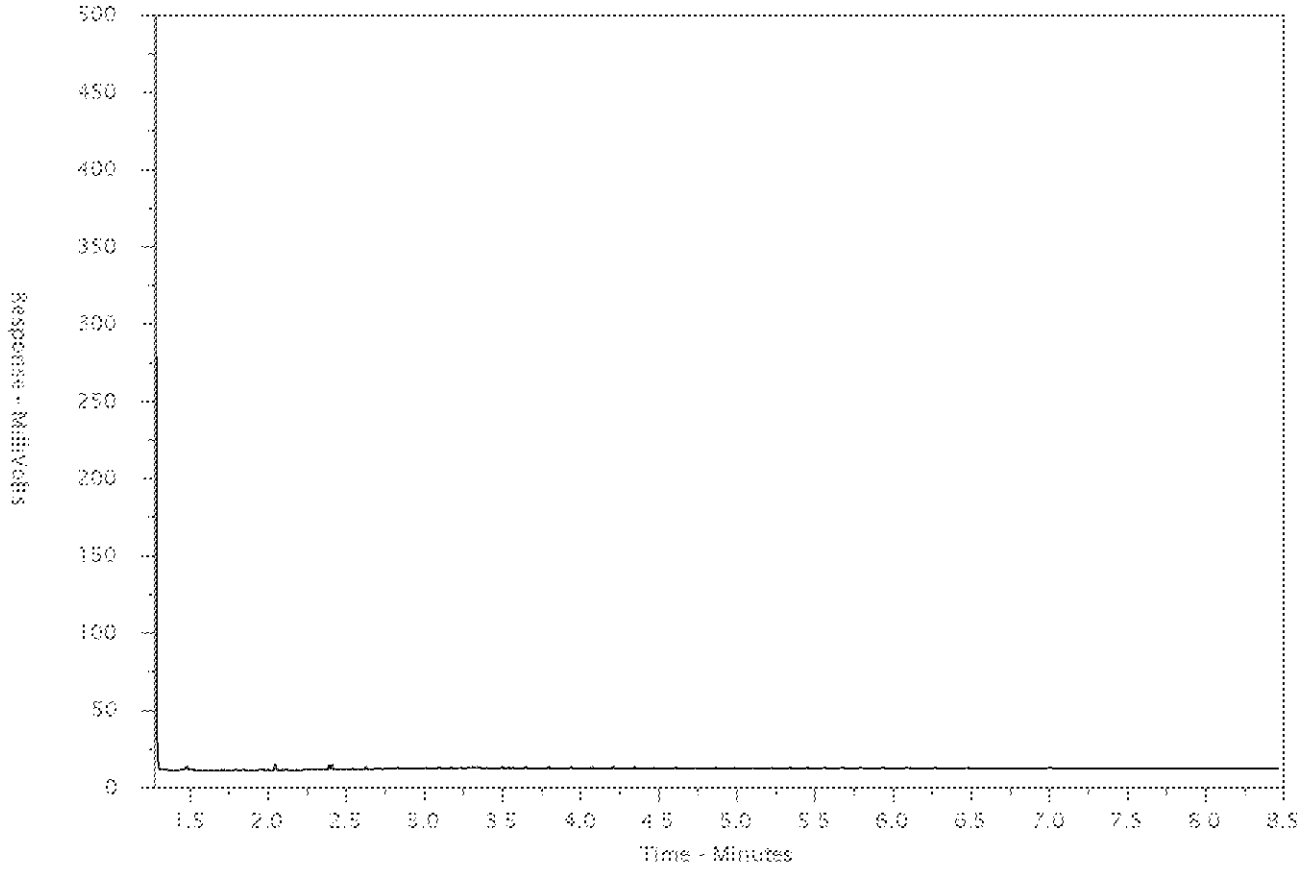
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-4
Client Sample ID: GW-45804-021016-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

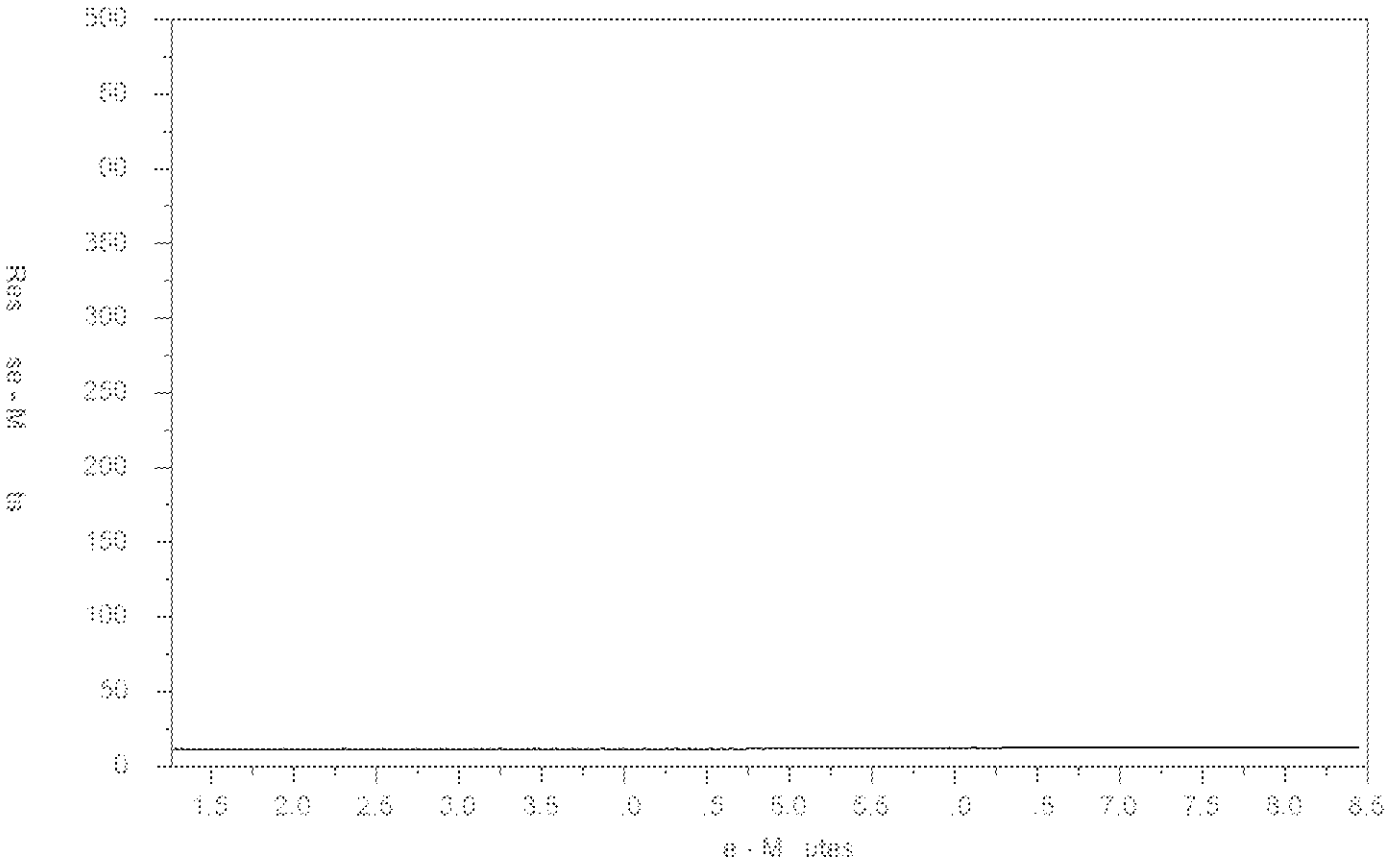
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-5
Client Sample ID: GW-45804-021016-TS-006



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

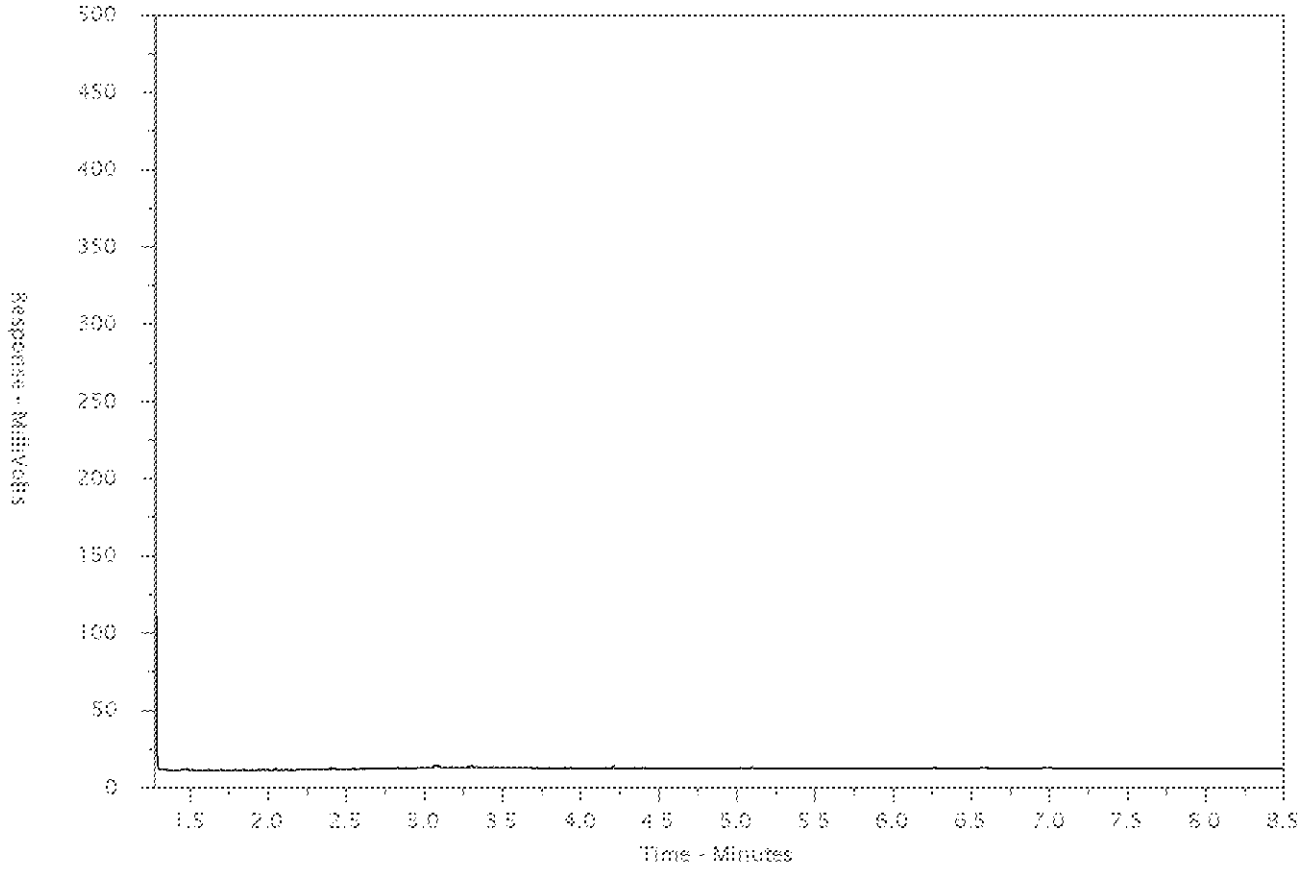
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-6
Client Sample ID: GW-45804-021016-TS-007



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
←Gasoline→		← Motor Oils/ Lube Oils/ Grease →	
←Diesel/ Jet Fuels→			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

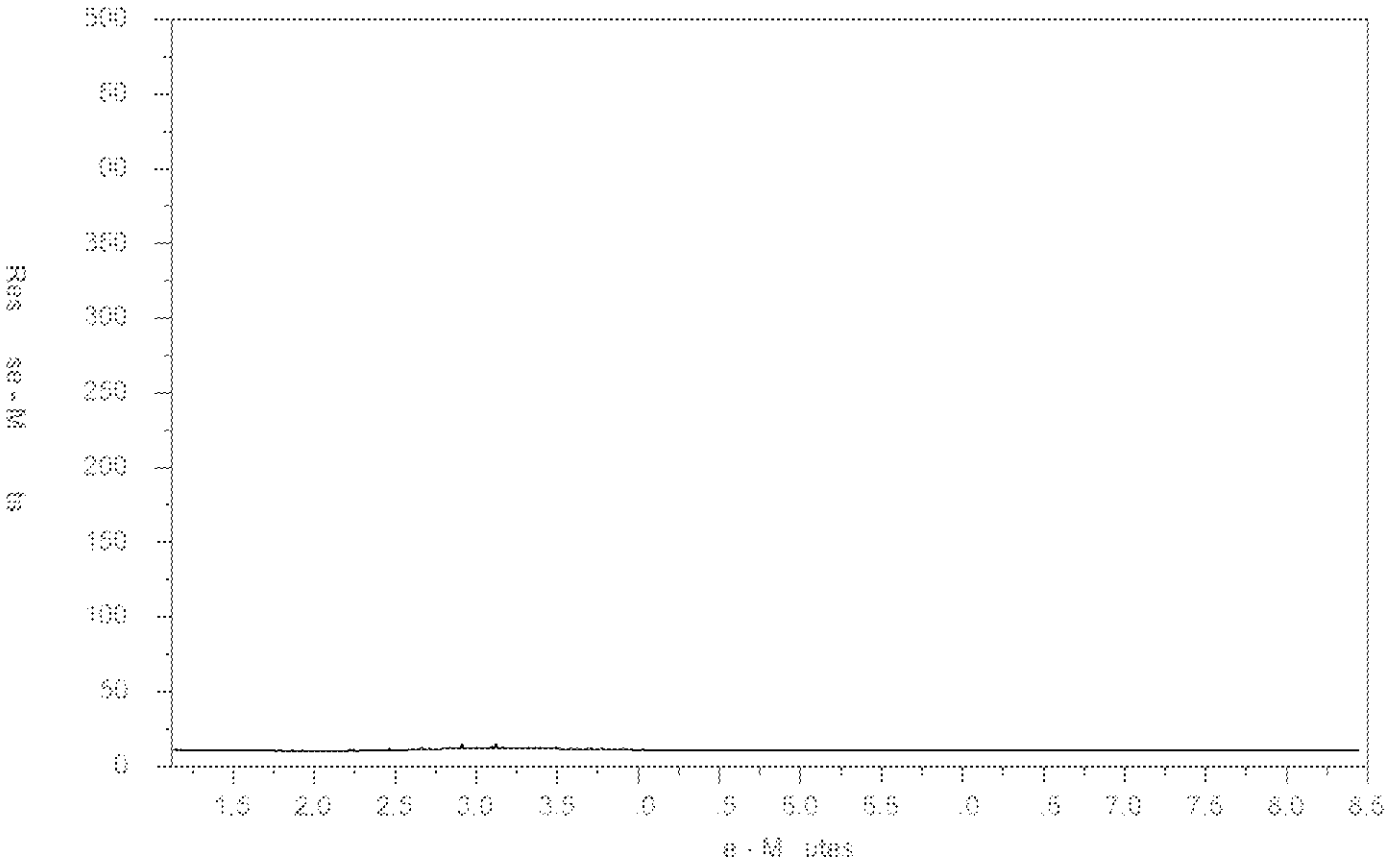
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-7
Client Sample ID: GW-45804-021016-TS-008



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

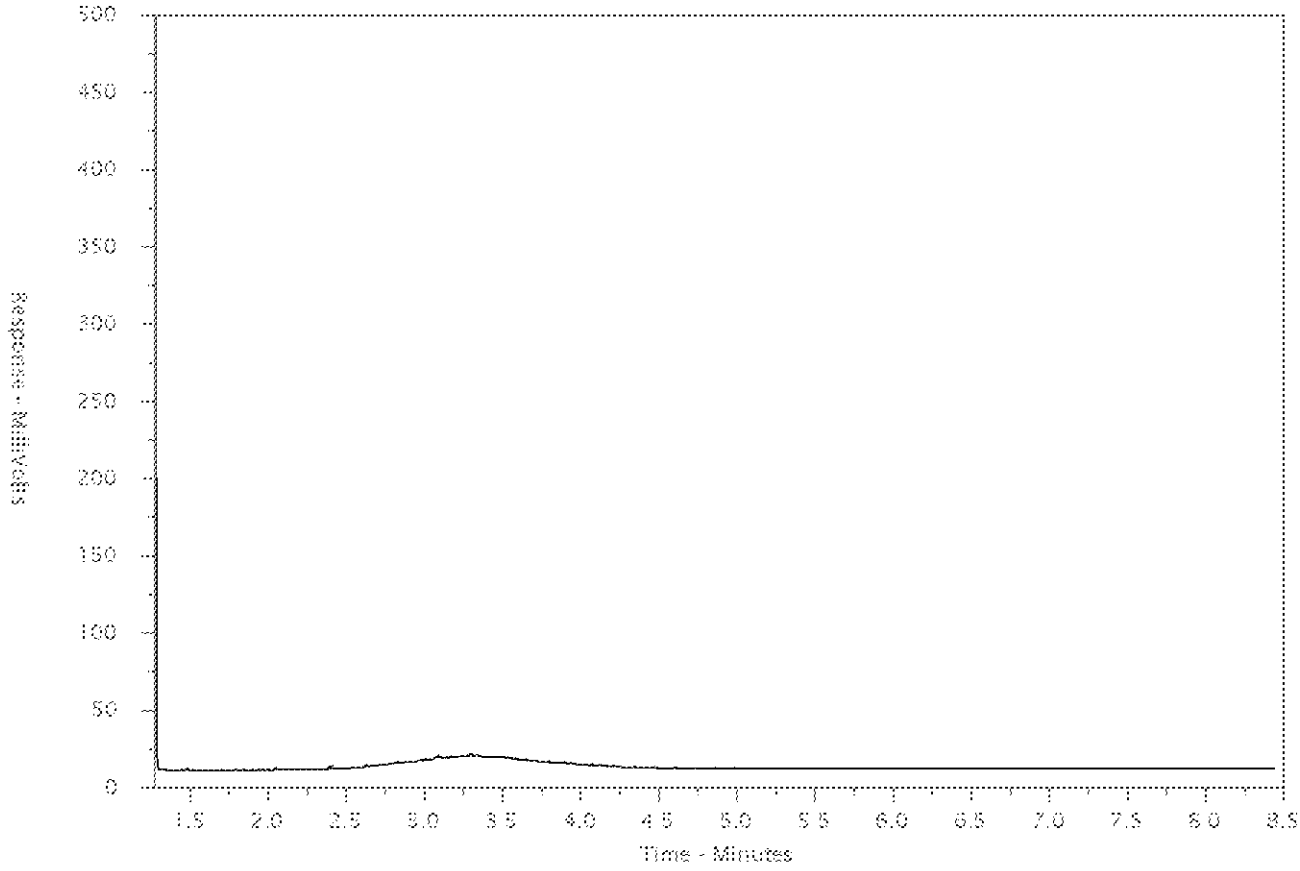
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-8
Client Sample ID: GW-45804-021016-TS-009



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

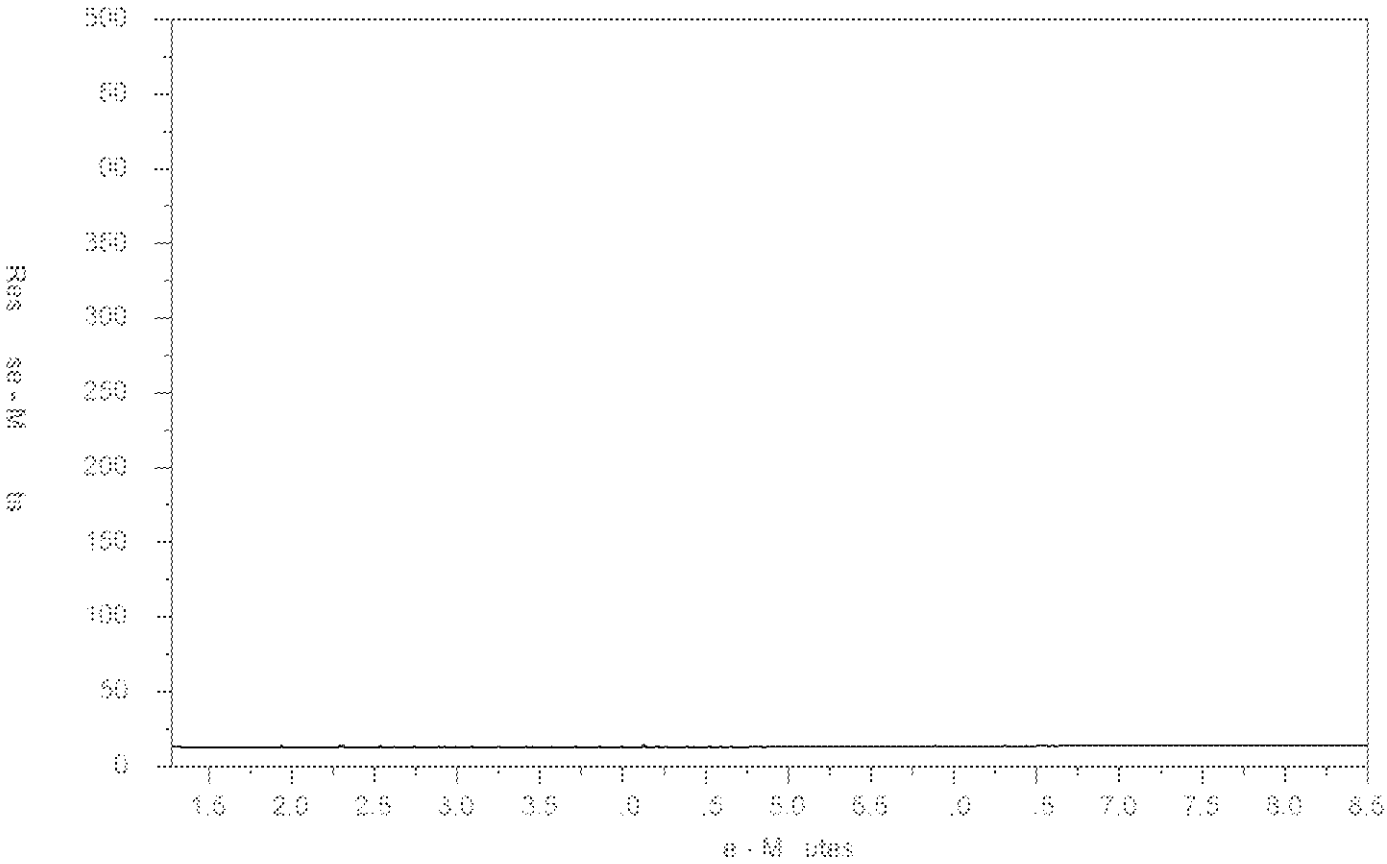
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1733803-9
Client Sample ID: GW-45804-021016-TS-010



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	75°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

C of C # XXXXX
PAGE _1__ OF _1__

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

L1733803-COFC

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED (13791)
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Reg 153/04; Table; TCLP ____ MISA ____ PWQO ____; OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL_X___ FAX_____
EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL_ben constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL_Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both__X__

ANALYSIS REQUEST — INDICATE BOTTLES FIELD FILTERED (⇦ PRESERVED (F/P))

SUBMISSION # L1733803
ENTERED BY: RH
DATE/TIME ENTERED: 12-Feb-16
BIN # 12A

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	TYPE: GRAB	MATRIX: WATER	MATRIX: SOIL	MATRIX: OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
16-02-10				X			GW-45804- 021016 -TS-001	15	X				1
				X			GW-45804- -TS-002	15	X				
16-02-10	1215			X			GW-45804- 021016 -TS-003	15	X	7.29	5.82		2
	1300			X			GW-45804- -TS-004	15	X	7.30	6.17		3
	1500			X			GW-45804- -TS-005	15	X	6.79	14.98		4
	1015			X			GW-45804- -TS-006	15	X	7.08	7.87		5
	1300			X			GW-45804- -TS-007	15	X	7.30	6.17		6
	1345			X			GW-45804- -TS-008	15	X	7.22	4.95		7
	1130			X			GW-45804- -TS-009	15	X	7.25	8.88		8
	1420			X			GW-45804- -TS-010	15	X	7.07	14.71		9

SPECIAL INSTRUCTIONS/COMMENTS
PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION: FROZEN; COLD ✓; COOLING INITIATED; AMBIENT — MEAN TEMP 9.6
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___ — INIT RH

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	Feb 10/16 1530		Feb/10/16 3:30
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
			12 Feb 16 @ 2:45 @ 1030

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs. RH
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

003417

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 16-MAY-16
Report Date: 25-MAY-16 07:12 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1769313
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-1 SW-45804-051616-TS-001 Sampled By: T. SAUNDERS on 16-MAY-16 @ 10:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.11		0.10	pH		17-MAY-16	R3459362
Temperature, Client	13.4		-50	Deg. C		17-MAY-16	R3459362
Physical Tests							
Color, Apparent	39.0		1.0	C.U.		17-MAY-16	R3460528
pH	8.24		0.10	pH units		17-MAY-16	R3460078
Total Suspended Solids	6.5		2.0	mg/L	20-MAY-16	21-MAY-16	R3462515
Total Dissolved Solids	760	DLDS	20	mg/L		18-MAY-16	R3462610
Turbidity	4.55		0.10	NTU		17-MAY-16	R3459431
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	194		10	mg/L		18-MAY-16	R3460560
Unionized ammonia	0.0075		0.0058	mg/L		18-MAY-16	
Ammonia, Total (as N)	0.026		0.020	mg/L		17-MAY-16	R3459966
Chloride (Cl)	96.6	DLDS	2.5	mg/L		18-MAY-16	R3461414
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-MAY-16	R3461414
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-MAY-16	R3461414
Total Kjeldahl Nitrogen	1.40		0.15	mg/L	18-MAY-16	18-MAY-16	R3460556
Phosphorus, Total	0.0627		0.0030	mg/L	18-MAY-16	18-MAY-16	R3460574
Sulfate (SO4)	290	DLDS	1.5	mg/L		18-MAY-16	R3461414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.6		1.0	mg/L		18-MAY-16	R3461753
Bacteriological Tests							
E. Coli	9		0	CFU/100mL	17-MAY-16	18-MAY-16	R3460530
Fecal Coliforms	40	DLM	10	CFU/100mL	17-MAY-16	18-MAY-16	R3460525
Total Coliforms	700	DLM	100	CFU/100mL	17-MAY-16	18-MAY-16	R3460522
Total Metals							
Arsenic (As)-Total	0.00057		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Boron (B)-Total	0.031		0.010	mg/L	17-MAY-16	17-MAY-16	R3459647
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-MAY-16	17-MAY-16	R3459647
Chromium (Cr)-Total	0.00067		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Cobalt (Co)-Total	0.00015		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Iron (Fe)-Total	0.059		0.050	mg/L	17-MAY-16	17-MAY-16	R3459647
Lead (Pb)-Total	<0.00010		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Manganese (Mn)-Total	0.0663		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAY-16	R3460185
Molybdenum (Mo)-Total	0.00765		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Nickel (Ni)-Total	0.0017		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-MAY-16	17-MAY-16	R3459647
Aggregate Organics							
BOD Carbonaceous	2.9		2.0	mg/L	17-MAY-16	22-MAY-16	R3463221
COD	61		10	mg/L		18-MAY-16	R3461740
Phenols (4AAP)	0.0022		0.0010	mg/L		18-MAY-16	R3460913

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-1 SW-45804-051616-TS-001 Sampled By: T. SAUNDERS on 16-MAY-16 @ 10:00 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-MAY-16	R3460191
F2 (C10-C16)	<100		100	ug/L	18-MAY-16	18-MAY-16	R3463438
F3 (C16-C34)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
F4 (C34-C50)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
Total Hydrocarbons (C6-C50)	<380		380	ug/L		24-MAY-16	
Chrom. to baseline at nC50	YES				18-MAY-16	18-MAY-16	R3463438
Surrogate: 2-Bromobenzotrifluoride	83.1		60-140	%	18-MAY-16	18-MAY-16	R3463438
Surrogate: 3,4-Dichlorotoluene	95.9		60-140	%		17-MAY-16	R3460191
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	21-MAY-16	R3460418
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	21-MAY-16	R3460418
Surrogate: d10-Acenaphthene	78.9		60-140	%	18-MAY-16	21-MAY-16	R3460418
Surrogate: d9-Acridine (SS)	64.4		60-140	%	18-MAY-16	21-MAY-16	R3460418
Surrogate: d12-Chrysene	83.0		60-140	%	18-MAY-16	21-MAY-16	R3460418
Surrogate: d8-Naphthalene	71.9		60-140	%	18-MAY-16	21-MAY-16	R3460418
Surrogate: d10-Phenanthrene	84.9		60-140	%	18-MAY-16	21-MAY-16	R3460418
L1769313-2 SW-45804-051616-TS-002 Sampled By: T. SAUNDERS on 16-MAY-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.62		0.10	pH		17-MAY-16	R3459362
Temperature, Client	12.5		-50	Deg. C		17-MAY-16	R3459362
Physical Tests							
Color, Apparent	5.9		1.0	C.U.		17-MAY-16	R3460528
pH	8.08		0.10	pH units		17-MAY-16	R3460078
Total Suspended Solids	2.4		2.0	mg/L	20-MAY-16	21-MAY-16	R3462515
Total Dissolved Solids	1430	DLDS	20	mg/L		18-MAY-16	R3462610
Turbidity	0.93		0.10	NTU		17-MAY-16	R3459431
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	213		10	mg/L		18-MAY-16	R3460560
Unionized ammonia	0.0029		0.0021	mg/L		18-MAY-16	
Ammonia, Total (as N)	0.028		0.020	mg/L		17-MAY-16	R3459966
Chloride (Cl)	177	DLDS	2.5	mg/L		18-MAY-16	R3461414
Nitrate (as N)	1.85	DLDS	0.10	mg/L		18-MAY-16	R3461414
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-MAY-16	R3461414
Total Kjeldahl Nitrogen	0.51		0.15	mg/L	18-MAY-16	18-MAY-16	R3460556
Phosphorus, Total	0.0070		0.0030	mg/L	18-MAY-16	18-MAY-16	R3460574
Sulfate (SO4)	684	DLDS	1.5	mg/L		18-MAY-16	R3461414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.9		1.0	mg/L		18-MAY-16	R3461753
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-2 SW-45804-051616-TS-002 Sampled By: T. SAUNDERS on 16-MAY-16 @ 10:30 Matrix: WATER							
Bacteriological Tests							
E. Coli	4		0	CFU/100mL	17-MAY-16	18-MAY-16	R3460530
Fecal Coliforms	30	DLM	10	CFU/100mL	17-MAY-16	18-MAY-16	R3460525
Total Coliforms	800	DLM	100	CFU/100mL	17-MAY-16	18-MAY-16	R3460522
Total Metals							
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	17-MAY-16	17-MAY-16	R3459647
Cadmium (Cd)-Total	<0.00010	DLHC	0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	17-MAY-16	17-MAY-16	R3459647
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	17-MAY-16	17-MAY-16	R3459647
Iron (Fe)-Total	<0.50	DLHC	0.50	mg/L	17-MAY-16	17-MAY-16	R3459647
Lead (Pb)-Total	<0.0010	DLHC	0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Manganese (Mn)-Total	0.0273	DLHC	0.0050	mg/L	17-MAY-16	17-MAY-16	R3459647
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAY-16	R3460185
Molybdenum (Mo)-Total	0.230	DLHC	0.00050	mg/L	17-MAY-16	18-MAY-16	R3459647
Nickel (Ni)-Total	0.0071	DLHC	0.0050	mg/L	17-MAY-16	17-MAY-16	R3459647
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	17-MAY-16	17-MAY-16	R3459647
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-MAY-16	22-MAY-16	R3463221
COD	19		10	mg/L		18-MAY-16	R3461740
Phenols (4AAP)	0.0017		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-MAY-16	R3460191
F2 (C10-C16)	<100		100	ug/L	18-MAY-16	20-MAY-16	R3463438
F3 (C16-C34)	<250		250	ug/L	18-MAY-16	20-MAY-16	R3463438
F4 (C34-C50)	<250		250	ug/L	18-MAY-16	20-MAY-16	R3463438
Total Hydrocarbons (C6-C50)	<380		380	ug/L		24-MAY-16	
Chrom. to baseline at nC50	YES				18-MAY-16	20-MAY-16	R3463438
Surrogate: 2-Bromobenzotrifluoride	97.0		60-140	%	18-MAY-16	20-MAY-16	R3463438
Surrogate: 3,4-Dichlorotoluene	98.1		60-140	%		18-MAY-16	R3460191
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	24-MAY-16	R3460418
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Acenaphthene	110.5		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d9-Acridine (SS)	79.5		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d12-Chrysene	105.4		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d8-Naphthalene	92.5		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Phenanthrene	105.3		60-140	%	18-MAY-16	24-MAY-16	R3460418
L1769313-3 SW-45804-051616-TS-003 Sampled By: T. SAUNDERS on 16-MAY-16 @ 11:00 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-3 SW-45804-051616-TS-003 Sampled By: T. SAUNDERS on 16-MAY-16 @ 11:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.19		0.10	pH		17-MAY-16	R3459362
Temperature, Client	10.9		-50	Deg. C		17-MAY-16	R3459362
Physical Tests							
Color, Apparent	33.0		1.0	C.U.		17-MAY-16	R3460528
pH	8.32		0.10	pH units		17-MAY-16	R3460078
Total Suspended Solids	19.0		2.0	mg/L	20-MAY-16	21-MAY-16	R3462515
Total Dissolved Solids	683	DLDS	20	mg/L		18-MAY-16	R3462610
Turbidity	5.50		0.10	NTU		17-MAY-16	R3459431
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	217		10	mg/L		18-MAY-16	R3460560
Unionized ammonia	0.0170		0.0057	mg/L		18-MAY-16	
Ammonia, Total (as N)	0.059		0.020	mg/L		17-MAY-16	R3459966
Chloride (Cl)	145	DLDS	2.5	mg/L		18-MAY-16	R3461414
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-MAY-16	R3461414
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-MAY-16	R3461414
Total Kjeldahl Nitrogen	0.52		0.15	mg/L	18-MAY-16	18-MAY-16	R3460556
Phosphorus, Total	0.301		0.0030	mg/L	18-MAY-16	18-MAY-16	R3460574
Sulfate (SO4)	180	DLDS	1.5	mg/L		18-MAY-16	R3461414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.8		1.0	mg/L		18-MAY-16	R3461753
Bacteriological Tests							
E. Coli	28		0	CFU/100mL	17-MAY-16	18-MAY-16	R3460530
Fecal Coliforms	80	DLM	10	CFU/100mL	17-MAY-16	18-MAY-16	R3460525
Total Coliforms	1200	DLM	100	CFU/100mL	17-MAY-16	18-MAY-16	R3460522
Total Metals							
Arsenic (As)-Total	0.00042		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Boron (B)-Total	0.026		0.010	mg/L	17-MAY-16	17-MAY-16	R3459647
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-MAY-16	17-MAY-16	R3459647
Chromium (Cr)-Total	0.00097		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Cobalt (Co)-Total	0.00035		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Iron (Fe)-Total	0.444		0.050	mg/L	17-MAY-16	17-MAY-16	R3459647
Lead (Pb)-Total	0.00018		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Manganese (Mn)-Total	0.161		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAY-16	R3460185
Molybdenum (Mo)-Total	0.00719		0.00050	mg/L	17-MAY-16	18-MAY-16	R3459647
Nickel (Ni)-Total	0.0022		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-MAY-16	17-MAY-16	R3459647
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-MAY-16	22-MAY-16	R3463221
COD	30		10	mg/L		18-MAY-16	R3461740
Phenols (4AAP)	0.0018		0.0010	mg/L		18-MAY-16	R3460913

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-3 SW-45804-051616-TS-003 Sampled By: T. SAUNDERS on 16-MAY-16 @ 11:00 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-MAY-16	R3460191
F2 (C10-C16)	<100		100	ug/L	18-MAY-16	18-MAY-16	R3463438
F3 (C16-C34)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
F4 (C34-C50)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
Total Hydrocarbons (C6-C50)	<380		380	ug/L		24-MAY-16	
Chrom. to baseline at nC50	YES				18-MAY-16	18-MAY-16	R3463438
Surrogate: 2-Bromobenzotrifluoride	106.9		60-140	%	18-MAY-16	18-MAY-16	R3463438
Surrogate: 3,4-Dichlorotoluene	101.5		60-140	%		18-MAY-16	R3460191
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	24-MAY-16	R3460418
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Acenaphthene	101.4		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d9-Acridine (SS)	70.2		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d12-Chrysene	121.1		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d8-Naphthalene	78.5		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Phenanthrene	87.8		60-140	%	18-MAY-16	24-MAY-16	R3460418
L1769313-4 SW-45804-051616-TS-004 Sampled By: T. SAUNDERS on 16-MAY-16 @ 12:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.65		0.10	pH		17-MAY-16	R3459362
Temperature, Client	11.3		-50	Deg. C		17-MAY-16	R3459362
Physical Tests							
Color, Apparent	31.2		1.0	C.U.		17-MAY-16	R3460528
pH	8.34		0.10	pH units		17-MAY-16	R3460078
Total Suspended Solids	6.4		2.0	mg/L	20-MAY-16	21-MAY-16	R3462515
Total Dissolved Solids	791	DLDS	20	mg/L		18-MAY-16	R3462618
Turbidity	4.81		0.10	NTU		17-MAY-16	R3459431
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	225		10	mg/L		18-MAY-16	R3460560
Unionized ammonia	<0.012		0.012	mg/L		18-MAY-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		17-MAY-16	R3459966
Chloride (Cl)	160	DLDS	2.5	mg/L		18-MAY-16	R3461414
Nitrate (as N)	0.29	DLDS	0.10	mg/L		18-MAY-16	R3461414
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-MAY-16	R3461414
Total Kjeldahl Nitrogen	0.54		0.15	mg/L	18-MAY-16	18-MAY-16	R3460556
Phosphorus, Total	0.0219		0.0030	mg/L	18-MAY-16	18-MAY-16	R3460574
Sulfate (SO4)	247	DLDS	1.5	mg/L		18-MAY-16	R3461414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.7		1.0	mg/L		18-MAY-16	R3461753
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-4 SW-45804-051616-TS-004 Sampled By: T. SAUNDERS on 16-MAY-16 @ 12:00 Matrix: WATER							
Bacteriological Tests							
E. Coli	26		0	CFU/100mL	17-MAY-16	18-MAY-16	R3460530
Fecal Coliforms	70	DLM	10	CFU/100mL	17-MAY-16	18-MAY-16	R3460525
Total Coliforms	1200	DLM	100	CFU/100mL	17-MAY-16	18-MAY-16	R3460522
Total Metals							
Arsenic (As)-Total	0.00043		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Boron (B)-Total	0.032		0.010	mg/L	17-MAY-16	17-MAY-16	R3459647
Cadmium (Cd)-Total	0.000013		0.000010	mg/L	17-MAY-16	17-MAY-16	R3459647
Chromium (Cr)-Total	0.00069		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Cobalt (Co)-Total	0.00035		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Iron (Fe)-Total	0.280		0.050	mg/L	17-MAY-16	17-MAY-16	R3459647
Lead (Pb)-Total	0.00017		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Manganese (Mn)-Total	0.157		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAY-16	R3460185
Molybdenum (Mo)-Total	0.0247		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Nickel (Ni)-Total	0.0031		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-MAY-16	17-MAY-16	R3459647
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-MAY-16	22-MAY-16	R3463221
COD	23		10	mg/L		18-MAY-16	R3461740
Phenols (4AAP)	0.0023		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-MAY-16	R3460191
F2 (C10-C16)	<100		100	ug/L	18-MAY-16	20-MAY-16	R3463438
F3 (C16-C34)	<250		250	ug/L	18-MAY-16	20-MAY-16	R3463438
F4 (C34-C50)	<250		250	ug/L	18-MAY-16	20-MAY-16	R3463438
Total Hydrocarbons (C6-C50)	<380		380	ug/L		24-MAY-16	
Chrom. to baseline at nC50	YES				18-MAY-16	20-MAY-16	R3463438
Surrogate: 2-Bromobenzotrifluoride	98.4		60-140	%	18-MAY-16	20-MAY-16	R3463438
Surrogate: 3,4-Dichlorotoluene	94.1		60-140	%		18-MAY-16	R3460191
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	24-MAY-16	R3460418
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Acenaphthene	88.2		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d9-Acridine (SS)	91.2		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d12-Chrysene	107.7		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d8-Naphthalene	81.4		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Phenanthrene	122.0		60-140	%	18-MAY-16	24-MAY-16	R3460418
L1769313-5 SW-45804-051616-TS-005 Sampled By: T. SAUNDERS on 16-MAY-16 @ 12:00 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-5 SW-45804-051616-TS-005 Sampled By: T. SAUNDERS on 16-MAY-16 @ 12:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.65		0.10	pH		17-MAY-16	R3459362
Temperature, Client	11.3		-50	Deg. C		17-MAY-16	R3459362
Physical Tests							
Color, Apparent	30.9		1.0	C.U.		17-MAY-16	R3460528
pH	8.34		0.10	pH units		17-MAY-16	R3460078
Total Suspended Solids	7.4		2.0	mg/L	20-MAY-16	21-MAY-16	R3462515
Total Dissolved Solids	805	DLDS	20	mg/L		18-MAY-16	R3462618
Turbidity	4.23		0.10	NTU		17-MAY-16	R3459431
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	230		10	mg/L		18-MAY-16	R3460560
Unionized ammonia	<0.012		0.012	mg/L		18-MAY-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		17-MAY-16	R3459966
Chloride (Cl)	153	DLDS	2.5	mg/L		18-MAY-16	R3461414
Nitrate (as N)	0.27	DLDS	0.10	mg/L		18-MAY-16	R3461414
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-MAY-16	R3461414
Total Kjeldahl Nitrogen	0.54		0.15	mg/L	18-MAY-16	18-MAY-16	R3460556
Phosphorus, Total	0.0214		0.0030	mg/L	18-MAY-16	18-MAY-16	R3460574
Sulfate (SO4)	237	DLDS	1.5	mg/L		18-MAY-16	R3461414
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.9		1.0	mg/L		18-MAY-16	R3461753
Bacteriological Tests							
E. Coli	21		0	CFU/100mL	17-MAY-16	18-MAY-16	R3460530
Fecal Coliforms	80	DLM	10	CFU/100mL	17-MAY-16	18-MAY-16	R3460525
Total Coliforms	1400	DLM	100	CFU/100mL	17-MAY-16	18-MAY-16	R3460522
Total Metals							
Arsenic (As)-Total	0.00038		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Boron (B)-Total	0.031		0.010	mg/L	17-MAY-16	17-MAY-16	R3459647
Cadmium (Cd)-Total	0.000012		0.000010	mg/L	17-MAY-16	17-MAY-16	R3459647
Chromium (Cr)-Total	0.00071		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Cobalt (Co)-Total	0.00035		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Iron (Fe)-Total	0.272		0.050	mg/L	17-MAY-16	17-MAY-16	R3459647
Lead (Pb)-Total	0.00016		0.00010	mg/L	17-MAY-16	17-MAY-16	R3459647
Manganese (Mn)-Total	0.154		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAY-16	R3460185
Molybdenum (Mo)-Total	0.0234		0.00050	mg/L	17-MAY-16	17-MAY-16	R3459647
Nickel (Ni)-Total	0.0030		0.0010	mg/L	17-MAY-16	17-MAY-16	R3459647
Zinc (Zn)-Total	0.0033		0.0030	mg/L	17-MAY-16	17-MAY-16	R3459647
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-MAY-16	22-MAY-16	R3463221
COD	23		10	mg/L		18-MAY-16	R3461740
Phenols (4AAP)	0.0020		0.0010	mg/L		18-MAY-16	R3460913

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1769313-5 SW-45804-051616-TS-005 Sampled By: T. SAUNDERS on 16-MAY-16 @ 12:00 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-MAY-16	R3460191
F2 (C10-C16)	<100		100	ug/L	18-MAY-16	18-MAY-16	R3463438
F3 (C16-C34)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
F4 (C34-C50)	<250		250	ug/L	18-MAY-16	18-MAY-16	R3463438
Total Hydrocarbons (C6-C50)	<380		380	ug/L		24-MAY-16	
Chrom. to baseline at nC50	YES				18-MAY-16	18-MAY-16	R3463438
Surrogate: 2-Bromobenzotrifluoride	103.2		60-140	%	18-MAY-16	18-MAY-16	R3463438
Surrogate: 3,4-Dichlorotoluene	98.4		60-140	%		18-MAY-16	R3460191
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	24-MAY-16	R3460418
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Acenaphthene	77.1		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d9-Acridine (SS)	86.2		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d12-Chrysene	102.4		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d8-Naphthalene	89.0		60-140	%	18-MAY-16	24-MAY-16	R3460418
Surrogate: d10-Phenanthrene	67.2		60-140	%	18-MAY-16	24-MAY-16	R3460418

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Chloride (Cl)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Nitrate (as N)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Sulfate (SO4)	DLDS	L1769313-1, -2, -3, -4, -5
Duplicate	Total Suspended Solids	DLHC	L1769313-1, -2, -3, -4, -5
Matrix Spike	Boron (B)-Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Zinc (Zn)-Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Phosphorus, Total	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Nitrate (as N)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Nitrate (as N)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	Sulfate (SO4)	MS-B	L1769313-1, -2, -3, -4, -5
Matrix Spike	COD	MS-B	L1769313-1, -2, -3, -4, -5

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Reference Information

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-MS-WT Water Total Metals in Water by ICPMS EPA 200.8
This analysis involves preliminary sample treatment by hotblock acid digestion (APHA 3030E). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P B E

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

Reference Information

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3460560								
WG2311187-11 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			102.0		%		80-120	18-MAY-16
WG2311187-15 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			86.5		%		80-120	18-MAY-16
WG2311187-12 DUP		**L1769295-6**						
Alkalinity, Total (as CaCO3)		178	183		mg/L	2.9	20	18-MAY-16
WG2311187-16 DUP		**L1769313-5**						
Alkalinity, Total (as CaCO3)		230	226		mg/L	1.7	20	18-MAY-16
WG2311187-10 LCS								
Alkalinity, Total (as CaCO3)			99.3		%		85-115	18-MAY-16
WG2311187-14 LCS								
Alkalinity, Total (as CaCO3)			105.8		%		85-115	18-MAY-16
WG2311187-13 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-MAY-16
WG2311187-9 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-MAY-16
BOD-C-WT	Water							
Batch R3463221								
WG2310040-2 DUP		**L1769177-1**						
BOD Carbonaceous		3.7	3.7		mg/L	0.5	20	22-MAY-16
WG2310040-3 LCS								
BOD Carbonaceous			94.9		%		85-115	22-MAY-16
WG2310040-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-MAY-16
C-DIS-ORG-WT	Water							
Batch R3461753								
WG2311208-3 DUP		**L1768554-1**						
Dissolved Organic Carbon		7.3	6.5		mg/L	13	20	18-MAY-16
WG2311208-2 LCS								
Dissolved Organic Carbon			98.5		%		80-120	18-MAY-16
WG2311208-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	18-MAY-16
WG2311208-4 MS		**L1768554-1**						
Dissolved Organic Carbon			86.1		%		70-130	18-MAY-16
CL-IC-WT	Water							

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Chloride (Cl)		11.3	11.3		mg/L	0.2	25	18-MAY-16
WG2310495-7 LCS								
Chloride (Cl)			99.1		%		70-130	18-MAY-16
WG2310495-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Chloride (Cl)			98.4		%		70-130	18-MAY-16
COD-T-WT	Water							
Batch R3461740								
WG2311255-7 DUP		**L1768717-1**						
COD		203	207		mg/L	2.1	25	18-MAY-16
WG2311255-6 LCS								
COD			101.2		%		70-130	18-MAY-16
WG2311255-5 MB								
COD			<10		mg/L		10	18-MAY-16
WG2311255-8 MS		**L1768717-1**						
COD			N/A	MS-B	%		-	18-MAY-16
COLOUR-WT	Water							
Batch R3460528								
WG2310240-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			94.7		%		80-120	17-MAY-16
WG2310240-4 DUP		**L1769045-1**						
Color, Apparent		<1.0	<1.0	RPD-NA	C.U.	N/A	20	17-MAY-16
WG2310240-1 MB								
Color, Apparent			<1.0		C.U.		1	17-MAY-16
EC-MF-WT	Water							
Batch R3460530								
WG2309866-2 DUP		**WG2309866-4**						
E. Coli		12000	10000		CFU/100mL	18	65	18-MAY-16
WG2309866-1 MB								
E. Coli			0		CFU/100mL		1	18-MAY-16
F1-HS-WT	Water							
Batch R3460191								
WG2307328-4 DUP		**WG2307328-3**						
F1 (C6-C10)		<100	100	RPD-NA	ug/L	N/A	50	18-MAY-16
WG2307328-1 LCS								

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3460191								
WG2307328-1 LCS								
F1 (C6-C10)			94.1		%		80-120	17-MAY-16
WG2307328-2 MB								
F1 (C6-C10)			<100		ug/L		100	17-MAY-16
Surrogate: 3,4-Dichlorotoluene			101.5		%		60-140	17-MAY-16
F2-F4-WT	Water							
Batch R3463438								
WG2310329-2 LCS								
F2 (C10-C16)			88.6		%		65-135	18-MAY-16
F3 (C16-C34)			92.1		%		65-135	18-MAY-16
F4 (C34-C50)			85.8		%		65-135	18-MAY-16
WG2310329-3 LCSD		**WG2310329-2**						
F2 (C10-C16)		88.6	87.7		%	1.0	50	18-MAY-16
F3 (C16-C34)		92.1	93.9		%	1.9	50	18-MAY-16
F4 (C34-C50)		85.8	84.6		%	1.5	50	18-MAY-16
WG2310329-1 MB								
F2 (C10-C16)			<100		ug/L		100	18-MAY-16
F3 (C16-C34)			<250		ug/L		250	18-MAY-16
F4 (C34-C50)			<250		ug/L		250	18-MAY-16
Surrogate: 2-Bromobenzotrifluoride			103.7		%		60-140	18-MAY-16
FC-MF-WT	Water							
Batch R3460525								
WG2309871-2 DUP		**WG2309871-4**						
Fecal Coliforms		30	20		CFU/100mL	40	65	18-MAY-16
WG2309871-1 MB								
Fecal Coliforms			0		CFU/100mL		1	18-MAY-16
HG-T-CVAA-WT	Water							
Batch R3460185								
WG2310437-4 DUP		**WG2310437-3**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310437-2 LCS								
Mercury (Hg)-Total			109.0		%		80-120	18-MAY-16
WG2310437-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	18-MAY-16
WG2310437-6 MS		**WG2310437-5**						
Mercury (Hg)-Total			103.0		%		70-130	18-MAY-16

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3459647								
WG2310236-4 DUP		**WG2310236-3**						
Arsenic (As)-Total		0.00014	0.00013		mg/L	6.1	20	17-MAY-16
Boron (B)-Total		0.116	0.112		mg/L	3.5	20	17-MAY-16
Cadmium (Cd)-Total		0.000061	0.000063		mg/L	2.4	20	17-MAY-16
Chromium (Cr)-Total		0.00132	0.00135		mg/L	2.1	20	17-MAY-16
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-MAY-16
Copper (Cu)-Total		0.0075	0.0073		mg/L	2.8	20	17-MAY-16
Iron (Fe)-Total		<0.050	<0.050	RPD-NA	mg/L	N/A	20	17-MAY-16
Lead (Pb)-Total		0.00062	0.00061		mg/L	1.4	20	17-MAY-16
Manganese (Mn)-Total		0.00346	0.00336		mg/L	2.8	20	17-MAY-16
Molybdenum (Mo)-Total		0.000340	0.000324		mg/L	4.7	20	17-MAY-16
Nickel (Ni)-Total		0.00225	0.00228		mg/L	1.2	20	17-MAY-16
Zinc (Zn)-Total		0.119	0.116		mg/L	2.5	20	17-MAY-16
WG2310236-2 LCS								
Arsenic (As)-Total			101.9		%		80-120	17-MAY-16
Boron (B)-Total			87.8		%		80-120	17-MAY-16
Cadmium (Cd)-Total			99.4		%		80-120	17-MAY-16
Chromium (Cr)-Total			100.7		%		80-120	17-MAY-16
Cobalt (Co)-Total			100.5		%		80-120	17-MAY-16
Copper (Cu)-Total			99.2		%		80-120	17-MAY-16
Iron (Fe)-Total			94.7		%		80-120	17-MAY-16
Lead (Pb)-Total			101.3		%		80-120	17-MAY-16
Manganese (Mn)-Total			103.1		%		80-120	17-MAY-16
Molybdenum (Mo)-Total			105.4		%		80-120	17-MAY-16
Nickel (Ni)-Total			99.1		%		80-120	17-MAY-16
Zinc (Zn)-Total			95.1		%		80-120	17-MAY-16
WG2310236-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Boron (B)-Total			<0.010		mg/L		0.01	17-MAY-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	17-MAY-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	17-MAY-16
Iron (Fe)-Total			<0.050		mg/L		0.05	17-MAY-16
Lead (Pb)-Total			<0.00010				0.0001	

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-MS-WT	Water							
Batch R3459647								
WG2310236-1 MB								
Lead (Pb)-Total			<0.00010		mg/L		0.0001	17-MAY-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	17-MAY-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-MAY-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-MAY-16
WG2310236-5 MS		**WG2310236-3**						
Arsenic (As)-Total			97.6		%		70-130	17-MAY-16
Boron (B)-Total			N/A	MS-B	%		-	17-MAY-16
Cadmium (Cd)-Total			92.5		%		70-130	17-MAY-16
Chromium (Cr)-Total			90.6		%		70-130	18-MAY-16
Cobalt (Co)-Total			93.0		%		70-130	17-MAY-16
Copper (Cu)-Total			87.8		%		70-130	17-MAY-16
Iron (Fe)-Total			119.4		%		70-130	18-MAY-16
Lead (Pb)-Total			94.8		%		70-130	17-MAY-16
Manganese (Mn)-Total			112.5		%		70-130	17-MAY-16
Molybdenum (Mo)-Total			102.4		%		70-130	17-MAY-16
Nickel (Ni)-Total			90.7		%		70-130	17-MAY-16
Zinc (Zn)-Total			N/A	MS-B	%		-	17-MAY-16
NH3-WT	Water							
Batch R3459966								
WG2309656-39 DUP		**L1769313-1**						
Ammonia, Total (as N)		0.026	<0.020	RPD-NA	mg/L	N/A	20	17-MAY-16
WG2309656-38 LCS								
Ammonia, Total (as N)			107.2		%		85-115	17-MAY-16
WG2309656-37 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	17-MAY-16
WG2309656-40 MS		**L1769313-1**						
Ammonia, Total (as N)			101.6		%		75-125	17-MAY-16
NO2-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-MAY-16
WG2310495-7 LCS								
Nitrite (as N)			99.4		%		70-130	18-MAY-16
WG2310495-6 MB								

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3461414								
WG2310495-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Nitrite (as N)			99.9		%		70-130	18-MAY-16
NO3-IC-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Nitrate (as N)		0.063	0.063		mg/L	0.8	25	18-MAY-16
WG2310495-7 LCS								
Nitrate (as N)			97.7		%		70-130	18-MAY-16
WG2310495-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						
Nitrate (as N)			97.6		%		70-130	18-MAY-16
P-T-COL-WT	Water							
Batch R3460574								
WG2310306-3 DUP		**L1768917-1**						
Phosphorus, Total		0.204	0.208		mg/L	2.2	20	18-MAY-16
WG2310306-2 LCS								
Phosphorus, Total			99.7		%		80-120	18-MAY-16
WG2310306-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-MAY-16
WG2310306-4 MS		**L1768917-1**						
Phosphorus, Total			N/A	MS-B	%		-	18-MAY-16
PAH-CCME-WT	Water							
Batch R3460418								
WG2310260-2 LCS								
Anthracene			85.1		%		50-140	18-MAY-16
Benzo(a)pyrene			107.1		%		60-130	18-MAY-16
WG2310260-3 LCSD		**WG2310260-2**						
Anthracene		85.1	73.8		%	14	50	18-MAY-16
Benzo(a)pyrene		107.1	104.8		%	2.2	50	18-MAY-16
WG2310260-1 MB								
Anthracene			<0.020		ug/L		0.02	18-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	18-MAY-16
Surrogate: d8-Naphthalene			87.5		%		60-140	18-MAY-16
Surrogate: d10-Phenanthrene			92.6		%		60-140	18-MAY-16

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3460418								
WG2310260-1 MB								
Surrogate: d12-Chrysene			102.2		%		60-140	18-MAY-16
Surrogate: d10-Acenaphthene			92.6		%		60-140	18-MAY-16
Surrogate: d9-Acridine (SS)			63.2		%		60-140	18-MAY-16
PH-WT	Water							
Batch R3460078								
WG2309941-6 DUP		**WG2309941-5**						
pH		8.47	8.49	J	pH units	0.02	0.2	17-MAY-16
WG2309941-4 LCS								
pH			7.00		pH units		6.9-7.1	17-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3460913								
WG2310717-11 DUP		**L1769313-1**						
Phenols (4AAP)		0.0022	0.0021		mg/L	0.2	20	18-MAY-16
WG2310717-7 DUP		**L1769295-5**						
Phenols (4AAP)		0.0029	0.0026		mg/L	10	20	18-MAY-16
WG2310717-10 LCS								
Phenols (4AAP)			100.9		%		85-115	18-MAY-16
WG2310717-6 LCS								
Phenols (4AAP)			100.4		%		85-115	18-MAY-16
WG2310717-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-12 MS		**L1769313-1**						
Phenols (4AAP)			104.9		%		75-125	18-MAY-16
WG2310717-8 MS		**L1769295-5**						
Phenols (4AAP)			107.4		%		75-125	18-MAY-16
SO4-IC-N-WT	Water							
Batch R3461414								
WG2310495-9 DUP		**WG2310495-10**						
Sulfate (SO4)		168	168		mg/L	0.2	20	18-MAY-16
WG2310495-7 LCS								
Sulfate (SO4)			100.3		%		90-110	18-MAY-16
WG2310495-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-MAY-16
WG2310495-8 MS		**WG2310495-10**						

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3461414								
WG2310495-8 MS		**WG2310495-10**						
Sulfate (SO4)			N/A	MS-B	%		-	18-MAY-16
SOLIDS-TDS-WT	Water							
Batch R3462610								
WG2310337-3 DUP		**L1768544-2**						
Total Dissolved Solids		578	584		mg/L	0.9	20	18-MAY-16
WG2310337-2 LCS								
Total Dissolved Solids			99.9		%		85-115	18-MAY-16
WG2310337-1 MB								
Total Dissolved Solids			<10		mg/L		10	18-MAY-16
Batch R3462618								
WG2310338-3 DUP		**L1769295-1**						
Total Dissolved Solids		474	465		mg/L	1.9	20	18-MAY-16
WG2310338-2 LCS								
Total Dissolved Solids			98.1		%		85-115	18-MAY-16
WG2310338-1 MB								
Total Dissolved Solids			<10		mg/L		10	18-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3462515								
WG2311534-3 DUP		**L1769381-1**						
Total Suspended Solids		380	367		mg/L	3.6	20	21-MAY-16
WG2311534-2 LCS								
Total Suspended Solids			99.4		%		85-115	21-MAY-16
WG2311534-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
TC-MF-WT	Water							
Batch R3460522								
WG2309726-2 DUP		**WG2309726-4**						
Total Coliforms		800	600		CFU/100mL	29	65	18-MAY-16
WG2309726-1 MB								
Total Coliforms			0		CFU/100mL		1	18-MAY-16
TKN-WT	Water							
Batch R3460556								
WG2310304-3 DUP		**L1769111-2**						
Total Kjeldahl Nitrogen		0.15	<0.15	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310304-2 LCS								

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3460556								
WG2310304-2 LCS								
Total Kjeldahl Nitrogen			98.3		%		75-125	18-MAY-16
WG2310304-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	18-MAY-16
WG2310304-4 MS		**L1769111-2**						
Total Kjeldahl Nitrogen			101.8		%		70-130	18-MAY-16
TURBIDITY-WT	Water							
Batch R3459431								
WG2309703-3 DUP		**L1769372-2**						
Turbidity		2.32	2.24		NTU	3.5	15	17-MAY-16
WG2309703-2 LCS								
Turbidity			105.0		%		85-115	17-MAY-16
WG2309703-1 MB								
Turbidity			<0.10		NTU		0.1	17-MAY-16

Quality Control Report

Workorder: L1769313 Report Date: 25-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

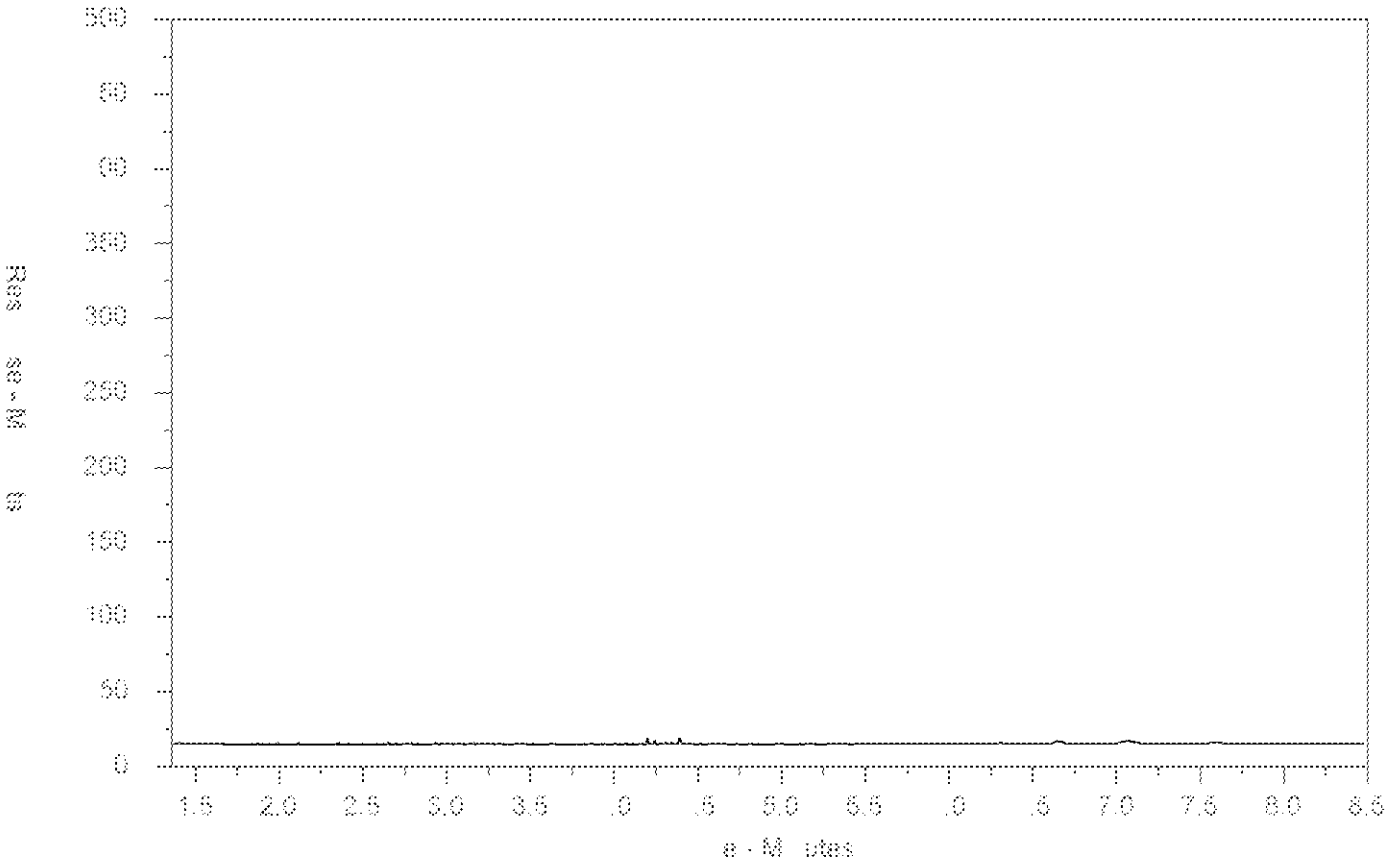
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-1
Client Sample ID: SW-45804-051616-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

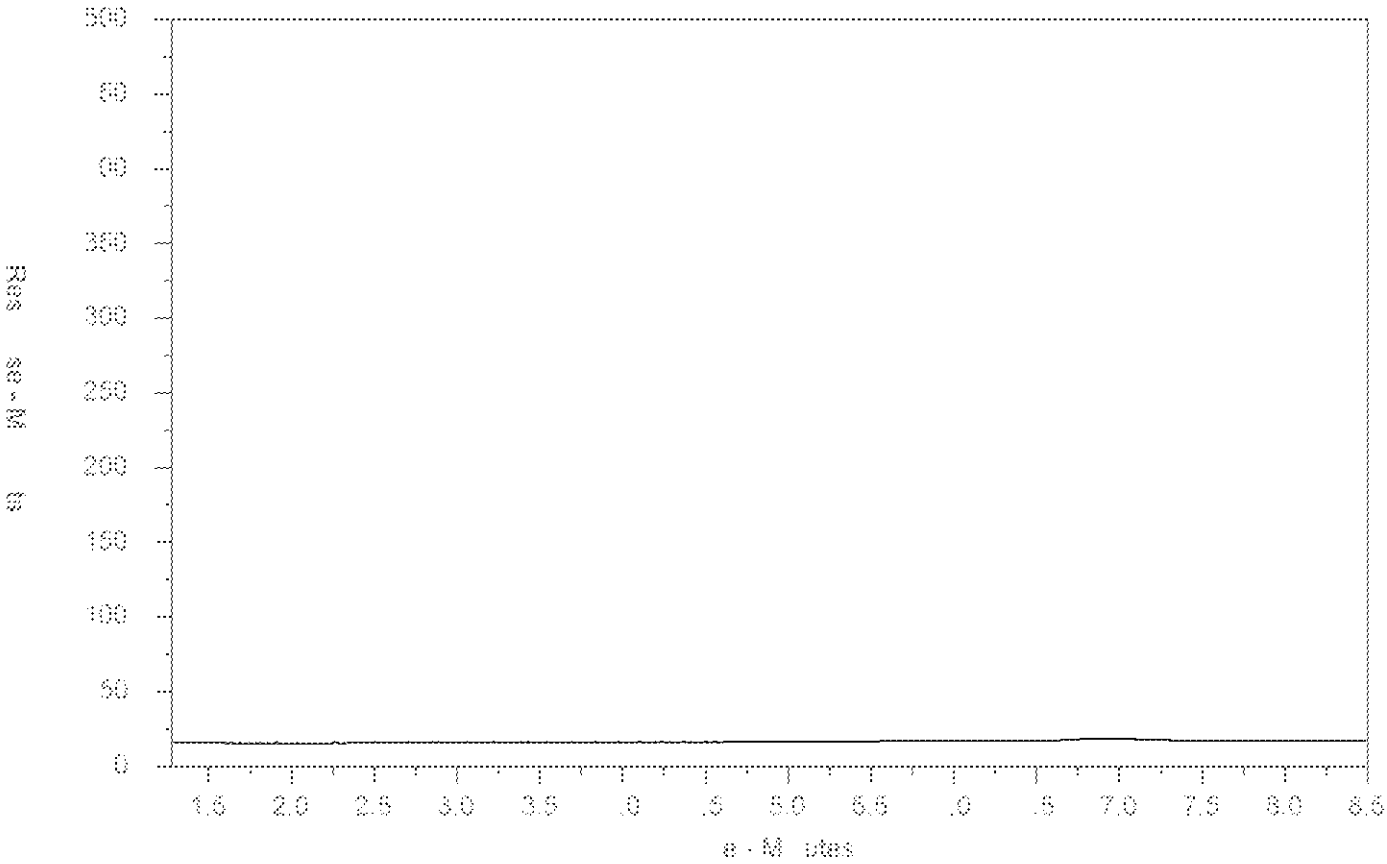
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-2
Client Sample ID: SW-45804-051616-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

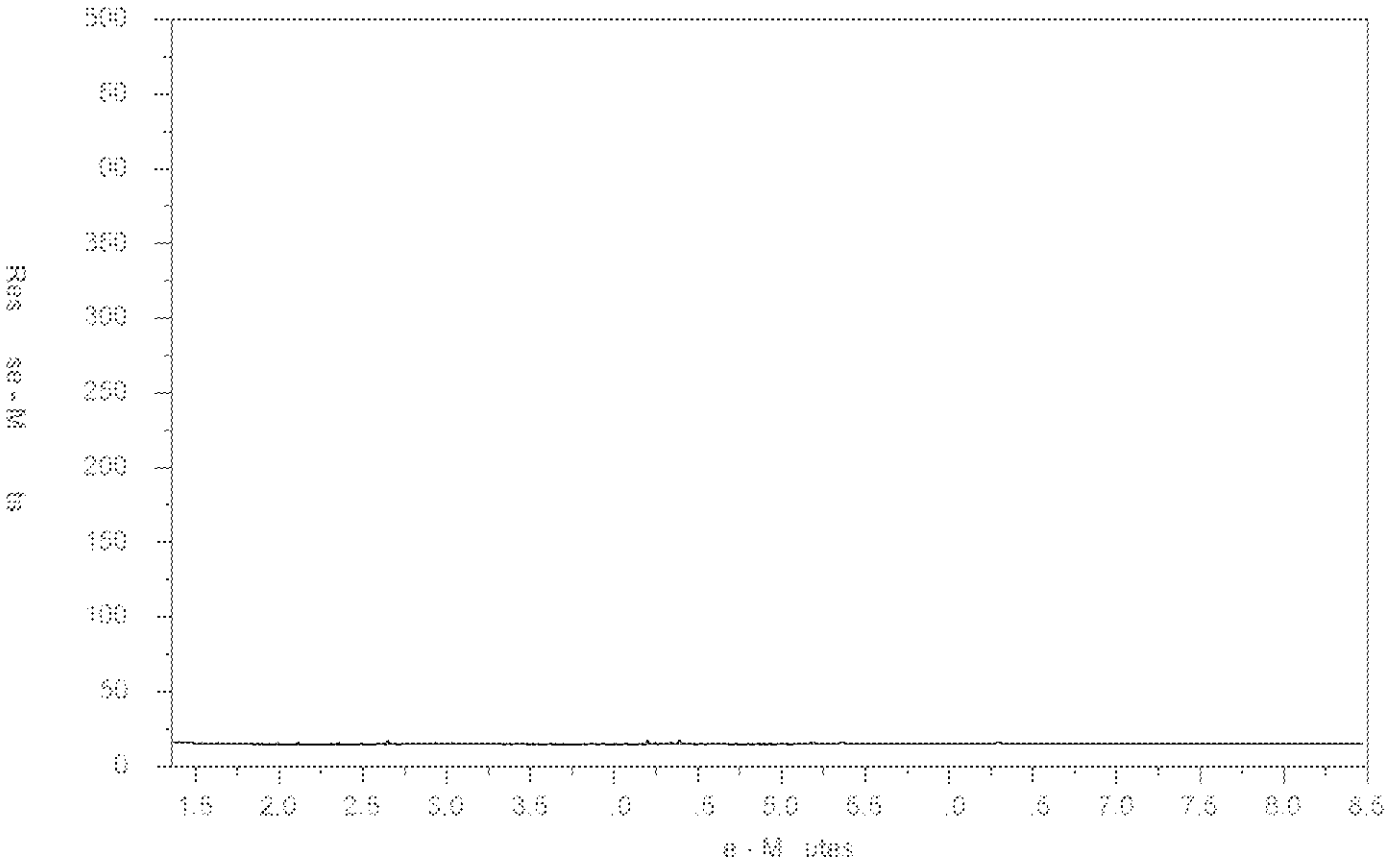
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-3
Client Sample ID: SW-45804-051616-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

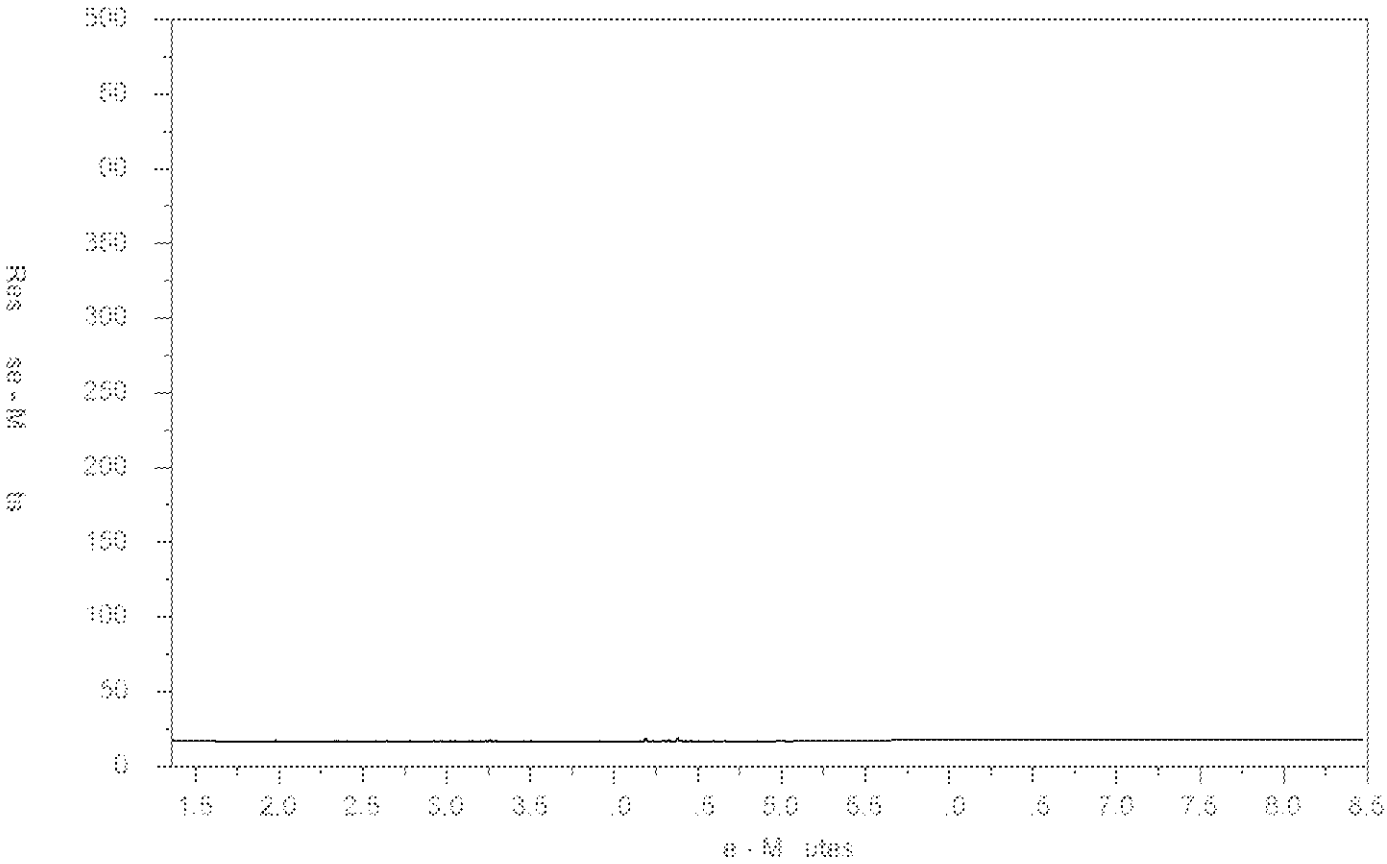
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-4
Client Sample ID: SW-45804-051616-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

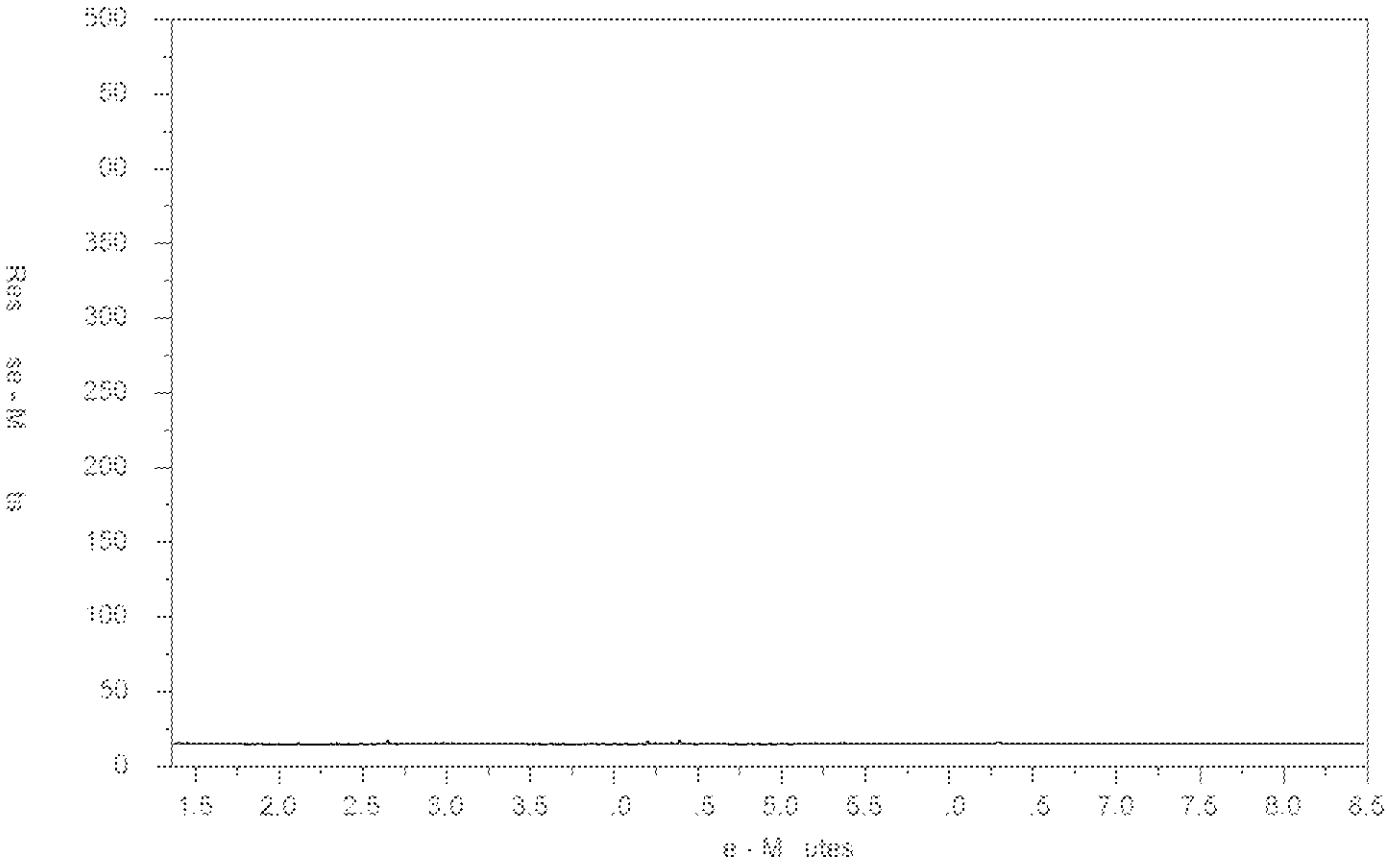
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1769313-5
Client Sample ID: SW-45804-051616-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Criteria on report (y/n) ____
Reg 153/04
Table____
TCLP ____ MISA ____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX
EMAIL airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both X

SUBMISSION # L1769313
ENTERED BY: S
DATE/TIME ENTERED: 17MAY16
BIN # MAY 17A

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX			SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT			FIELD PH	FIELD TEMP	COMMENTS	LAB ID
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER										
5/16/16	1000			X			SW-45804-051616 -TS-001	15		X			9.11	13.38		1
	1030			X			SW-45804-051616 -TS-002	15		X			8.62	12.51		2
	1100			X			SW-45804-051616 -TS-003	15		X			9.19	10.91		3
	1200			X			SW-45804-051616 -TS-004	15		X			9.65	11.34		4
	1200			X			SW-45804-051616 -TS-005	15		X			9.65	11.34		5
				X			SW-45804- -TS-006	15		X						
				X			SW-45804- -TS-007	15		X						
				X			SW-45804- -TS-008	15		X						
				X			SW-45804- -TS-009	15		X						

L1769313-COFC

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low-level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION: FROZEN / COLD / COOLING INITIATED / AMBIENT — MEAN TEMP 11.4
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____ — INIT S

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	5/16/16		5/16/16 1:15
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
	5/16/16		17MAY16 8:50 10.0°C

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

003445

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 17-MAY-16
Report Date: 26-MAY-16 13:52 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1770123
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-1 GW-45804-051716-TS-001 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.54		0.10	pH		19-MAY-16	R3460716
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	47.7		1.0	C.U.		18-MAY-16	R3462448
pH	7.89		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	23.3		2.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	728	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	29.4		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	259		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0571		0.0019	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.591		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	92.7		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.70		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0408		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	213		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.4		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	40	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Boron (B)-Dissolved	0.13	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	18-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	18-MAY-16	18-MAY-16	R3460618
Iron (Fe)-Dissolved	1.49	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.425	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.242	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	18-MAY-16	18-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-1 GW-45804-051716-TS-001 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Aggregate Organics							
COD	69		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0023		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	99.8		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	87.5		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	71.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	95.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	130.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	74.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	120.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.54		0.10	pH		19-MAY-16	R3460716
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	66.3		1.0	C.U.		18-MAY-16	R3462448
pH	7.90		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	86.0	DLHC	4.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	712	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	28.6		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	257		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0543		0.0019	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.561		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	91.6		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.68		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0390		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	211		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.9		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	40	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Boron (B)-Dissolved	0.14	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	18-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	18-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	18-MAY-16	18-MAY-16	R3460618
Iron (Fe)-Dissolved	1.55	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.434	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.247	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	18-MAY-16	18-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	19		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0034		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	87.5		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	77.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	99.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	132.3		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	71.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	131.8		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-2 GW-45804-051716-TS-002 Sampled By: T. SAUNDERS on 17-MAY-16 @ 10:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1770123-3 GW-45804-051716-TS-003 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:20 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.74		0.10	pH		19-MAY-16	R3460716
Temperature, Client	10.6		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	86.6		1.0	C.U.		18-MAY-16	R3462448
pH	7.89		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	567	DLHC	20	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	502	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	64.5		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	284		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0064		0.0023	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.054		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	0.88		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	0.27		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0991		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	118		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.1		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	20	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00024		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.011		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000035		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00369		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	0.000129		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.00171		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00905		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-3 GW-45804-051716-TS-003 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:20 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	0.00434		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0139		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	18		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0024		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	85.0		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	79.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	71.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	120.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	70.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	100.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Field Tests							
pH, Client Supplied	9.38		0.10	pH		19-MAY-16	R3460716
Temperature, Client	10.5		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	48.2		1.0	C.U.		18-MAY-16	R3462448
pH	8.33		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	45.2	DLHC	4.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	349	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	161		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	173		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0318		0.0077	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.083		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	75.0		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0096		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	42.1		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.8		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	2		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.022		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00056		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00047		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	1.08		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.218		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.000422		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0031		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	13		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0035		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	103.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.7		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	77.3		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-4 GW-45804-051716-TS-004 Sampled By: T. SAUNDERS on 17-MAY-16 @ 11:50 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	113.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	132.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	76.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-5 GW-45804-051716-TS-005 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:10 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.70		0.10	pH		19-MAY-16	R3460716
Temperature, Client	9.6		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	233		1.0	C.U.		18-MAY-16	R3462448
pH	7.90		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	20.1		2.0	mg/L	20-MAY-16	21-MAY-16	R3462565
Total Dissolved Solids	711	DLDS	20	mg/L		24-MAY-16	R3464077
Turbidity	61.1		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	292		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0130		0.00044	mg/L		19-MAY-16	
Ammonia, Total (as N)	1.19	DLHC	0.040	mg/L		18-MAY-16	R3461000
Chloride (Cl)	80.4		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.83		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0261		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	144		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.6		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	10	DLM	10	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00631		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.030		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00069		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	5.32		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-5 GW-45804-051716-TS-005 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:10 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	2.95	DLHC	0.0050	mg/L	18-MAY-16	18-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00372		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00142		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0015		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	32		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0021		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3461178
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.1		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	85.6		60-140	%		19-MAY-16	R3461178
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	68.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	98.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	134.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	67.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	129.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.67		0.10	pH		19-MAY-16	R3460716
Temperature, Client	11.5		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	260	DLHC	2.0	C.U.		18-MAY-16	R3462448
pH	7.85		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	11.3		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	727	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	78.1		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	322		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00945		0.00024	mg/L		19-MAY-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	0.803		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	97.1		0.50	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.020		0.020	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.010		0.010	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.62		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.118		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	149		0.30	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.7		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	0.00186		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.032		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	0.00066		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00011		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	6.28		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	1.26		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00113		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00084		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0010		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	35		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0022		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	97.2		60-140	%		19-MAY-16	R3460654

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-6 GW-45804-051716-TS-006 Sampled By: T. SAUNDERS on 17-MAY-16 @ 12:45 Matrix: WATER							
Hydrocarbons							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	72.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	100.0		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	138.7		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	68.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-7 GW-45804-051716-TS-007 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.58		0.10	pH		19-MAY-16	R3460716
Temperature, Client	11.9		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		18-MAY-16	R3462448
pH	7.79		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	<2.0		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1500	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	0.16		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	338		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00029		0.00020	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.030		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	70.8	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	0.18	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	<0.0030		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	680	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.5		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.054		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000049		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-7 GW-45804-051716-TS-007 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:25 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	0.00068		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00021		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00050		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.207		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.0188		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00675		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	<10		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	92.7		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	72.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	96.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	131.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	64.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	119.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.66		0.10	pH		19-MAY-16	R3460716
Temperature, Client	15.7		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	3.8		1.0	C.U.		18-MAY-16	R3462448
pH	7.84		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	2.8		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1420	DLDS	20	mg/L		24-MAY-16	R3464113

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Physical Tests							
Turbidity	1.41		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	314		10	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.00058		0.00032	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.037		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	64.4	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.10	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0046		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	683	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.8		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.056		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Cadmium (Cd)-Dissolved	0.000012		0.000010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	0.00023		0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.00035		0.00020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	0.045		0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Manganese (Mn)-Dissolved	0.160		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.0268		0.000050	mg/L	18-MAY-16	19-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.00136		0.00050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.0029		0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	<10		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	<0.0010		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-8 GW-45804-051716-TS-008 Sampled By: T. SAUNDERS on 17-MAY-16 @ 13:55 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	98.1		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	73.9		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	101.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	134.1		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	60.5		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	125.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
L1770123-9 GW-45804-051716-TS-009 Sampled By: T. SAUNDERS on 17-MAY-16 @ 14:35 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.70		0.10	pH		19-MAY-16	R3460716
Temperature, Client	12.4		-50	Deg. C		19-MAY-16	R3460716
Physical Tests							
Color, Apparent	34.2		1.0	C.U.		18-MAY-16	R3462448
pH	7.71		0.10	pH units		18-MAY-16	R3461415
Total Suspended Solids	5.5		2.0	mg/L	20-MAY-16	21-MAY-16	R3463170
Total Dissolved Solids	1680	DLDS	20	mg/L		24-MAY-16	R3464113
Turbidity	9.20		0.10	NTU		19-MAY-16	R3460619
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	580	DLHC	20	mg/L		19-MAY-16	R3462034
Unionized ammonia	0.0107		0.00027	mg/L		19-MAY-16	
Ammonia, Total (as N)	0.795		0.020	mg/L		18-MAY-16	R3461000
Chloride (Cl)	506	DLHC	2.5	mg/L		19-MAY-16	R3462193
Nitrate (as N)	<0.10	DLHC	0.10	mg/L		19-MAY-16	R3462193
Nitrite (as N)	<0.050	DLHC	0.050	mg/L		19-MAY-16	R3462193
Total Kjeldahl Nitrogen	1.08		0.15	mg/L	19-MAY-16	19-MAY-16	R3461730
Phosphorus, Total	0.0037		0.0030	mg/L	19-MAY-16	19-MAY-16	R3461786
Sulfate (SO4)	312	DLHC	1.5	mg/L		19-MAY-16	R3462193
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.6		1.0	mg/L		19-MAY-16	R3461755
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461721
Fecal Coliforms	0		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461715
Total Coliforms	1		0	CFU/100mL	18-MAY-16	19-MAY-16	R3461712
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-MAY-16	R3460062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1770123-9 GW-45804-051716-TS-009 Sampled By: T. SAUNDERS on 17-MAY-16 @ 14:35 Matrix: WATER							
Dissolved Metals							
Dissolved Metals Filtration Location	FIELD					18-MAY-16	R3460004
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	18-MAY-16	19-MAY-16	R3460618
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	18-MAY-16	19-MAY-16	R3460618
Copper (Cu)-Dissolved	0.0147	DLHC	0.0020	mg/L	18-MAY-16	19-MAY-16	R3460618
Iron (Fe)-Dissolved	0.67	DLHC	0.10	mg/L	18-MAY-16	18-MAY-16	R3460618
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Manganese (Mn)-Dissolved	1.55	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-MAY-16	18-MAY-16	R3460194
Molybdenum (Mo)-Dissolved	0.00438	DLHC	0.00050	mg/L	18-MAY-16	18-MAY-16	R3460618
Nickel (Ni)-Dissolved	0.0075	DLHC	0.0050	mg/L	18-MAY-16	19-MAY-16	R3460618
Zinc (Zn)-Dissolved	0.013	DLHC	0.010	mg/L	18-MAY-16	19-MAY-16	R3460618
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	18-MAY-16	23-MAY-16	R3463279
COD	28		10	mg/L		23-MAY-16	R3462990
Phenols (4AAP)	0.0025		0.0010	mg/L		18-MAY-16	R3460913
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-MAY-16	R3460654
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		26-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.4		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	82.3		60-140	%		19-MAY-16	R3460654
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-MAY-16	26-MAY-16	R3463063
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Acenaphthene	73.6		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d9-Acridine (SS)	86.2		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d12-Chrysene	131.4		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d8-Naphthalene	66.8		60-140	%	18-MAY-16	26-MAY-16	R3463063
Surrogate: d10-Phenanthrene	120.6		60-140	%	18-MAY-16	26-MAY-16	R3463063

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLHC	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Total Suspended Solids	DLHC	L1770123-1, -2, -3, -4, -5
Duplicate	Total Suspended Solids	DLHC	L1770123-6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nitrate (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Nitrate (as N)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	COD	MS-B	L1770123-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

Reference Information

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h. Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION

F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT	Water	F1 (O.Reg.153/04)	E3421/CCME (HS)

Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT	Water	F2-F4 (O.Reg.153/04)	MOE DECPH-E3421/CCME TIER 1

The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT	Water	Fecal Coliforms	SM 9222D

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT	Water	Dissolved Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P B E

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT	Water	CCME PAHs	SW846 8270

Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3462034								
WG2312012-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			87.0		%		80-120	19-MAY-16
WG2312012-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			90.6		%		80-120	19-MAY-16
WG2312012-4 DUP		**L1769474-1**						
Alkalinity, Total (as CaCO3)		289	291		mg/L	0.8	20	19-MAY-16
WG2312012-8 DUP		**L1770123-7**						
Alkalinity, Total (as CaCO3)		338	332		mg/L	1.8	20	19-MAY-16
WG2312012-2 LCS								
Alkalinity, Total (as CaCO3)			104.2		%		85-115	19-MAY-16
WG2312012-6 LCS								
Alkalinity, Total (as CaCO3)			110.6		%		85-115	19-MAY-16
WG2312012-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-MAY-16
WG2312012-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	19-MAY-16
BOD-C-WT	Water							
Batch R3463279								
WG2310868-2 DUP		**L1769918-1**						
BOD Carbonaceous		141	131		mg/L	7.4	20	23-MAY-16
WG2310868-6 DUP		**L1769972-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	23-MAY-16
WG2310868-3 LCS								
BOD Carbonaceous			96.0		%		85-115	23-MAY-16
WG2310868-7 LCS								
BOD Carbonaceous			93.9		%		85-115	23-MAY-16
WG2310868-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	23-MAY-16
WG2310868-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	23-MAY-16
C-DIS-ORG-WT	Water							
Batch R3461755								
WG2311266-3 DUP		**L1770123-9**						
Dissolved Organic Carbon		7.6	6.4		mg/L	18	20	19-MAY-16
WG2311266-2 LCS								
Dissolved Organic Carbon			97.1		%		80-120	19-MAY-16
WG2311266-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	19-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R3461755								
WG2311266-4 MS		**L1770123-9**						
Dissolved Organic Carbon			85.6		%		70-130	19-MAY-16
CL-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Chloride (Cl)		91.8	91.9		mg/L	0.1	25	19-MAY-16
WG2311494-7 LCS								
Chloride (Cl)			100.8		%		70-130	19-MAY-16
WG2311494-6 MB								
Chloride (Cl)			<0.50		mg/L		0.5	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Chloride (Cl)			92.9		%		70-130	19-MAY-16
COD-T-WT	Water							
Batch R3462990								
WG2313322-8 DUP		**L1771411-6**						
COD		<10	<10	RPD-NA	mg/L	N/A	25	23-MAY-16
WG2313322-6 LCS								
COD			101.4		%		70-130	23-MAY-16
WG2313322-5 MB								
COD			<10		mg/L		10	23-MAY-16
WG2313322-7 MS		**L1771411-6**						
COD			103.7		%		70-130	23-MAY-16
COLOUR-WT	Water							
Batch R3462448								
WG2311172-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			96.4		%		80-120	18-MAY-16
WG2311172-4 DUP		**L1770123-1**						
Color, Apparent		47.7	45.5		C.U.	4.8	20	18-MAY-16
WG2311172-1 MB								
Color, Apparent			<1.0		C.U.		1	18-MAY-16
EC-MF-WT	Water							
Batch R3461721								
WG2310701-2 DUP		**WG2310701-4**						
E. Coli		17	14		CFU/100mL	19	65	19-MAY-16
WG2310701-1 MB								
E. Coli			0		CFU/100mL		1	19-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3460654								
WG2309892-4 DUP		**WG2309892-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-MAY-16
WG2309892-1 LCS								
F1 (C6-C10)			103.7		%		80-120	19-MAY-16
WG2309892-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-MAY-16
Surrogate: 3,4-Dichlorotoluene			113.2		%		60-140	19-MAY-16
Batch R3461178								
WG2307329-4 DUP		**WG2307329-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-MAY-16
WG2307329-1 LCS								
F1 (C6-C10)			94.9		%		80-120	19-MAY-16
WG2307329-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-MAY-16
Surrogate: 3,4-Dichlorotoluene			101.8		%		60-140	19-MAY-16
F2-F4-WT	Water							
Batch R3463404								
WG2312128-2 LCS								
F2 (C10-C16)			90.9		%		65-135	20-MAY-16
F3 (C16-C34)			93.9		%		65-135	20-MAY-16
F4 (C34-C50)			82.3		%		65-135	20-MAY-16
WG2312128-3 LCSD		**WG2312128-2**						
F2 (C10-C16)		90.9	90.7		%	0.2	50	20-MAY-16
F3 (C16-C34)		93.9	84.9		%	10	50	20-MAY-16
F4 (C34-C50)		82.3	72.6		%	13	50	20-MAY-16
WG2312128-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			105.3		%		60-140	20-MAY-16
FC-MF-WT	Water							
Batch R3461715								
WG2310709-1 MB								
Fecal Coliforms			0		CFU/100mL		1	19-MAY-16
HG-D-CVAA-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	Water							
Batch R3460194								
WG2310702-3 DUP		**L1770123-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310702-2 LCS								
Mercury (Hg)-Dissolved			108.0		%		80-120	18-MAY-16
WG2310702-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-16
WG2310702-4 MS		**L1770123-2**						
Mercury (Hg)-Dissolved			104.0		%		70-130	18-MAY-16
MET-D-CCMS-WT	Water							
Batch R3460618								
WG2310628-4 DUP		**WG2310628-3**						
Arsenic (As)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	18-MAY-16
Boron (B)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-MAY-16
Cadmium (Cd)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	18-MAY-16
Chromium (Cr)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-MAY-16
Cobalt (Co)-Dissolved		0.700	0.707		mg/L	1.0	20	18-MAY-16
Copper (Cu)-Dissolved		9.58	9.72		mg/L	1.5	20	18-MAY-16
Iron (Fe)-Dissolved		<1.0	<1.0	RPD-NA	mg/L	N/A	20	18-MAY-16
Lead (Pb)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	18-MAY-16
Manganese (Mn)-Dissolved		<0.050	<0.050	RPD-NA	mg/L	N/A	20	18-MAY-16
Molybdenum (Mo)-Dissolved		0.0520	0.0544		mg/L	4.6	20	18-MAY-16
Nickel (Ni)-Dissolved		0.439	0.443		mg/L	0.8	20	18-MAY-16
Zinc (Zn)-Dissolved		<0.10	<0.10	RPD-NA	mg/L	N/A	20	18-MAY-16
WG2310628-2 LCS								
Arsenic (As)-Dissolved			99.9		%		80-120	18-MAY-16
Boron (B)-Dissolved			94.1		%		80-120	18-MAY-16
Cadmium (Cd)-Dissolved			98.8		%		80-120	18-MAY-16
Chromium (Cr)-Dissolved			98.9		%		80-120	18-MAY-16
Cobalt (Co)-Dissolved			98.2		%		80-120	18-MAY-16
Copper (Cu)-Dissolved			98.3		%		80-120	18-MAY-16
Iron (Fe)-Dissolved			98.6		%		80-120	18-MAY-16
Lead (Pb)-Dissolved			97.1		%		80-120	18-MAY-16
Manganese (Mn)-Dissolved			98.4		%		80-120	18-MAY-16
Molybdenum (Mo)-Dissolved			97.5		%		80-120	18-MAY-16
Nickel (Ni)-Dissolved			97.3		%		80-120	18-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3460618								
WG2310628-2 LCS								
Zinc (Zn)-Dissolved			91.8		%		80-120	18-MAY-16
WG2310628-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	18-MAY-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	18-MAY-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	18-MAY-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	18-MAY-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	18-MAY-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	18-MAY-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	18-MAY-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	18-MAY-16
WG2310628-5 MS		**WG2310628-3**						
Arsenic (As)-Dissolved			97.1		%		70-130	18-MAY-16
Boron (B)-Dissolved			92.9		%		70-130	18-MAY-16
Cadmium (Cd)-Dissolved			94.6		%		70-130	18-MAY-16
Chromium (Cr)-Dissolved			97.1		%		70-130	18-MAY-16
Cobalt (Co)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Copper (Cu)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Iron (Fe)-Dissolved			102.4		%		70-130	18-MAY-16
Lead (Pb)-Dissolved			95.0		%		70-130	18-MAY-16
Manganese (Mn)-Dissolved			102.6		%		70-130	18-MAY-16
Molybdenum (Mo)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Nickel (Ni)-Dissolved			N/A	MS-B	%		-	18-MAY-16
Zinc (Zn)-Dissolved			91.8		%		70-130	18-MAY-16
NH3-WT	Water							
Batch R3461000								
WG2310488-20 DUP		**L1770123-5**						
Ammonia, Total (as N)		1.19	1.16		mg/L	2.2	20	18-MAY-16
WG2310488-19 MS		**L1770123-5**						
Ammonia, Total (as N)			N/A	MS-B	%		-	18-MAY-16
NO2-IC-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	19-MAY-16
WG2311494-7 LCS								
Nitrite (as N)			102.6		%		70-130	19-MAY-16
WG2311494-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Nitrite (as N)			101.7		%		70-130	19-MAY-16
NO3-IC-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	19-MAY-16
WG2311494-7 LCS								
Nitrate (as N)			99.7		%		70-130	19-MAY-16
WG2311494-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Nitrate (as N)			99.2		%		70-130	19-MAY-16
P-T-COL-WT	Water							
Batch R3461786								
WG2311270-3 DUP		**L1770123-1**						
Phosphorus, Total		0.0408	0.0403		mg/L	1.1	20	19-MAY-16
WG2311270-2 LCS								
Phosphorus, Total			103.5		%		80-120	19-MAY-16
WG2311270-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	20-MAY-16
WG2311270-4 MS		**L1770123-1**						
Phosphorus, Total			93.2		%		70-130	19-MAY-16
PAH-CCME-WT	Water							
Batch R3463063								
WG2311216-2 LCS								
Anthracene			111.5		%		50-140	24-MAY-16
Benzo(a)pyrene			92.4		%		60-130	24-MAY-16
WG2311216-3 LCSD		**WG2311216-2**						
Anthracene		111.5	114.0		%	2.2	50	24-MAY-16
Benzo(a)pyrene		92.4	93.5		%	1.2	50	24-MAY-16
WG2311216-1 MB								

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3463063								
WG2311216-1 MB								
Anthracene			<0.020		ug/L		0.02	24-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	24-MAY-16
Surrogate: d8-Naphthalene			66.9		%		60-140	24-MAY-16
Surrogate: d10-Phenanthrene			112.2		%		60-140	24-MAY-16
Surrogate: d12-Chrysene			125.3		%		60-140	24-MAY-16
Surrogate: d10-Acenaphthene			68.0		%		60-140	24-MAY-16
Surrogate: d9-Acridine (SS)			102.8		%		60-140	24-MAY-16
PH-WT	Water							
Batch R3461415								
WG2310796-9 DUP		**WG2310796-8**						
pH		7.32	7.33	J	pH units	0.01	0.2	18-MAY-16
WG2310796-7 LCS								
pH			7.00		pH units		6.9-7.1	18-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3460913								
WG2310717-11 DUP		**L1769313-1**						
Phenols (4AAP)		0.0022	0.0021		mg/L	0.2	20	18-MAY-16
WG2310717-10 LCS								
Phenols (4AAP)			100.9		%		85-115	18-MAY-16
WG2310717-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-MAY-16
WG2310717-12 MS		**L1769313-1**						
Phenols (4AAP)			104.9		%		75-125	18-MAY-16
SO4-IC-N-WT	Water							
Batch R3462193								
WG2311494-8 DUP		**WG2311494-10**						
Sulfate (SO4)		212	212		mg/L	0.2	20	19-MAY-16
WG2311494-7 LCS								
Sulfate (SO4)			100.3		%		90-110	19-MAY-16
WG2311494-6 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	19-MAY-16
WG2311494-9 MS		**WG2311494-10**						
Sulfate (SO4)			N/A	MS-B	%		-	19-MAY-16
SOLIDS-TDS-WT	Water							

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R3464077								
WG2313363-3 DUP		**L1770123-1**						
Total Dissolved Solids		728	709		mg/L	2.6	20	24-MAY-16
WG2313363-2 LCS								
Total Dissolved Solids			100.6		%		85-115	24-MAY-16
WG2313363-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
Batch R3464113								
WG2313364-3 DUP		**L1770123-6**						
Total Dissolved Solids		727	723		mg/L	0.6	20	24-MAY-16
WG2313364-2 LCS								
Total Dissolved Solids			100.9		%		85-115	24-MAY-16
WG2313364-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3462565								
WG2312767-3 DUP		**WG2312767-4**						
Total Suspended Solids		16200	17000		mg/L	4.8	20	21-MAY-16
WG2312767-2 LCS								
Total Suspended Solids			100.0		%		85-115	21-MAY-16
WG2312767-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
Batch R3463170								
WG2312772-3 DUP		**L1771985-1**						
Total Suspended Solids		374	319		mg/L	16	20	21-MAY-16
WG2312772-2 LCS								
Total Suspended Solids			100.2		%		85-115	21-MAY-16
WG2312772-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-MAY-16
TC-MF-WT	Water							
Batch R3461712								
WG2310691-1 MB								
Total Coliforms			0		CFU/100mL		1	19-MAY-16
TKN-WT	Water							

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3461730								
WG2311267-3 DUP		**L1770067-3**						
Total Kjeldahl Nitrogen		1.63	1.62		mg/L	0.6	20	19-MAY-16
WG2311267-2 LCS								
Total Kjeldahl Nitrogen			106.0		%		75-125	19-MAY-16
WG2311267-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	19-MAY-16
WG2311267-4 MS		**L1770067-3**						
Total Kjeldahl Nitrogen			110.8		%		70-130	19-MAY-16
Batch R3463334								
WG2312115-3 DUP		**L1770256-22**						
Total Kjeldahl Nitrogen		1.21	1.06		mg/L	13	20	20-MAY-16
WG2312115-2 LCS								
Total Kjeldahl Nitrogen			101.4		%		75-125	20-MAY-16
WG2312115-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-MAY-16
WG2312115-4 MS		**L1770256-22**						
Total Kjeldahl Nitrogen			110.5		%		70-130	20-MAY-16
TURBIDITY-WT	Water							
Batch R3460619								
WG2310686-3 DUP		**L1770123-6**						
Turbidity		78.1	77.7		NTU	0.5	15	19-MAY-16
WG2310686-2 LCS								
Turbidity			101.0		%		85-115	19-MAY-16
WG2310686-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Quality Control Report

Workorder: L1770123 Report Date: 26-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

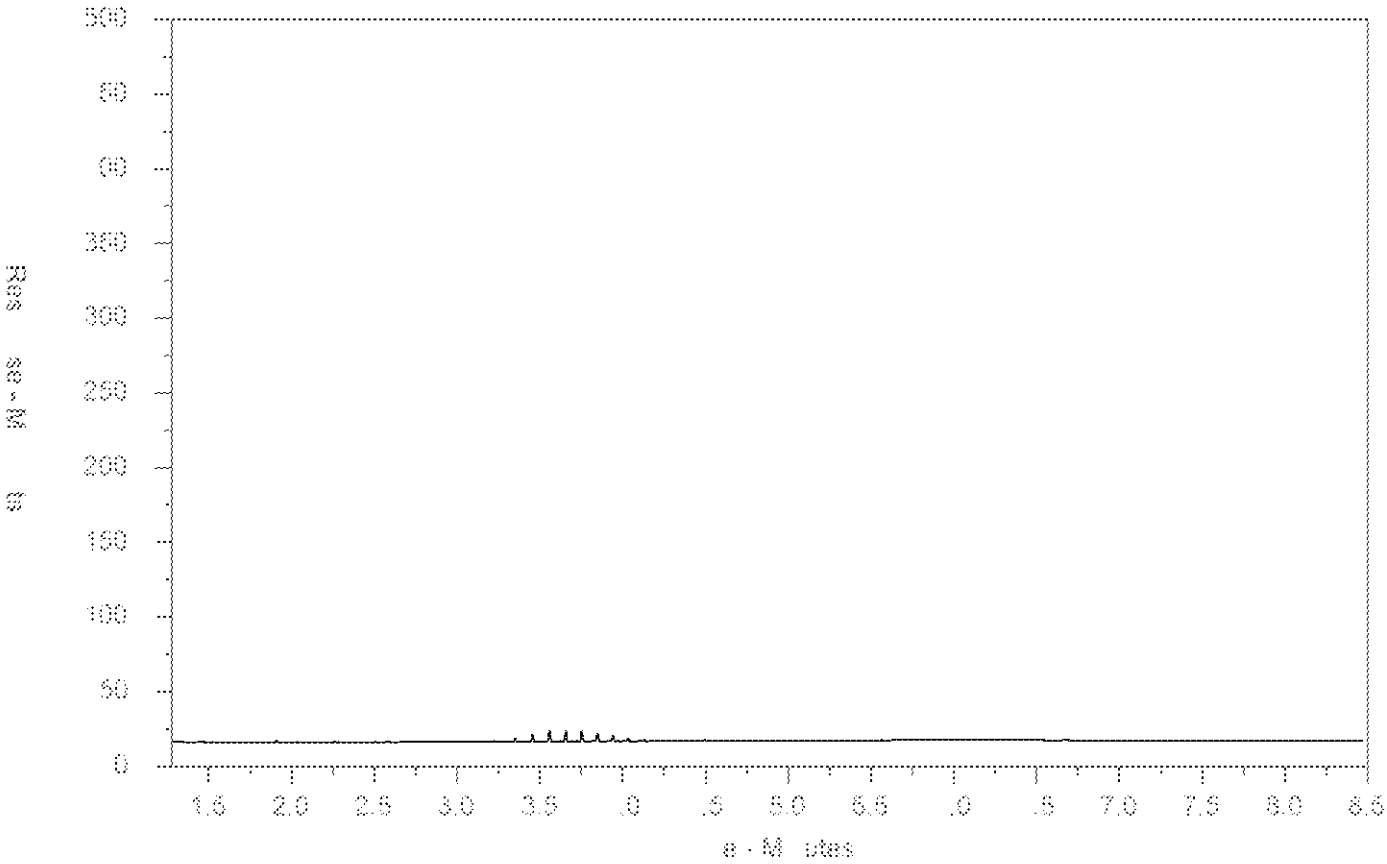
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-1
Client Sample ID: GW-45804-051716-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

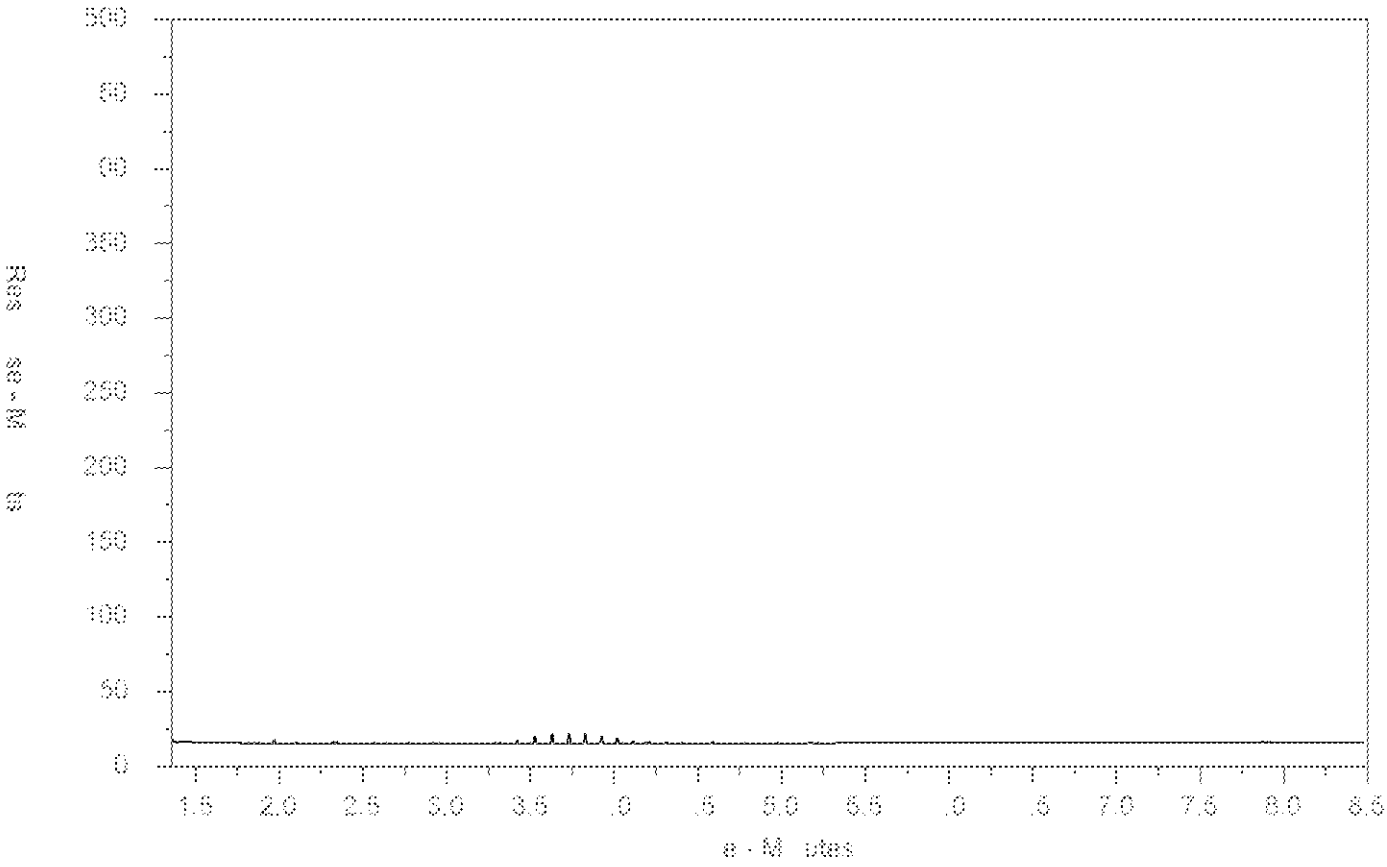
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-2
Client Sample ID: GW-45804-051716-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

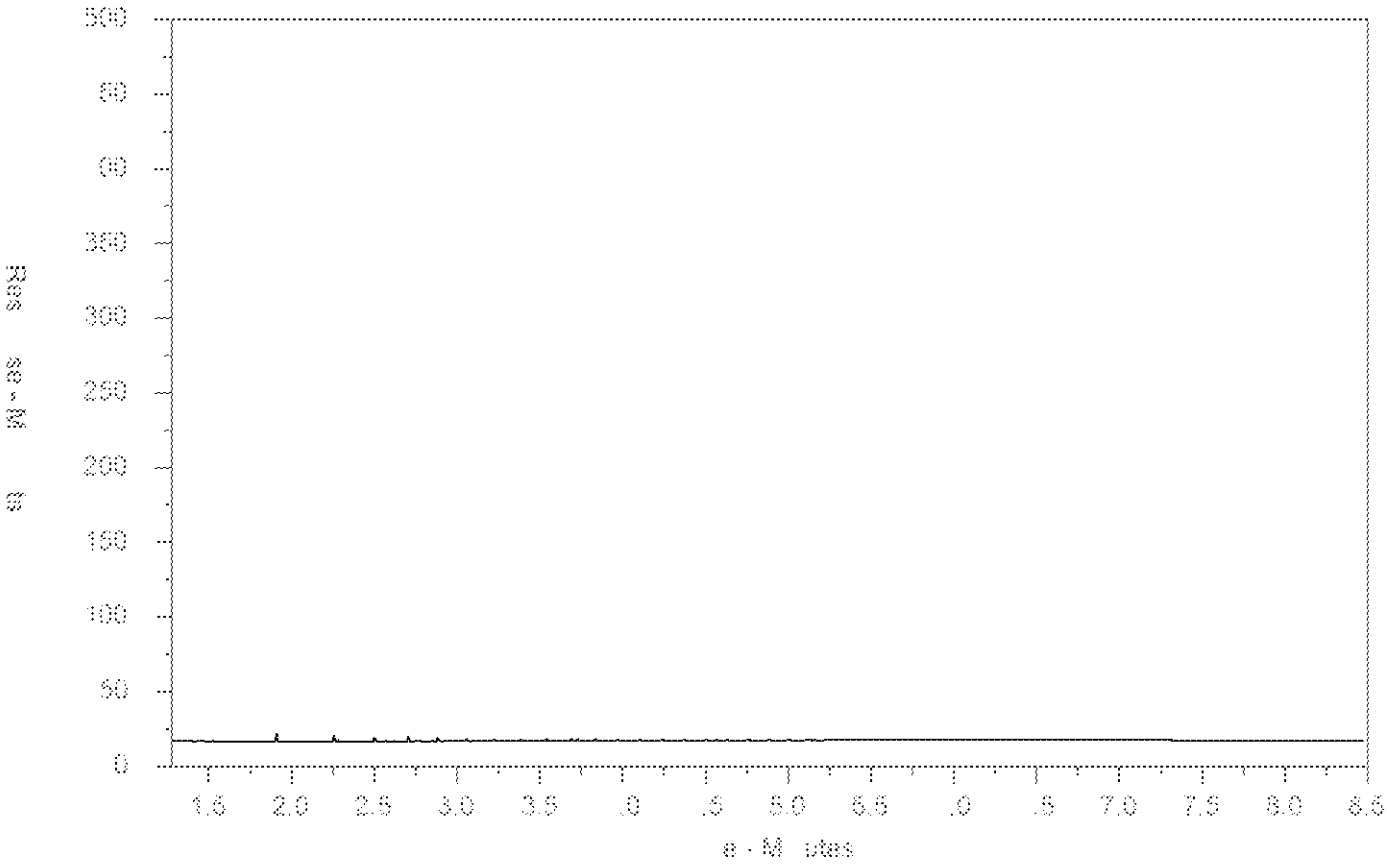
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-3
Client Sample ID: GW-45804-051716-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

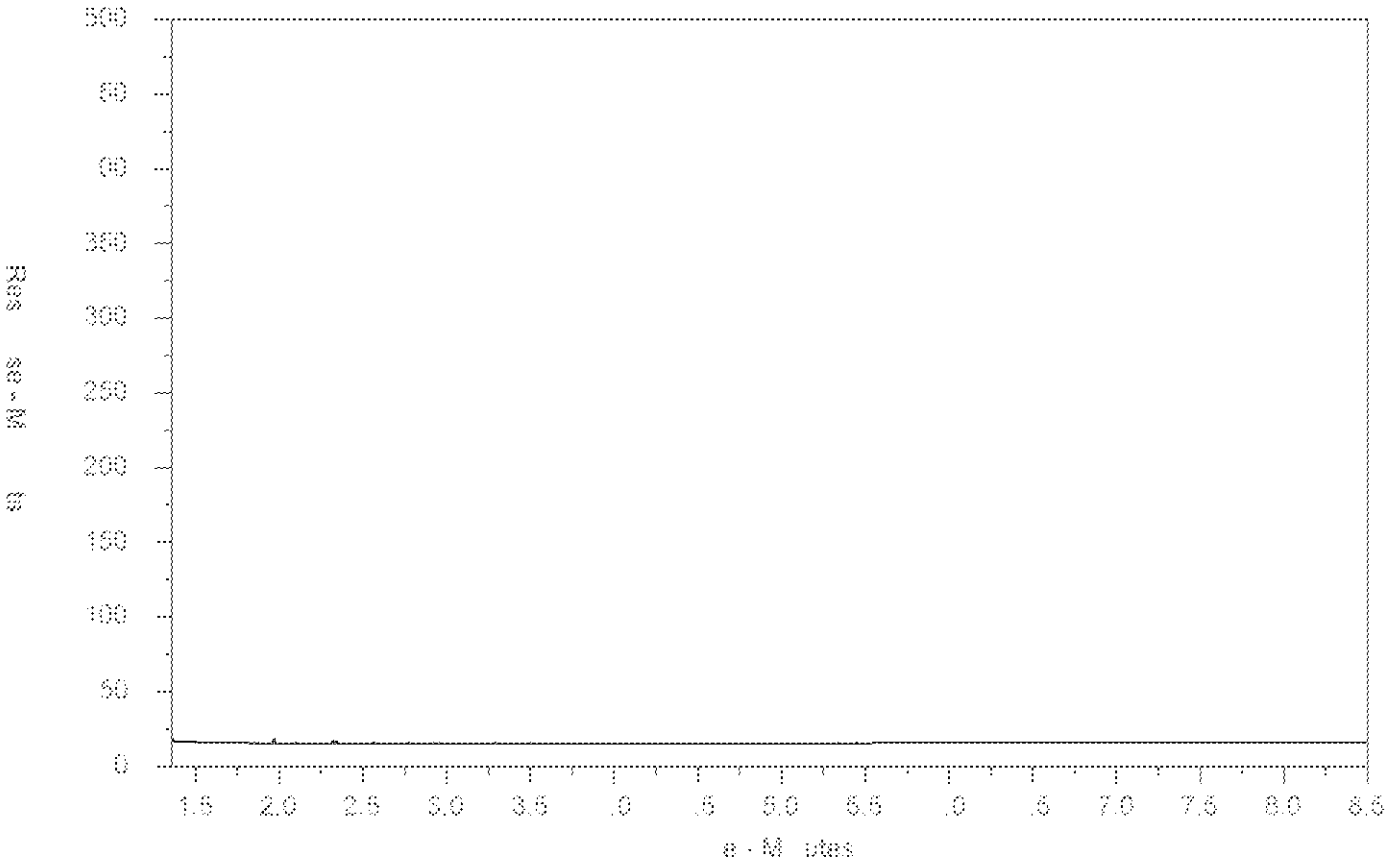
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-4
Client Sample ID: GW-45804-051716-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

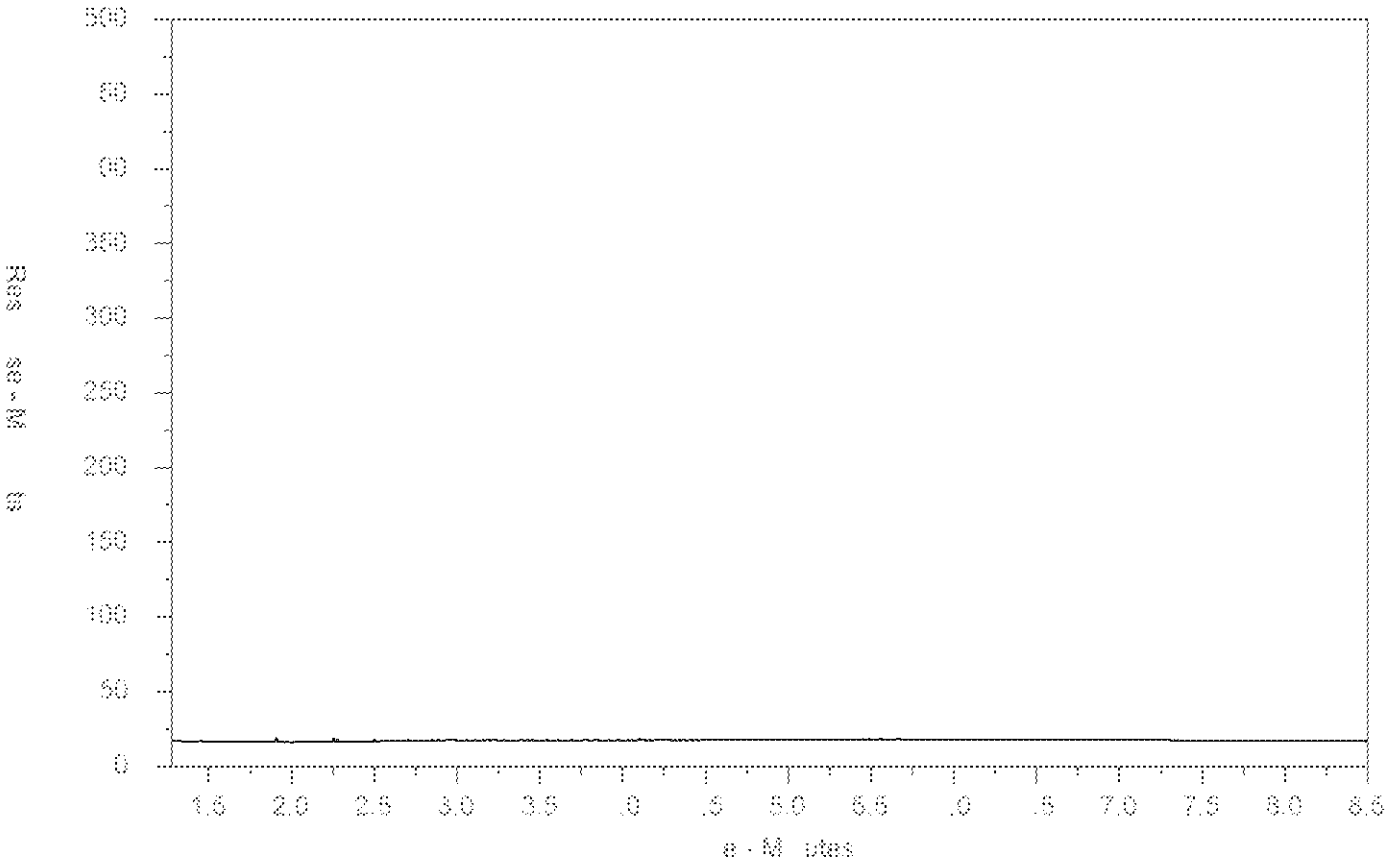
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-5
Client Sample ID: GW-45804-051716-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

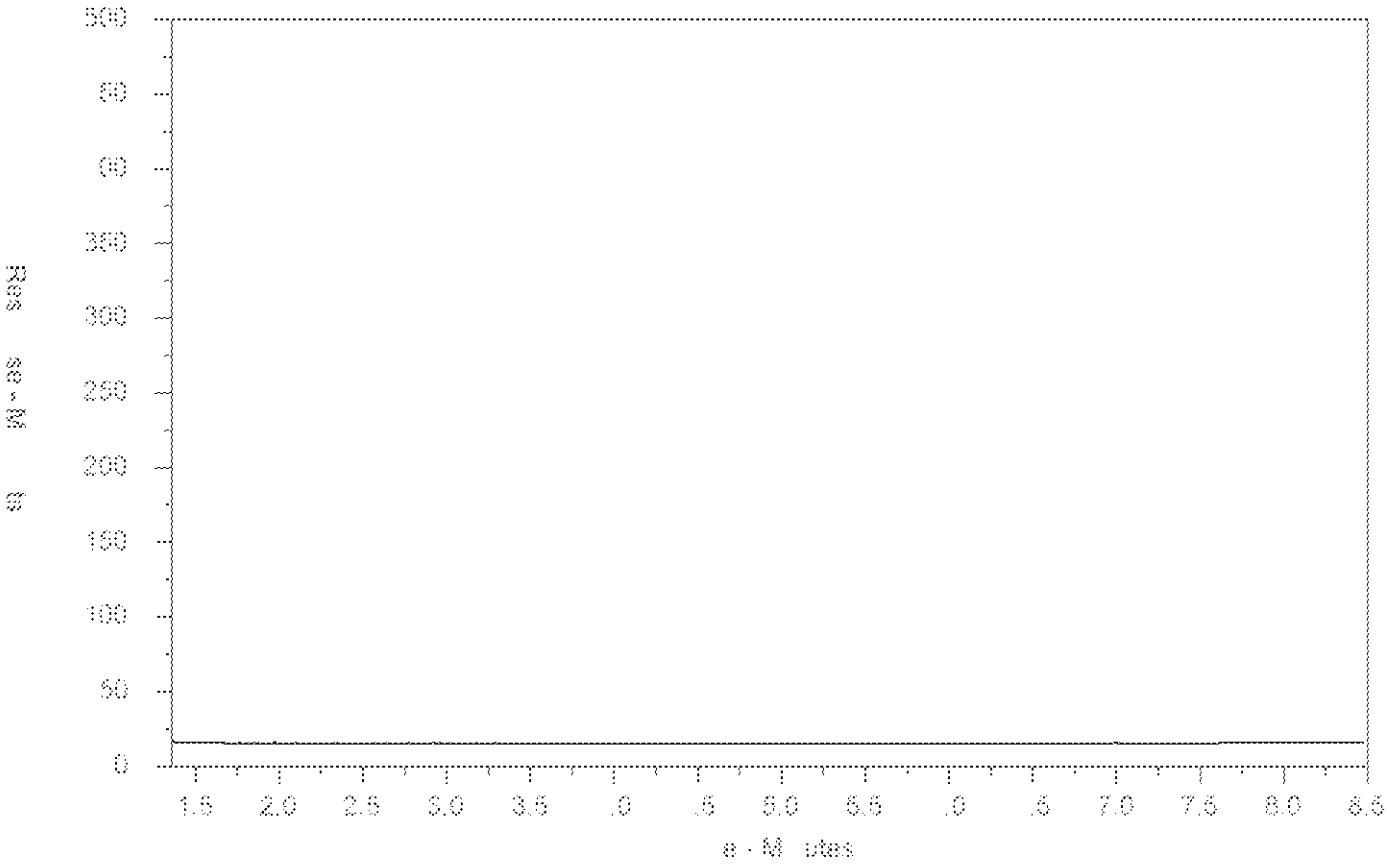
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-6
Client Sample ID: GW-45804-051716-TS-006



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

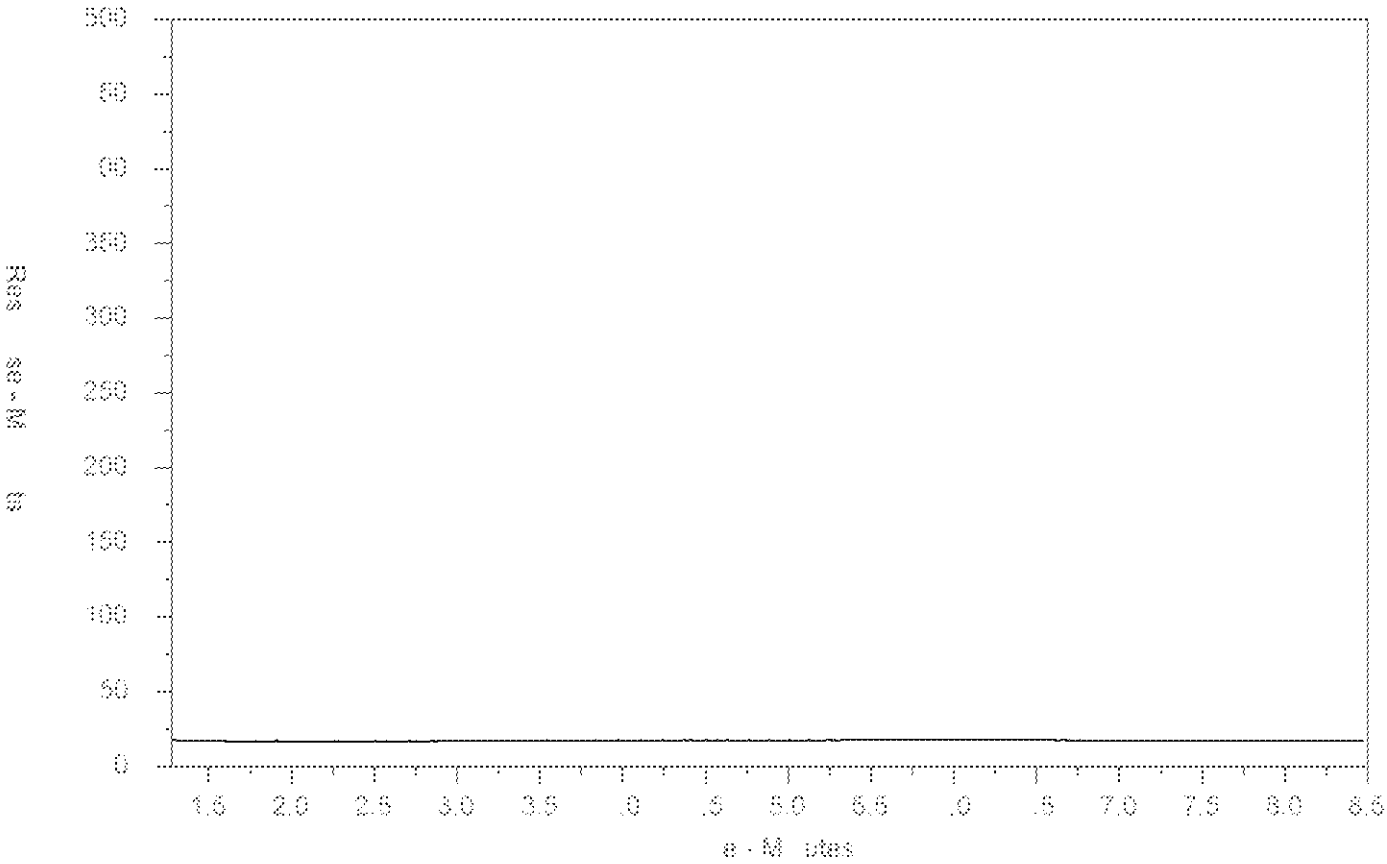
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-7
Client Sample ID: GW-45804-051716-TS-007



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

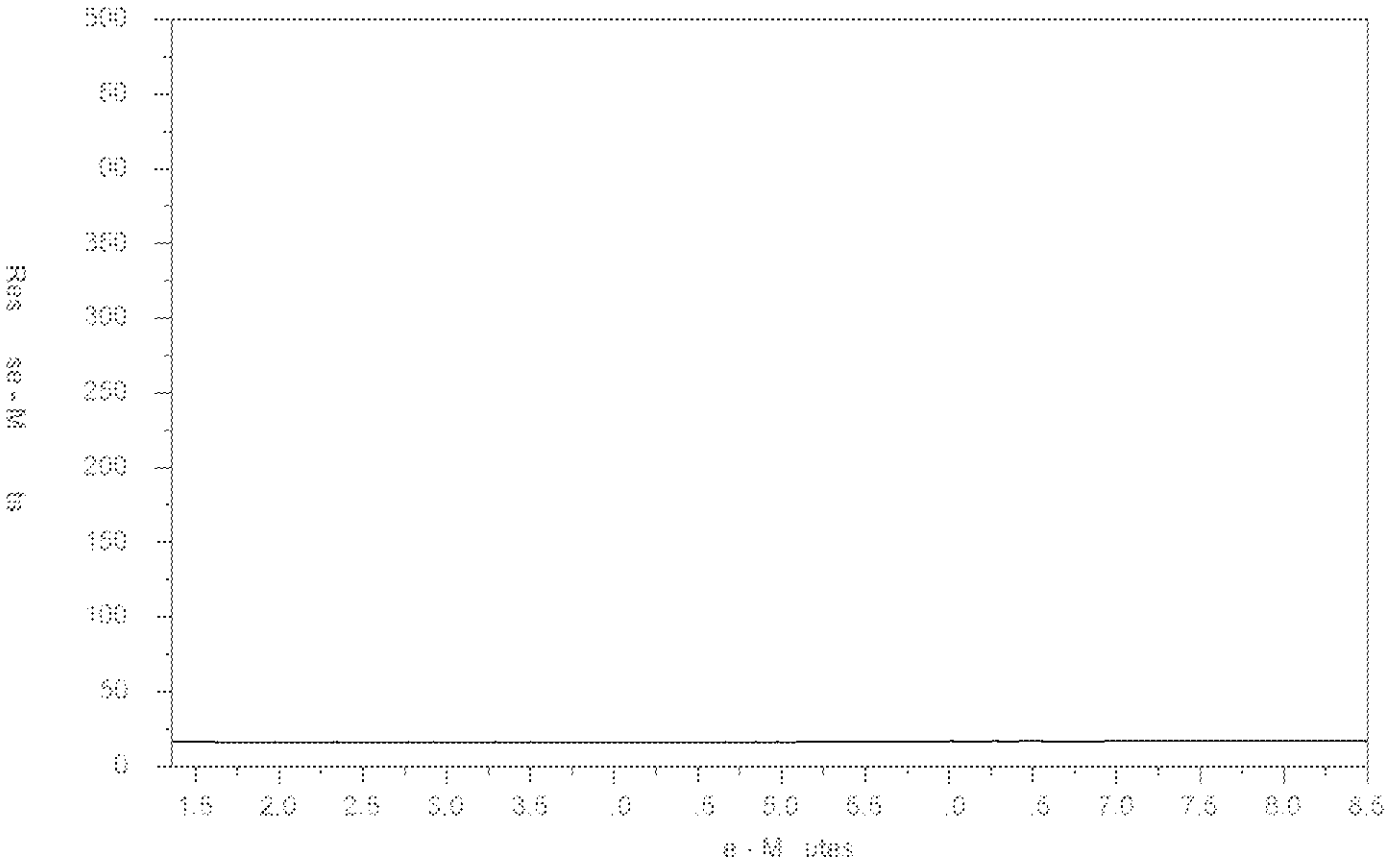
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-8
Client Sample ID: GW-45804-051716-TS-008



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

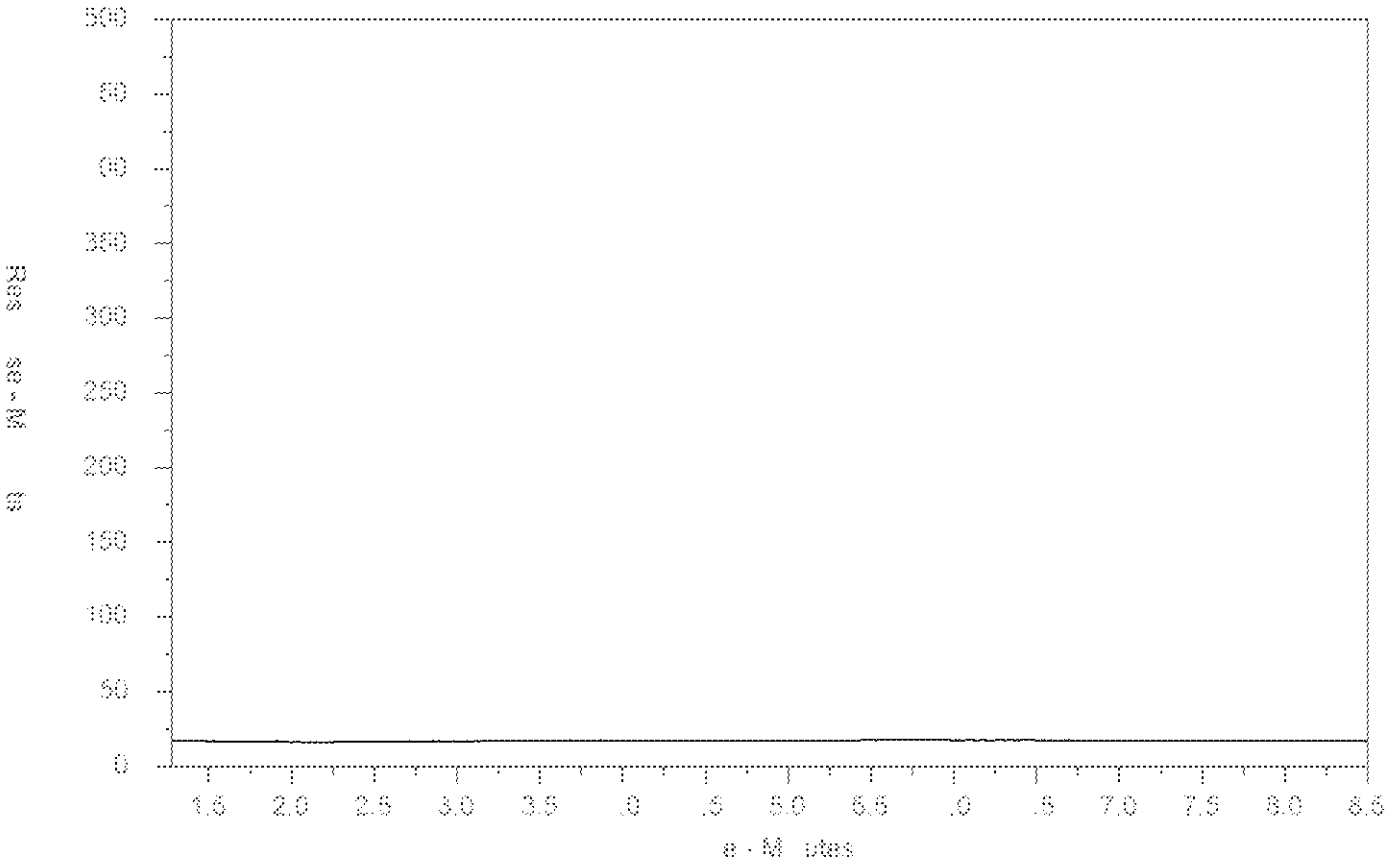
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1770123-9
Client Sample ID: GW-45804-051716-TS-009



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

L1770123-COFC

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Criteria on report (y/n) ____
Reg 153/04
Table ____
TCLP ____ MISA ____ PWQO ____
OTHER _CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX ____
EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL_Wayne.Williams@ghd.com
SELECT: pdf ____ digital ____ both X

INDICATE BOTTLES FIELD FILTERED
⇦ PRESERVED (F/P)
SUBMISSION # L1770123
ENTERED BY: KS
DATE/TIME ENTERED: MAY 18/16
BIN # 18A

SAMPLING INFORMATION

Sample Date/Time Date (yy/mm/dd)	Time (24 hr)	TYPE COMP	TYPE GRAB	MATRIX WATER	MATRIX SOIL	MATRIX OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
	1030			X			GW-45804- 05/17/16 -TS-001	15	X		8.54	13.80		1
	1030			X			GW-45804- -TS-002	15	X		8.54	13.80		2
	1120			X			GW-45804- -TS-003	15	X		8.74	10.58		3
	1150			X			GW-45804- -TS-004	15	X		9.38	10.47		4
	1240			X			GW-45804- -TS-005	15	X		7.70	9.63		5
	1245			X			GW-45804- -TS-006	15	X		7.67	11.51		6
	1325			X			GW-45804- -TS-007	15	X		7.58	11.88		7
	1355			X			GW-45804- -TS-008	15	X		7.66	15.72		8
	1435			X			GW-45804- -TS-009	15	X		7.70	12.35		9
				X			GW-45804- -TS-010	15	X					
				X			GW-45804- -TS-011	15	X					
				X			GW-45804- -TS-012	15	X					
				X			GW-45804- -TS-013	15	X					

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

	MEAN TEMP
FROZEN	
COLD	
COOLING INITIATED	11.1 12.1
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT KS

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	5/17/16		5/17/16 3:20
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
Trevor Saunders	5/17/16 1520		MAY 18/16 900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

003484

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 18-MAY-16
Report Date: 27-MAY-16 13:14 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1771020
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-1 GW-45804-051816-TS-010 Sampled By: T. SAUNDERS on 18-MAY-16 @ 08:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.22		0.10	pH		19-MAY-16	R3461224
Temperature, Client	18.1		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	79.3		1.0	C.U.		19-MAY-16	R3462458
pH	7.88		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	22.7		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1840	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	50.0		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	376		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.321		0.0066	mg/L		24-MAY-16	
Ammonia, Total (as N)	4.88	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	141	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	5.35		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0234		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	965	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.2		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	4.45	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.637	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0101	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-1 GW-45804-051816-TS-010 Sampled By: T. SAUNDERS on 18-MAY-16 @ 08:25 Matrix: WATER							
Aggregate Organics							
COD	16		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0015		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	104.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	89.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	105.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	84.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	114.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	107.8		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	131.8		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.22		0.10	pH		19-MAY-16	R3461224
Temperature, Client	10.6		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	132		1.0	C.U.		19-MAY-16	R3462458
pH	7.89		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	30.0	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1390	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	84.5		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	443		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.159		0.0038	mg/L		24-MAY-16	
Ammonia, Total (as N)	4.18	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	101	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	4.12		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.101		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	542	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.9		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00107		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.129		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00068		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00025		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	4.66		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	1.96		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0108		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00124		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	36		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0010		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	290		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	103.7		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	92.2		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	106.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	76.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	105.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	106.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	112.4		60-140	%	19-MAY-16	26-MAY-16	R3465515

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-2 GW-45804-051816-TS-011 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:20 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1771020-3 GW-45804-051816-TS-012 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.88		0.10	pH		19-MAY-16	R3461224
Temperature, Client	15.9		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	18.0		1.0	C.U.		19-MAY-16	R3462458
pH	7.86		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	9.2		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1460	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	11.8		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	417		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.321		0.011	mg/L		24-MAY-16	
Ammonia, Total (as N)	12.2	DLHC	0.40	mg/L		20-MAY-16	R3462139
Chloride (Cl)	81.3	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	12.6	DLHC	0.30	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0116		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	710	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.8		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.0130		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.073		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	0.000012		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00058		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00053		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00068		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	1.60		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	1.09		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0201		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-3 GW-45804-051816-TS-012 Sampled By: T. SAUNDERS on 18-MAY-16 @ 09:45 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	0.00282		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0049		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	15		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0024		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	101.3		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.0		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	0.0144		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	106.6		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	91.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	100.4		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	120.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.80		0.10	pH		19-MAY-16	R3461224
Temperature, Client	16.4		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	102		1.0	C.U.		19-MAY-16	R3462458
pH	7.86		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	40.3		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1760	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	77.5		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	380		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0906		0.0023	mg/L		24-MAY-16	
Ammonia, Total (as N)	3.97	DLHC	0.10	mg/L		20-MAY-16	R3462139
Chloride (Cl)	134	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	4.56		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0291		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	968	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.7		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.0014	DLHC	0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Boron (B)-Dissolved	0.11	DLHC	0.10	mg/L	19-MAY-16	20-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	20-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.0020	DLHC	0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	20-MAY-16	R3461833
Iron (Fe)-Dissolved	6.27	DLHC	0.10	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Manganese (Mn)-Dissolved	6.02	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0146	DLHC	0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	27		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0012		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.5		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	95.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	0.0127		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	90.1		60-140	%	19-MAY-16	26-MAY-16	R3465515

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-4 GW-45804-051816-TS-013 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:15 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	88.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	103.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	103.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	121.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-5 GW-45804-051816-TS-014 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:50 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.65		0.10	pH		19-MAY-16	R3461224
Temperature, Client	19.8		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	27.3		1.0	C.U.		19-MAY-16	R3462458
pH	8.34		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	27.0	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	673	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	47.9		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	153		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0223		0.0036	mg/L		24-MAY-16	
Ammonia, Total (as N)	0.123		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	45.3		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	0.112		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	0.015		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	0.26		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0099		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	304		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.2		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	4		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	5		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	50	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.070		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00069		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	0.022		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-5 GW-45804-051816-TS-014 Sampled By: T. SAUNDERS on 18-MAY-16 @ 10:50 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.0650		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.0150		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00084		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0013		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	16		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0020		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	100.2		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	114.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	84.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	138.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	113.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.64		0.10	pH		19-MAY-16	R3461224
Temperature, Client	10.3		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	115		1.0	C.U.		19-MAY-16	R3462458
pH	7.88		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	20.4	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1700	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	76.2		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	463		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.159		0.0040	mg/L		24-MAY-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Anions and Nutrients							
Ammonia, Total (as N)	15.9	DLHC	0.40	mg/L		20-MAY-16	R3462139
Chloride (Cl)	128	DLDS	2.5	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	16.2	DLHC	0.75	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.126		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	749	DLDS	1.5	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.7		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.069		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	0.000015		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	0.00063		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00014		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	0.00034		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	6.66		0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	3.06	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.00825		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00154		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0040		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	27		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0019		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	102.1		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	91.3		60-140	%		20-MAY-16	R3462029

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-6 GW-45804-051816-TS-015 Sampled By: T. SAUNDERS on 18-MAY-16 @ 11:25 Matrix: WATER							
Hydrocarbons							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	112.6		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	63.5		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	109.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	105.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	113.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-7 GW-45804-051816-TS-016 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:15 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.16		0.10	pH		19-MAY-16	R3461224
Temperature, Client	12.0		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	200		1.0	C.U.		19-MAY-16	R3462458
pH	7.91		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	27.6	DLHC	4.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1690	DLDS	20	mg/L		24-MAY-16	R3464142
Turbidity	101		0.10	NTU		19-MAY-16	R3461370
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	398		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.244		0.0074	mg/L		24-MAY-16	
Ammonia, Total (as N)	6.61	DLHC	0.20	mg/L		20-MAY-16	R3462139
Chloride (Cl)	155		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.020		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	7.50		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0653		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	726		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	8.8		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	0.00116		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	0.065		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-7 GW-45804-051816-TS-016 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:15 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	0.00018		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	7.89		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	4.72	DLHC	0.0050	mg/L	19-MAY-16	20-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.00789		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.00161		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0012		0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	33		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0021		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3463404
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3463404
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3463404
Surrogate: 2-Bromobenzotrifluoride	100.6		60-140	%	20-MAY-16	20-MAY-16	R3463404
Surrogate: 3,4-Dichlorotoluene	88.8		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	120.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	76.3		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	115.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	113.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	120.7		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.32		0.10	pH		19-MAY-16	R3461224
Temperature, Client	13.8		-50	Deg. C		19-MAY-16	R3461224
Physical Tests							
Color, Apparent	17.1		1.0	C.U.		19-MAY-16	R3462458
pH	7.93		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	101		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	1080	DLDS	20	mg/L		24-MAY-16	R3464142

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Physical Tests							
Turbidity	70.5		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	239		10	mg/L		25-MAY-16	R3465068
Unionized ammonia	0.0021		0.0012	mg/L		24-MAY-16	
Ammonia, Total (as N)	0.036		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	64.3		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	0.032		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	0.25		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	0.0779		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	506		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	2.9		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	<10	DLM	10	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	19-MAY-16	19-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	0.0386	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	0.191	DLHC	0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	0.0083	DLHC	0.0050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	14		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	<0.0010		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3464563
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-8 GW-45804-051816-TS-017 Sampled By: T. SAUNDERS on 18-MAY-16 @ 12:45 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3464563
Surrogate: 2-Bromobenzotrifluoride	102.4		60-140	%	20-MAY-16	20-MAY-16	R3464563
Surrogate: 3,4-Dichlorotoluene	92.7		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	19-MAY-16	26-MAY-16	R3465515
Benzo(a)pyrene	<0.0050		0.0050	ug/L	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Acenaphthene	97.9		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d9-Acridine (SS)	55.4	SURR-ND	60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d12-Chrysene	99.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d8-Naphthalene	99.2		60-140	%	19-MAY-16	26-MAY-16	R3465515
Surrogate: d10-Phenanthrene	117.1		60-140	%	19-MAY-16	26-MAY-16	R3465515
L1771020-9 GW-45804-051816-TS-018 Sampled By: T. SAUNDERS on 18-MAY-16 @ 13:00 Matrix: WATER							
Physical Tests							
Color, Apparent	<1.0		1.0	C.U.		19-MAY-16	R3462458
pH	7.09		0.10	pH units		19-MAY-16	R3462141
Total Suspended Solids	3.6		2.0	mg/L	21-MAY-16	24-MAY-16	R3463190
Total Dissolved Solids	<10		10	mg/L		24-MAY-16	R3464142
Turbidity	0.19		0.10	NTU		19-MAY-16	R3461717
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		25-MAY-16	R3465068
Ammonia, Total (as N)	0.051		0.020	mg/L		20-MAY-16	R3462139
Chloride (Cl)	<0.50		0.50	mg/L		20-MAY-16	R3463288
Nitrate (as N)	<0.020		0.020	mg/L		20-MAY-16	R3463288
Nitrite (as N)	<0.010		0.010	mg/L		20-MAY-16	R3463288
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	20-MAY-16	20-MAY-16	R3463334
Phosphorus, Total	<0.0030		0.0030	mg/L	24-MAY-16	24-MAY-16	R3463796
Sulfate (SO4)	<0.30		0.30	mg/L		20-MAY-16	R3463288
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		23-MAY-16	R3463741
Bacteriological Tests							
E. Coli	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462556
Fecal Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462550
Total Coliforms	0		0	CFU/100mL	19-MAY-16	20-MAY-16	R3462538
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					19-MAY-16	R3461416
Dissolved Metals Filtration Location	FIELD					19-MAY-16	R3461456
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	20-MAY-16	R3461833
Boron (B)-Dissolved	<0.010		0.010	mg/L	19-MAY-16	19-MAY-16	R3461833
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	19-MAY-16	R3461833

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1771020-9 GW-45804-051816-TS-018 Sampled By: T. SAUNDERS on 18-MAY-16 @ 13:00 Matrix: WATER							
Dissolved Metals							
Chromium (Cr)-Dissolved	0.00075		0.00050	mg/L	19-MAY-16	20-MAY-16	R3461833
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	19-MAY-16	19-MAY-16	R3461833
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	19-MAY-16	19-MAY-16	R3461833
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	19-MAY-16	20-MAY-16	R3461833
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	19-MAY-16	20-MAY-16	R3461910
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	19-MAY-16	19-MAY-16	R3461833
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	19-MAY-16	19-MAY-16	R3461833
Zinc (Zn)-Dissolved	0.0017		0.0010	mg/L	19-MAY-16	20-MAY-16	R3461833
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	20-MAY-16	25-MAY-16	R3464896
COD	<10		10	mg/L		23-MAY-16	R3463756
Phenols (4AAP)	0.0017		0.0010	mg/L		24-MAY-16	R3463923
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		20-MAY-16	R3462029
F2 (C10-C16)	<100		100	ug/L	20-MAY-16	20-MAY-16	R3464563
F3 (C16-C34)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
F4 (C34-C50)	<250		250	ug/L	20-MAY-16	20-MAY-16	R3464563
Total Hydrocarbons (C6-C50)	<380		380	ug/L		27-MAY-16	
Chrom. to baseline at nC50	YES				20-MAY-16	20-MAY-16	R3464563
Surrogate: 2-Bromobenzotrifluoride	112.3		60-140	%	20-MAY-16	20-MAY-16	R3464563
Surrogate: 3,4-Dichlorotoluene	99.3		60-140	%		20-MAY-16	R3462029
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	26-MAY-16	27-MAY-16	R3466103
Benzo(a)pyrene	<0.0050		0.0050	ug/L	26-MAY-16	27-MAY-16	R3466103
Surrogate: d10-Acenaphthene	105.1		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d9-Acridine (SS)	72.3		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d12-Chrysene	121.8		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d8-Naphthalene	131.1		60-140	%	26-MAY-16	27-MAY-16	R3466103
Surrogate: d10-Phenanthrene	74.7		60-140	%	26-MAY-16	27-MAY-16	R3466103

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Suspended Solids	DLHC	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	COD	MS-B	L1771020-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
SURR-ND	Surrogate recovery marginally exceeded ALS DQO. Reported non-detect results for associated samples were deemed to be unaffected.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.

Reference Information

2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P B E

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066

Reference Information

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3465068								
WG2314906-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			92.2		%		80-120	25-MAY-16
WG2314906-8 DUP		**L1771213-1**						
Alkalinity, Total (as CaCO3)		141	143		mg/L	1.0	20	25-MAY-16
WG2314906-6 LCS								
Alkalinity, Total (as CaCO3)			107.5		%		85-115	25-MAY-16
WG2314906-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	25-MAY-16
BOD-C-WT	Water							
Batch R3464896								
WG2312373-2 DUP		**L1771020-9**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	25-MAY-16
WG2312373-3 LCS								
BOD Carbonaceous			91.9		%		85-115	25-MAY-16
WG2312373-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	25-MAY-16
C-DIS-ORG-WT	Water							
Batch R3463741								
WG2313335-3 DUP		**L1767411-1**						
Dissolved Organic Carbon		8.1	7.5		mg/L	6.9	20	23-MAY-16
WG2313335-2 LCS								
Dissolved Organic Carbon			94.1		%		80-120	23-MAY-16
WG2313335-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	23-MAY-16
WG2313335-4 MS		**L1767411-1**						
Dissolved Organic Carbon			89.4		%		70-130	23-MAY-16
CL-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Chloride (Cl)			101.5		%		70-130	20-MAY-16
WG2312426-16 MB								
Chloride (Cl)			<0.50		mg/L		0.5	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Chloride (Cl)			104.7		%		70-130	20-MAY-16
COD-T-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3463756								
WG2313346-8 DUP		**L1771020-9**						
COD		<10	<10	RPD-NA	mg/L	N/A	25	23-MAY-16
WG2313346-6 LCS								
COD			96.2		%		70-130	23-MAY-16
WG2313346-5 MB								
COD			<10		mg/L		10	23-MAY-16
WG2313346-7 MS		**L1771020-9**						
COD			111.2		%		70-130	23-MAY-16
COLOUR-WT	Water							
Batch R3462458								
WG2312036-3 CRM		**WT-COLOUR-CRM**						
Color, Apparent			92.2		%		80-120	19-MAY-16
WG2312036-4 DUP		**L1770928-1**						
Color, Apparent		33.5	32.3		C.U.	3.9	20	19-MAY-16
WG2312036-1 MB								
Color, Apparent			<1.0		C.U.		1	19-MAY-16
EC-MF-WT	Water							
Batch R3462556								
WG2311613-2 DUP		**WG2311613-4**						
E. Coli		0	0		CFU/100mL	0.0	65	20-MAY-16
WG2311613-1 MB								
E. Coli			0		CFU/100mL		1	20-MAY-16
F1-HS-WT	Water							
Batch R3462029								
WG2311614-4 DUP		**WG2311614-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	20-MAY-16
WG2311614-1 LCS								
F1 (C6-C10)			114.9		%		80-120	20-MAY-16
WG2311614-2 MB								
F1 (C6-C10)			<100		ug/L		100	20-MAY-16
Surrogate: 3,4-Dichlorotoluene			107.0		%		60-140	20-MAY-16
WG2311614-5 MS		**WG2311614-3**						
F1 (C6-C10)			85.1		%		50-150	20-MAY-16
F2-F4-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3463404								
WG2312128-2 LCS								
F2 (C10-C16)			90.9		%		65-135	20-MAY-16
F3 (C16-C34)			93.9		%		65-135	20-MAY-16
F4 (C34-C50)			82.3		%		65-135	20-MAY-16
WG2312128-3 LCSD		**WG2312128-2**						
F2 (C10-C16)		90.9	90.7		%	0.2	50	20-MAY-16
F3 (C16-C34)		93.9	84.9		%	10	50	20-MAY-16
F4 (C34-C50)		82.3	72.6		%	13	50	20-MAY-16
WG2312128-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			105.3		%		60-140	20-MAY-16
Batch R3464563								
WG2312129-2 LCS								
F2 (C10-C16)			91.4		%		65-135	20-MAY-16
F3 (C16-C34)			93.7		%		65-135	20-MAY-16
F4 (C34-C50)			82.7		%		65-135	20-MAY-16
WG2312129-3 LCSD		**WG2312129-2**						
F2 (C10-C16)		91.4	94.0		%	2.8	50	20-MAY-16
F3 (C16-C34)		93.7	88.4		%	5.9	50	20-MAY-16
F4 (C34-C50)		82.7	78.2		%	5.6	50	20-MAY-16
WG2312129-1 MB								
F2 (C10-C16)			<100		ug/L		100	20-MAY-16
F3 (C16-C34)			<250		ug/L		250	20-MAY-16
F4 (C34-C50)			<250		ug/L		250	20-MAY-16
Surrogate: 2-Bromobenzotrifluoride			107.2		%		60-140	20-MAY-16
FC-MF-WT	Water							
Batch R3462550								
WG2311619-1 MB								
Fecal Coliforms			0		CFU/100mL		1	20-MAY-16
HG-D-CVAA-WT	Water							

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
HG-D-CVAA-WT	Water							
Batch R3461910								
WG2311743-4 DUP		**WG2311743-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	20-MAY-16
WG2311743-2 LCS								
Mercury (Hg)-Dissolved			102.0		%		80-120	20-MAY-16
WG2311743-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	20-MAY-16
WG2311743-6 MS		**WG2311743-5**						
Mercury (Hg)-Dissolved			89.5		%		70-130	20-MAY-16
MET-D-CCMS-WT	Water							
Batch R3461833								
WG2311767-4 DUP		**WG2311767-3**						
Arsenic (As)-Dissolved		0.00012	0.00010		mg/L	14	20	19-MAY-16
Boron (B)-Dissolved		0.019	0.020		mg/L	2.6	20	20-MAY-16
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	19-MAY-16
Chromium (Cr)-Dissolved		0.00065	0.00068		mg/L	4.2	20	19-MAY-16
Cobalt (Co)-Dissolved		0.00016	0.00016		mg/L	0.1	20	19-MAY-16
Copper (Cu)-Dissolved		0.00192	0.00193		mg/L	0.3	20	19-MAY-16
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	19-MAY-16
Lead (Pb)-Dissolved		<0.000050	<0.000050	RPD-NA	mg/L	N/A	20	20-MAY-16
Manganese (Mn)-Dissolved		0.00824	0.00825		mg/L	0.1	20	19-MAY-16
Molybdenum (Mo)-Dissolved		0.00107	0.00106		mg/L	1.3	20	20-MAY-16
Nickel (Ni)-Dissolved		0.00073	0.00075		mg/L	2.0	20	19-MAY-16
Zinc (Zn)-Dissolved		0.0012	0.0013		mg/L	10	20	19-MAY-16
WG2311767-2 LCS								
Arsenic (As)-Dissolved			99.9		%		80-120	19-MAY-16
Boron (B)-Dissolved			93.5		%		80-120	19-MAY-16
Cadmium (Cd)-Dissolved			97.9		%		80-120	19-MAY-16
Chromium (Cr)-Dissolved			99.4		%		80-120	19-MAY-16
Cobalt (Co)-Dissolved			99.1		%		80-120	19-MAY-16
Copper (Cu)-Dissolved			98.0		%		80-120	19-MAY-16
Iron (Fe)-Dissolved			104.1		%		80-120	19-MAY-16
Lead (Pb)-Dissolved			98.6		%		80-120	19-MAY-16
Manganese (Mn)-Dissolved			99.9		%		80-120	19-MAY-16
Molybdenum (Mo)-Dissolved			99.96		%		80-120	19-MAY-16
Nickel (Ni)-Dissolved			98.2		%		80-120	19-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3461833								
WG2311767-2 LCS								
Zinc (Zn)-Dissolved			94.9		%		80-120	19-MAY-16
WG2311767-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	19-MAY-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	19-MAY-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	19-MAY-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	19-MAY-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	19-MAY-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	19-MAY-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	19-MAY-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	19-MAY-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	19-MAY-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	19-MAY-16
WG2311767-5 MS		**WG2311767-3**						
Arsenic (As)-Dissolved			103.4		%		70-130	19-MAY-16
Boron (B)-Dissolved			91.1		%		70-130	19-MAY-16
Cadmium (Cd)-Dissolved			97.4		%		70-130	19-MAY-16
Chromium (Cr)-Dissolved			96.7		%		70-130	19-MAY-16
Cobalt (Co)-Dissolved			94.5		%		70-130	19-MAY-16
Copper (Cu)-Dissolved			91.4		%		70-130	19-MAY-16
Iron (Fe)-Dissolved			95.8		%		70-130	19-MAY-16
Lead (Pb)-Dissolved			93.1		%		70-130	19-MAY-16
Manganese (Mn)-Dissolved			93.6		%		70-130	19-MAY-16
Molybdenum (Mo)-Dissolved			95.5		%		70-130	19-MAY-16
Nickel (Ni)-Dissolved			92.1		%		70-130	19-MAY-16
Zinc (Zn)-Dissolved			97.4		%		70-130	19-MAY-16
NH3-WT	Water							
Batch R3462139								
WG2312146-3 DUP		**L1771411-4**						
Ammonia, Total (as N)		0.121	0.107		mg/L	12	20	20-MAY-16
WG2312146-7 DUP		**L1771084-1**						
Ammonia, Total (as N)		0.38	0.39		mg/L	3.7	20	20-MAY-16
WG2312146-2 LCS								

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3462139								
WG2312146-2 LCS								
Ammonia, Total (as N)			97.7		%		85-115	20-MAY-16
WG2312146-6 LCS								
Ammonia, Total (as N)			97.7		%		85-115	20-MAY-16
WG2312146-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312146-5 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312146-4 MS		**L1771411-4**						
Ammonia, Total (as N)			107.9		%		75-125	20-MAY-16
WG2312146-8 MS		**L1771084-1**						
Ammonia, Total (as N)			107.3		%		75-125	20-MAY-16
NO2-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Nitrite (as N)			103.3		%		70-130	20-MAY-16
WG2312426-16 MB								
Nitrite (as N)			<0.010		mg/L		0.01	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Nitrite (as N)			107.2		%		70-130	20-MAY-16
NO3-IC-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	20-MAY-16
WG2312426-17 LCS								
Nitrate (as N)			100.6		%		70-130	20-MAY-16
WG2312426-16 MB								
Nitrate (as N)			<0.020		mg/L		0.02	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Nitrate (as N)			104.7		%		70-130	20-MAY-16
P-T-COL-WT	Water							
Batch R3463796								
WG2313351-3 DUP		**L1771020-1**						
Phosphorus, Total		0.0234	0.0247		mg/L	5.2	20	24-MAY-16
WG2313351-2 LCS								

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3463796								
WG2313351-2 LCS								
Phosphorus, Total			99.99		%		80-120	24-MAY-16
WG2313351-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	24-MAY-16
WG2313351-4 MS		**L1771020-1**						
Phosphorus, Total			93.8		%		70-130	24-MAY-16
PAH-CCME-WT	Water							
Batch R3465515								
WG2312064-2 LCS								
Anthracene			104.4		%		50-140	26-MAY-16
Benzo(a)pyrene			114.3		%		60-130	26-MAY-16
WG2312064-3 LCSD		**WG2312064-2**						
Anthracene		104.4	107.0		%	2.4	50	26-MAY-16
Benzo(a)pyrene		114.3	116.7		%	2.1	50	26-MAY-16
WG2312064-1 MB								
Anthracene			<0.020		ug/L		0.02	26-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	26-MAY-16
Surrogate: d8-Naphthalene			106.9		%		60-140	26-MAY-16
Surrogate: d10-Phenanthrene			109.1		%		60-140	26-MAY-16
Surrogate: d12-Chrysene			108.2		%		60-140	26-MAY-16
Surrogate: d10-Acenaphthene			117.4		%		60-140	26-MAY-16
Surrogate: d9-Acridine (SS)			85.2		%		60-140	26-MAY-16
Batch R3466103								
WG2315754-2 LCS								
Anthracene			81.7		%		50-140	27-MAY-16
Benzo(a)pyrene			98.4		%		60-130	27-MAY-16
WG2315754-3 LCSD		**WG2315754-2**						
Anthracene		81.7	97.0		%	17	50	27-MAY-16
Benzo(a)pyrene		98.4	103.5		%	5.0	50	27-MAY-16
WG2315754-1 MB								
Anthracene			<0.020		ug/L		0.02	27-MAY-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	27-MAY-16
Surrogate: d8-Naphthalene			130.4		%		60-140	27-MAY-16
Surrogate: d10-Phenanthrene			113.7		%		60-140	27-MAY-16
Surrogate: d12-Chrysene			121.8		%		60-140	27-MAY-16
Surrogate: d10-Acenaphthene			107.4		%		60-140	27-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PAH-CCME-WT	Water							
Batch R3466103								
WG2315754-1 MB								
Surrogate: d9-Acridine (SS)			94.9		%		60-140	27-MAY-16
PH-WT	Water							
Batch R3462141								
WG2311682-12 DUP		**WG2311682-11**						
pH		7.87	7.87	J	pH units	0.00	0.2	19-MAY-16
WG2311682-10 LCS								
pH			7.02		pH units		6.9-7.1	19-MAY-16
PHENOLS-4AAP-WT	Water							
Batch R3463923								
WG2313542-11 DUP		**L1771020-2**						
Phenols (4AAP)		0.0010	0.0010		mg/L	1.0	20	24-MAY-16
WG2313542-7 DUP		**L1770809-6**						
Phenols (4AAP)		0.0036	0.0034		mg/L	4.9	20	24-MAY-16
WG2313542-10 LCS								
Phenols (4AAP)			106.7		%		85-115	24-MAY-16
WG2313542-6 LCS								
Phenols (4AAP)			106.5		%		85-115	24-MAY-16
WG2313542-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	24-MAY-16
WG2313542-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	24-MAY-16
WG2313542-12 MS		**L1771020-2**						
Phenols (4AAP)			106.0		%		75-125	24-MAY-16
WG2313542-8 MS		**L1770809-6**						
Phenols (4AAP)			100.9		%		75-125	24-MAY-16
SO4-IC-N-WT	Water							
Batch R3463288								
WG2312426-20 DUP		**WG2312426-18**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	20-MAY-16
WG2312426-17 LCS								
Sulfate (SO4)			100.8		%		90-110	20-MAY-16
WG2312426-16 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	20-MAY-16
WG2312426-19 MS		**WG2312426-18**						
Sulfate (SO4)			104.9		%		75-125	20-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R3464142								
WG2313365-3 DUP		**L1770279-7**						
Total Dissolved Solids		735	731		mg/L	0.6	20	24-MAY-16
WG2313365-2 LCS								
Total Dissolved Solids			98.4		%		85-115	24-MAY-16
WG2313365-1 MB								
Total Dissolved Solids			<10		mg/L		10	24-MAY-16
SOLIDS-TSS-WT	Water							
Batch R3463190								
WG2313029-3 DUP		**L1771020-5**						
Total Suspended Solids		27.0	26.0		mg/L	3.8	20	24-MAY-16
WG2313029-2 LCS								
Total Suspended Solids			100.6		%		85-115	24-MAY-16
WG2313029-1 MB								
Total Suspended Solids			<2.0		mg/L		2	24-MAY-16
TC-MF-WT	Water							
Batch R3462538								
WG2311623-1 MB								
Total Coliforms			0		CFU/100mL		1	20-MAY-16
TKN-WT	Water							
Batch R3463334								
WG2312118-3 DUP		**L1771020-6**						
Total Kjeldahl Nitrogen		16.2	15.0		mg/L	7.8	20	20-MAY-16
WG2312118-2 LCS								
Total Kjeldahl Nitrogen			97.1		%		75-125	20-MAY-16
WG2312118-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	20-MAY-16
WG2312118-4 MS		**L1771020-6**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	20-MAY-16
TURBIDITY-WT	Water							
Batch R3461370								
WG2311521-3 DUP		**L1770326-2**						
Turbidity		0.34	0.29	J	NTU	0.050	0.2	19-MAY-16
WG2311521-2 LCS								
Turbidity			101.0		%		85-115	19-MAY-16
WG2311521-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TURBIDITY-WT	Water							
Batch R3461717								
WG2311942-3 DUP		**L1770887-1**						
Turbidity		71.2	73.0		NTU	2.5	15	19-MAY-16
WG2311942-2 LCS								
Turbidity			99.5		%		85-115	19-MAY-16
WG2311942-1 MB								
Turbidity			<0.10		NTU		0.1	19-MAY-16

Quality Control Report

Workorder: L1771020 Report Date: 27-MAY-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

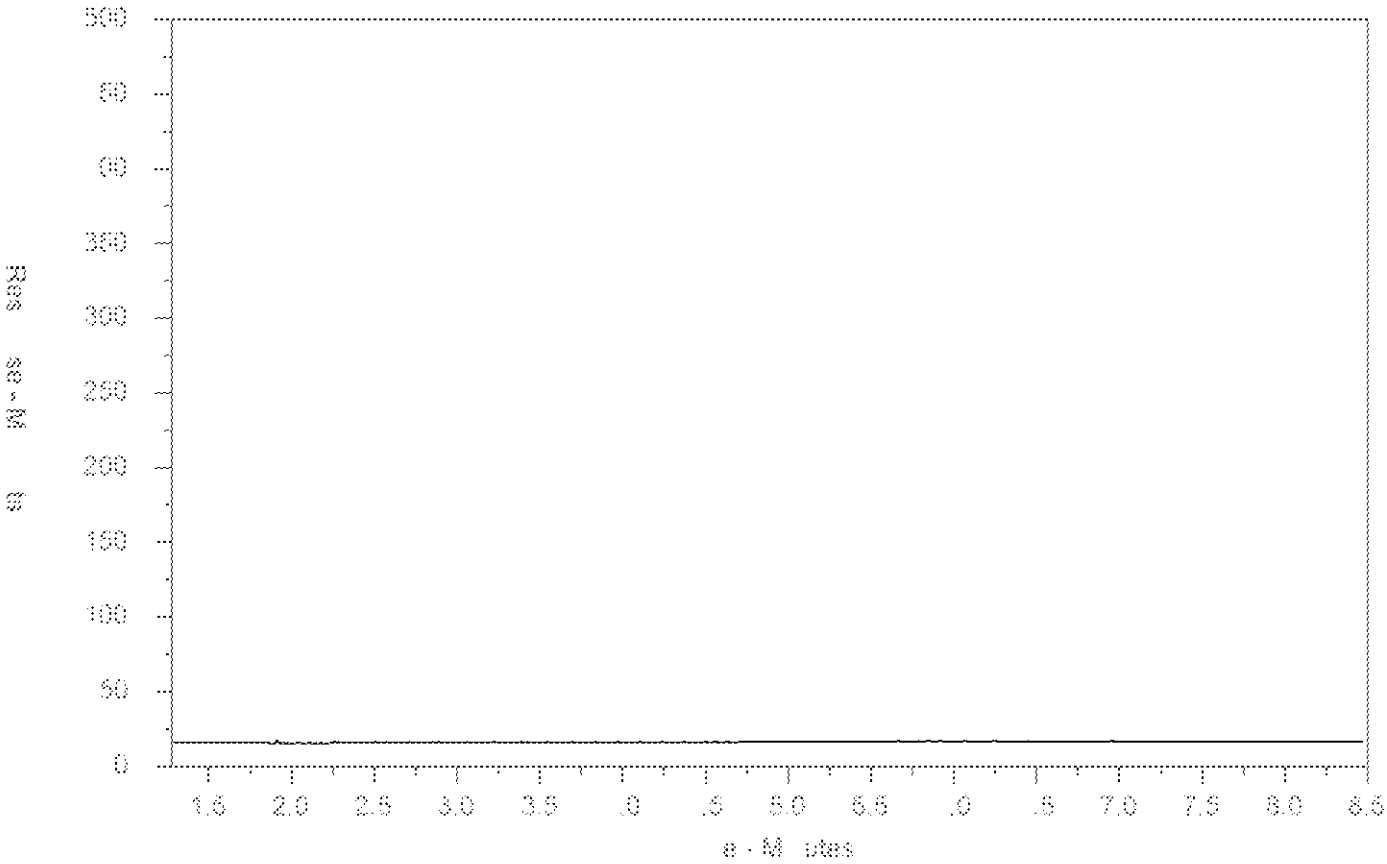
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-1
Client Sample ID: GW-45804-051816-TS-010



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

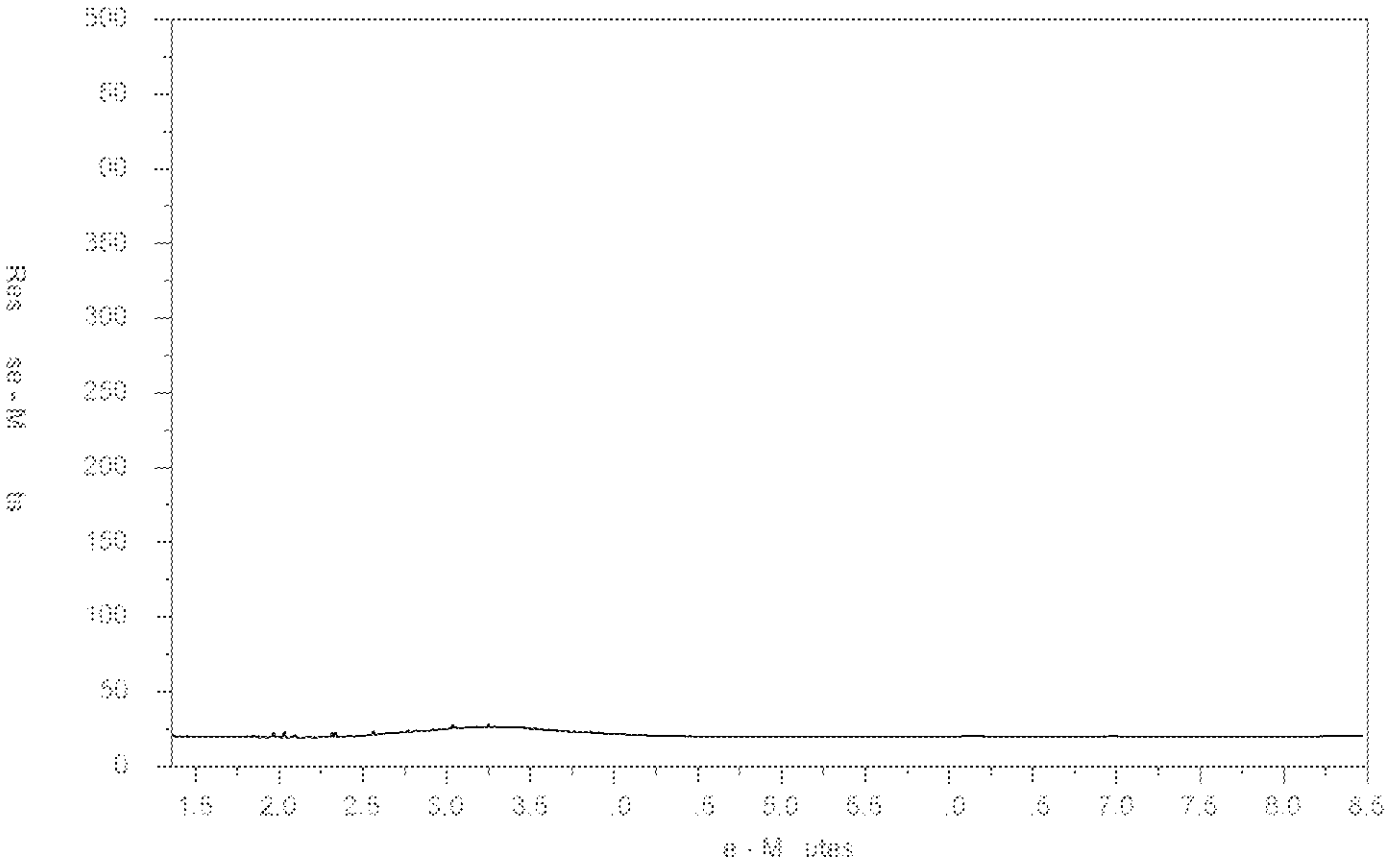
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-2
Client Sample ID: GW-45804-051816-TS-011



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

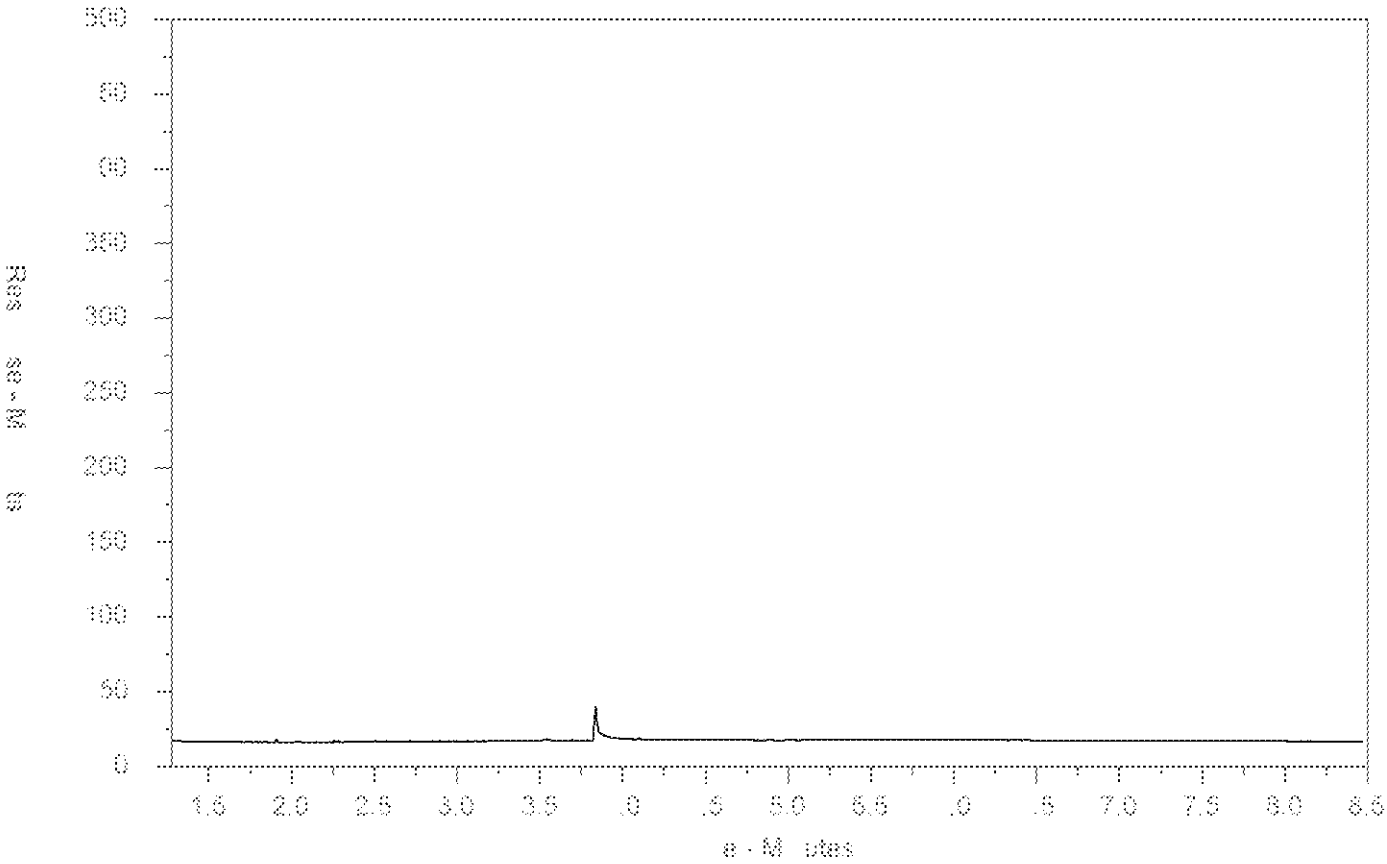
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-3
Client Sample ID: GW-45804-051816-TS-012



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

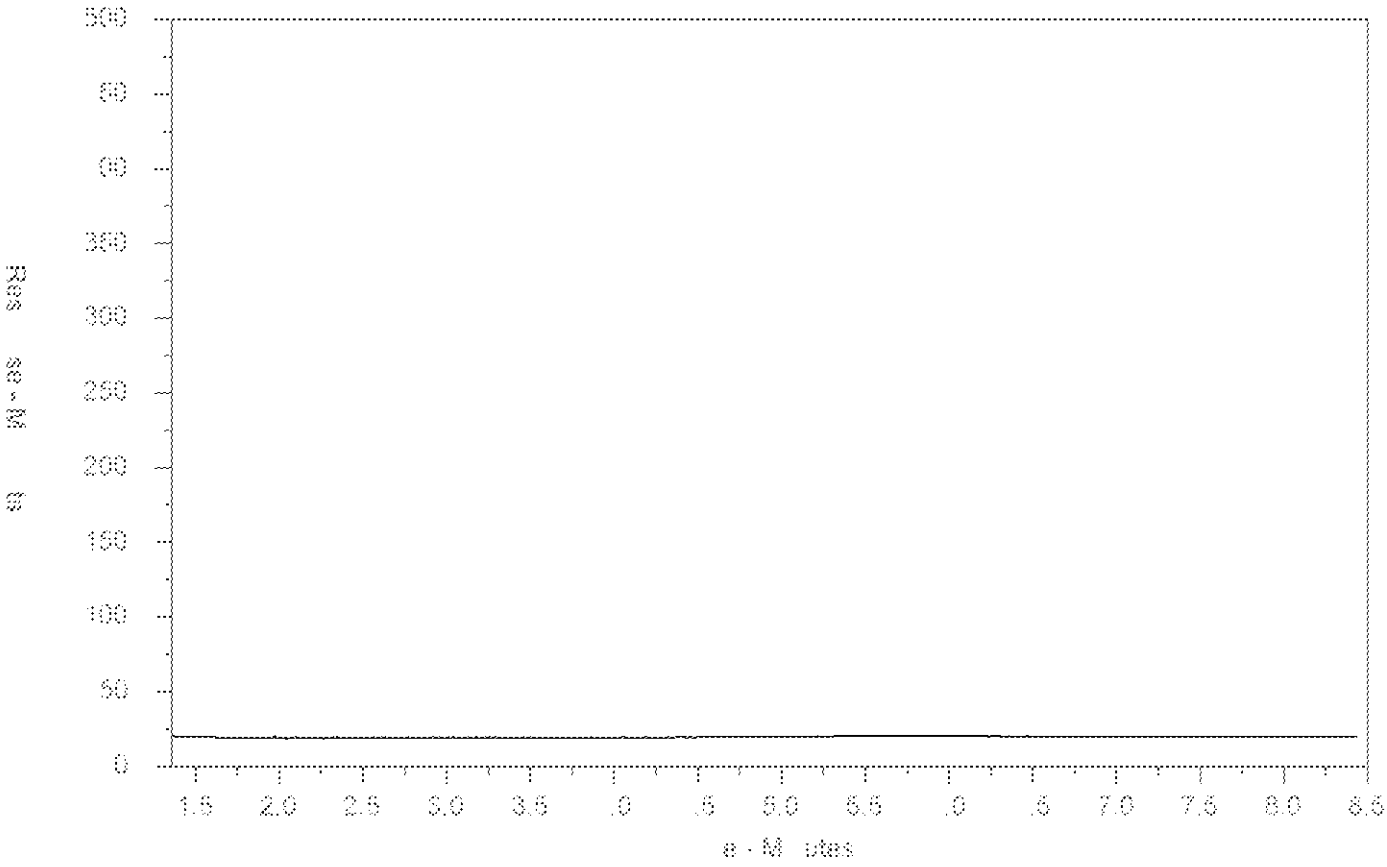
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-4
Client Sample ID: GW-45804-051816-TS-013



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

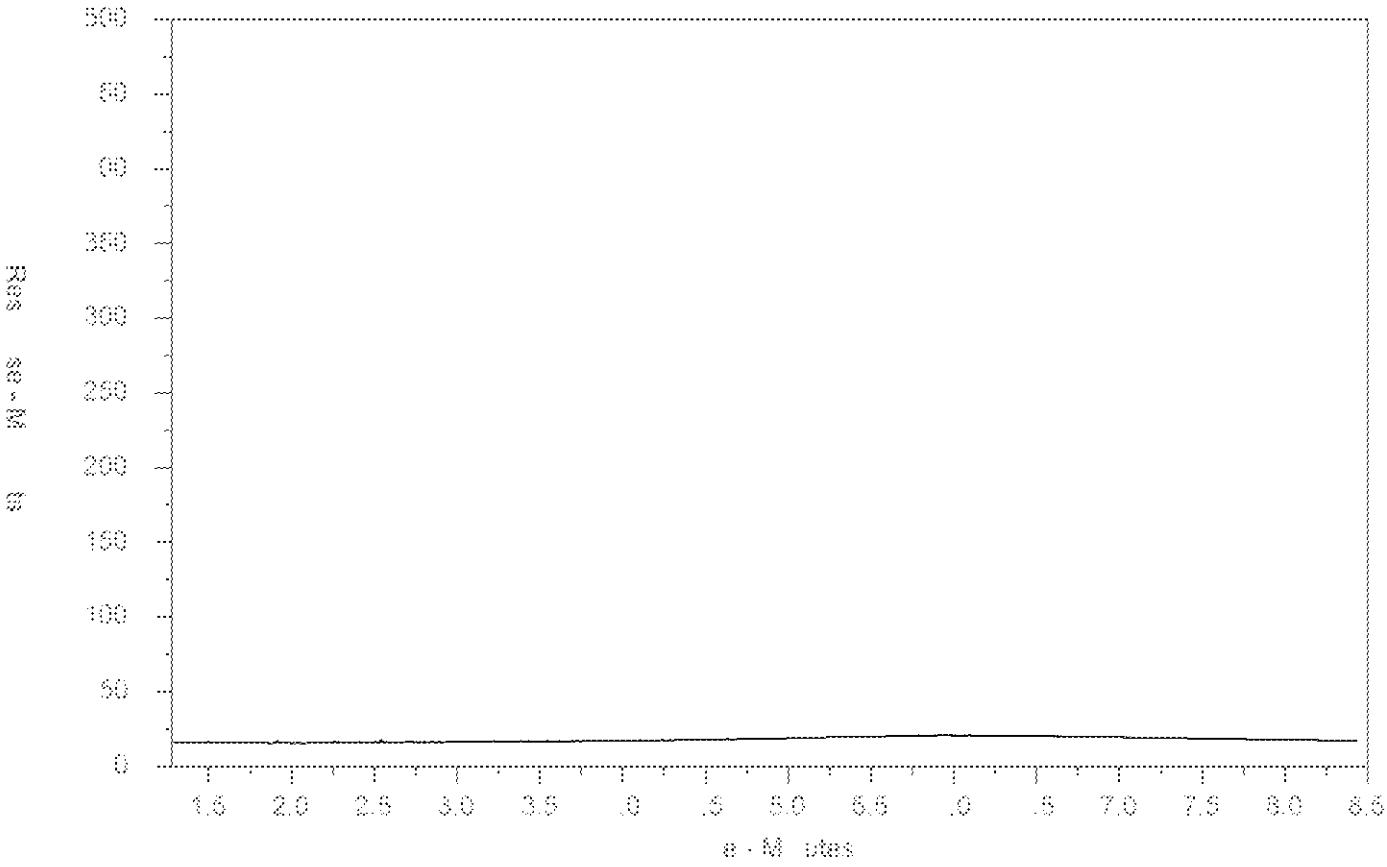
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-5
Client Sample ID: GW-45804-051816-TS-014



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

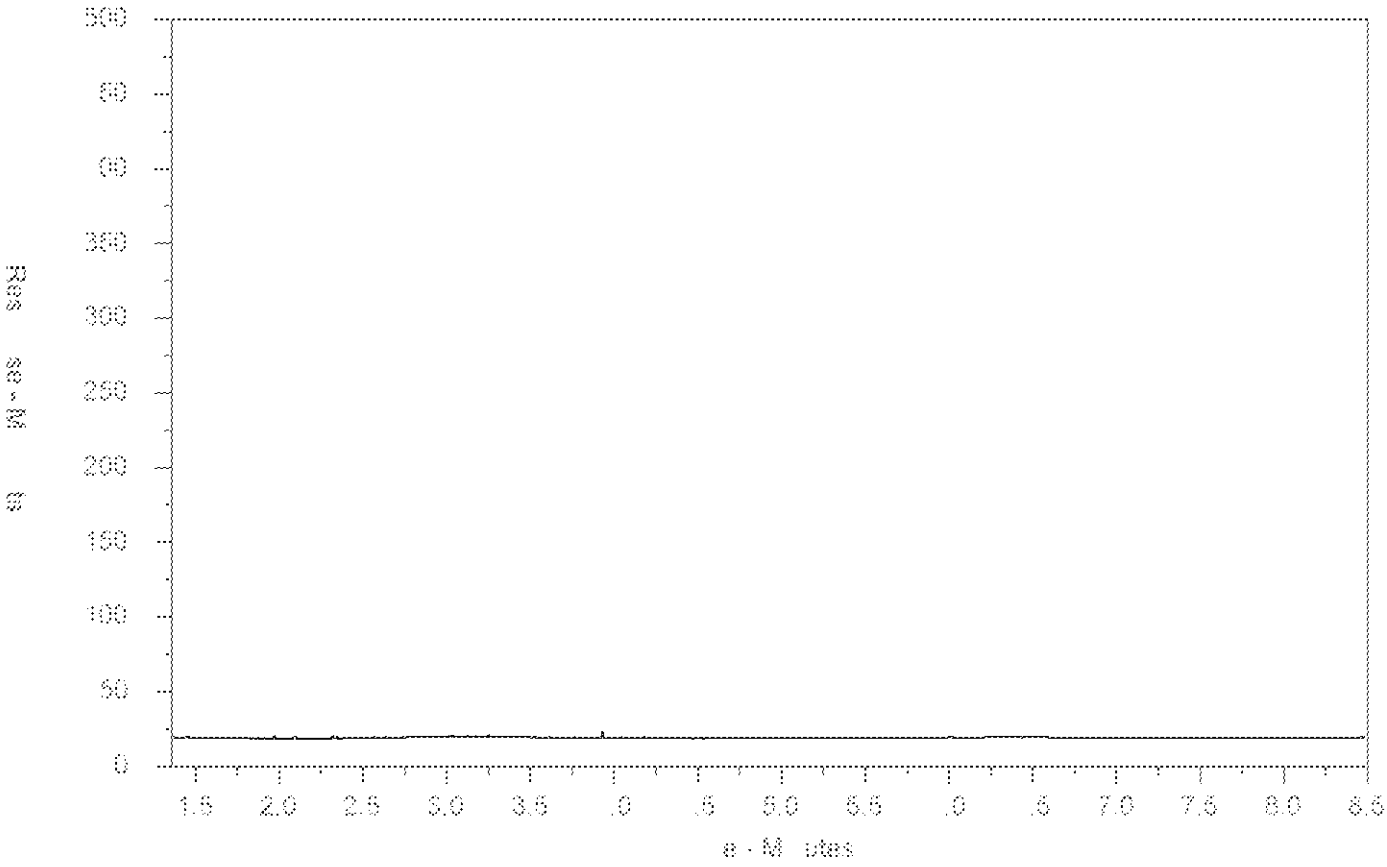
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-6
Client Sample ID: GW-45804-051816-TS-015



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

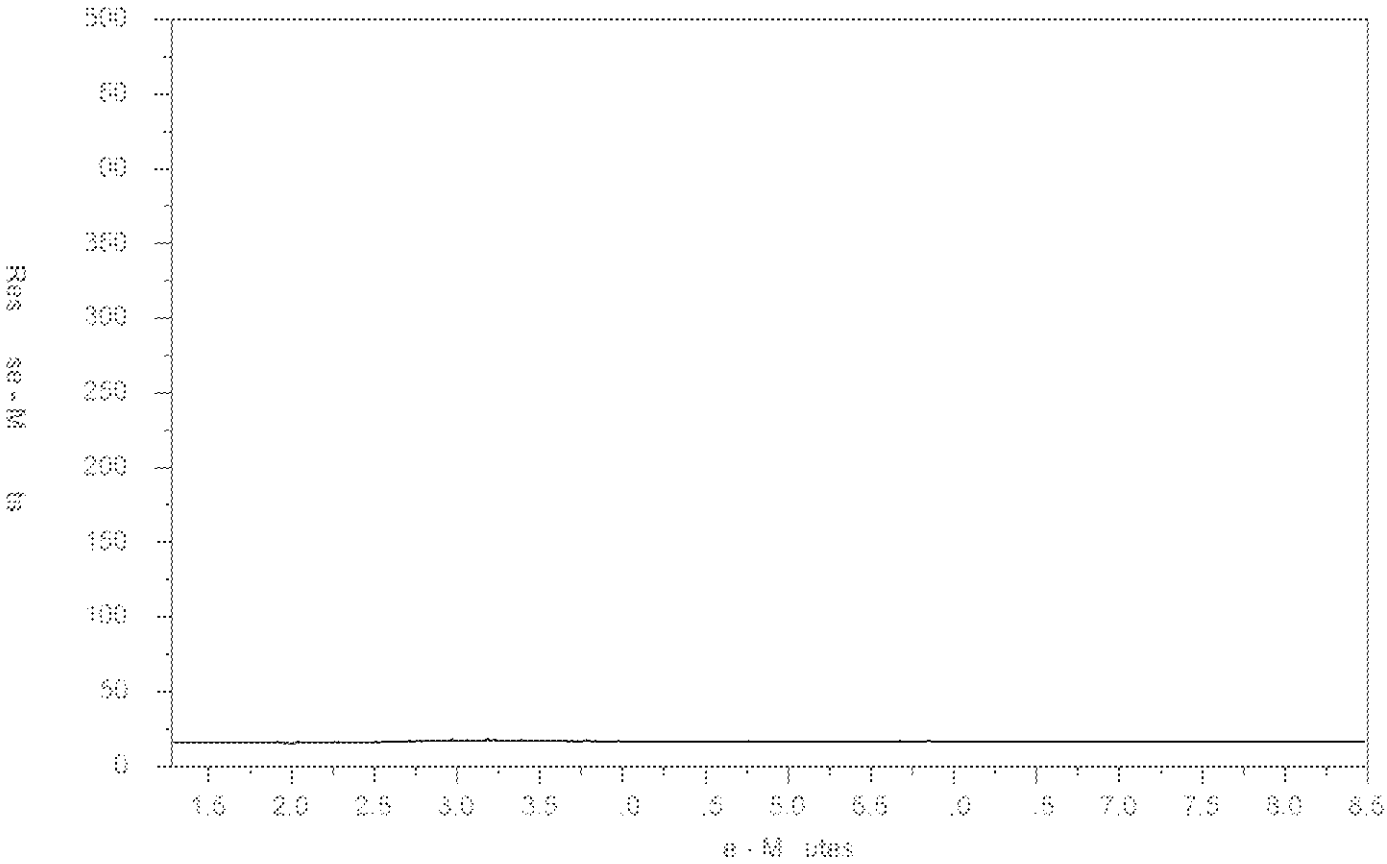
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-7
Client Sample ID: GW-45804-051816-TS-016



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

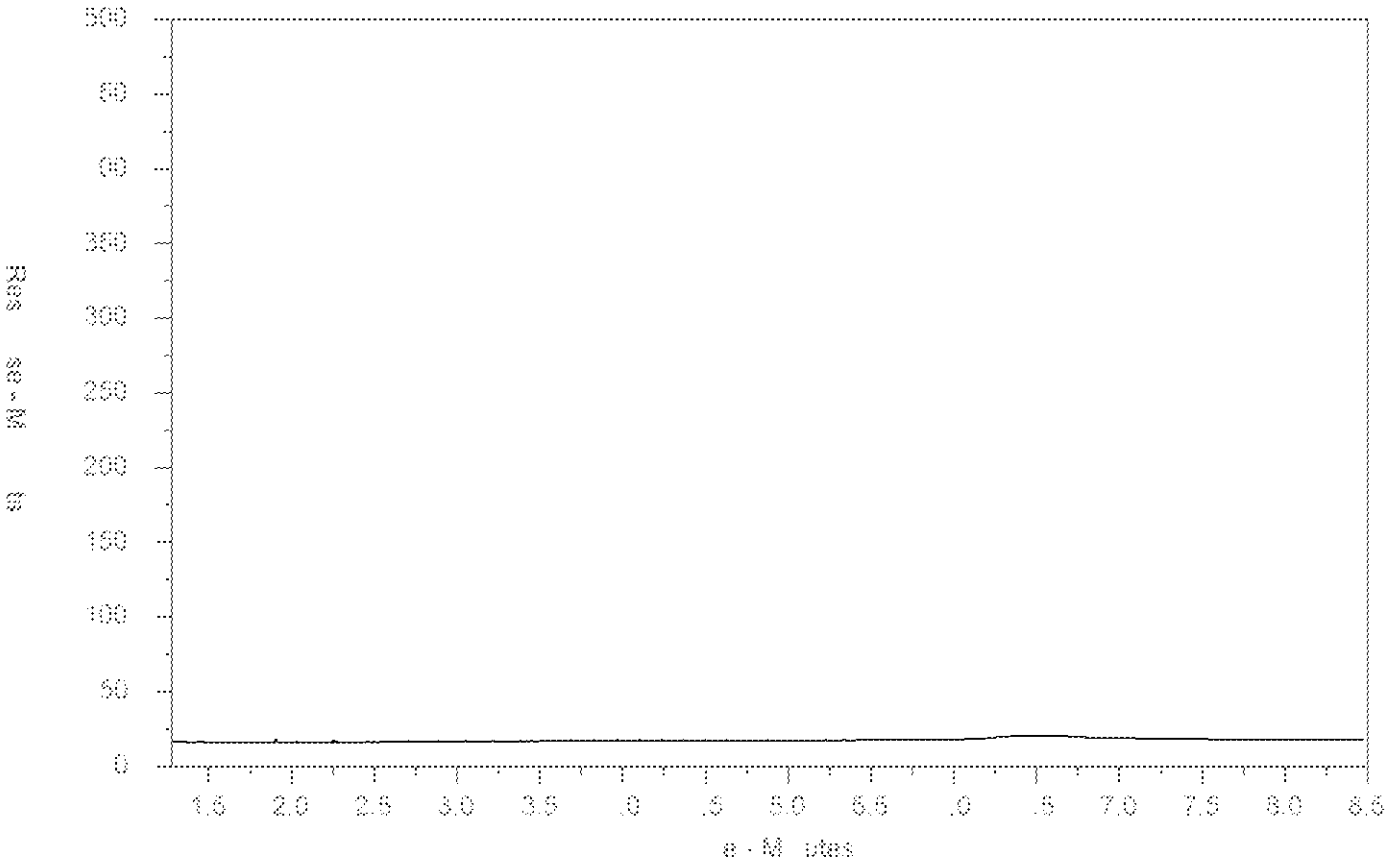
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-8
Client Sample ID: GW-45804-051816-TS-017



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

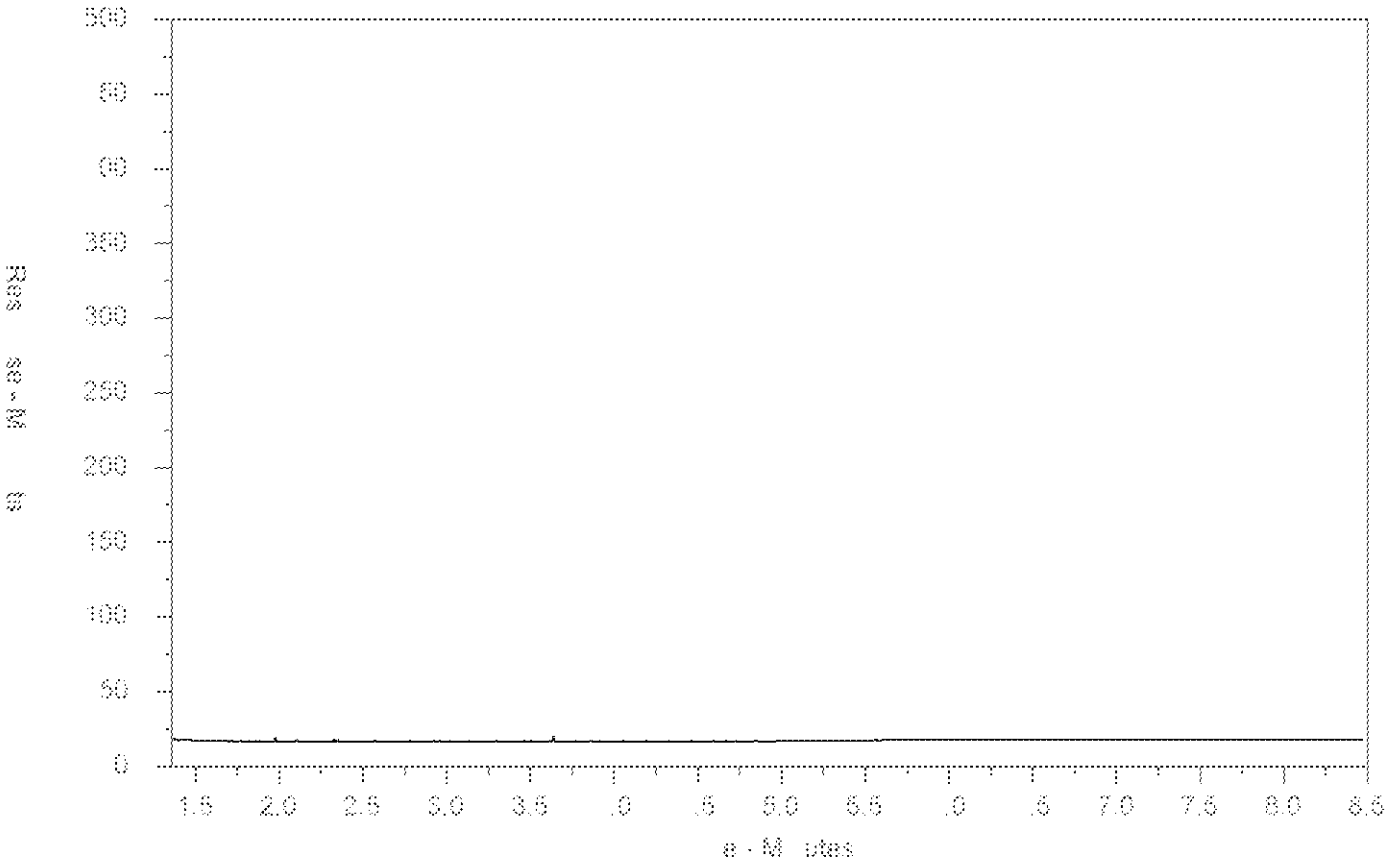
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1771020-9
Client Sample ID: GW-45804-051816-TS-018



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/ Lube Oils/ Grease →	
← Diesel/ Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

C of C # XXXXX
PAGE _1__ OF _1__

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

L1771020-COFC

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA: Crit
Reg 153/04
Table____
TCLP ____ MISA ____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX____
EMAIL airesse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both X

ANALYSIS REQUEST
INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)
SUBMISSION # L1771020
ENTERED BY: RM
DATE/TIME ENTERED: 19 MAY 16
BIN # 19B

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT			FIELD PH	FIELD TEMP	COMMENTS	LAB ID
	825			X			GW-45804- 05/18/16 -TS-0[illegible]10	15	X			8.22	18.12		1
	920			X			GW-45804- -TS-0[illegible]11	15	X			8.22	10.63		2
	945			X			GW-45804- -TS-0[illegible]12	15	X			7.88	15.91		3
	1015			X			GW-45804- -TS-0[illegible]13	15	X			7.80	16.40		4
	1050			X			GW-45804- -TS-0[illegible]14	15	X			8.65	19.81		5
	1125			X			GW-45804- -TS-0[illegible]15	15	X			7.64	10.31		6
	1215			X			GW-45804- -TS-0[illegible]16	15	X			8.16	11.99		7
	1245			X			GW-45804- -TS-0[illegible]17	15	X			8.32	13.77		8
	1300			X			GW-45804- -TS-0[illegible]18	15	X			Field Blank			9
				X			GW-45804- -TS-0[illegible]	15	X						

SPECIAL INSTRUCTIONS/COMMENTS
PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
SEE PO FOR GW PARAMETER LIST. USE PARENT CODE ABOVE.

SAMPLE CONDITION
FROZEN
COLD
COOLING INITIATED
AMBIENT
MEAN TEMP 6.9
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____
INIT MR

SAMPLED BY: T.Saunders	DATE & TIME 5/18/16	RECEIVED BY:	DATE & TIME 5/18/16
RELINQUISHED BY: T.Saunders	DATE & TIME 5/18/16	RECEIVED AT LAB BY:	DATE & TIME 5/19/16 9:00

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

003523

8.2

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 16-AUG-16
Report Date: 23-AUG-16 10:54 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1814405
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-1 GW-45804-081616-TS-001 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.73		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.9		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	107		1.0	CU		17-AUG-16	R3528517
pH	7.60		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	15.5		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1530	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	52.6		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	449		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0476		0.0012	mg/L		18-AUG-16	
Ammonia, Total (as N)	16.1	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	81.3	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	16.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0381		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	671	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.4		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	4		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.08	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	0.536	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00807	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-1 GW-45804-081616-TS-001 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Aggregate Organics							
COD	18		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0016		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	101.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	83.6		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	95.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	64.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	102.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	92.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	99.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.73		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.9		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	88.0		1.0	CU		17-AUG-16	R3528517
pH	7.60		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	6.1		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1520	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	49.6		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	451		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0475		0.0012	mg/L		18-AUG-16	
Ammonia, Total (as N)	16.0	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	87.7	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	16.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0393		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	722	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Organic / Inorganic Carbon							
Dissolved Organic Carbon	5.1		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	3		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.13	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	0.534	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00831	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.412	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	18		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0034		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	102.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	86.7		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	94.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	62.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	98.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	89.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	98.0		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-2 GW-45804-081616-TS-002 Sampled By: T. SAUNDERS on 16-AUG-16 @ 07:45 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
L1814405-3 GW-45804-081616-TS-003 Sampled By: T. SAUNDERS on 16-AUG-16 @ 08:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.72		0.10	pH		17-AUG-16	R3527654
Temperature, Client	22.7		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	237		1.0	CU		17-AUG-16	R3528517
pH	7.54		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	18.0	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1370	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	94.5		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	533	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0906		0.0061	mg/L		18-AUG-16	
Ammonia, Total (as N)	29.5	DLHC	2.0	mg/L		18-AUG-16	R3528572
Chloride (Cl)	85.7	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	32.3	DLHC	0.75	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0969		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	528	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.3		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	2		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0087	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	7.07	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	1.09	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0160	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-3 GW-45804-081616-TS-003 Sampled By: T. SAUNDERS on 16-AUG-16 @ 08:30 Matrix: WATER							
Dissolved Metals							
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	35		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0044		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	101.1		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	88.1		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	0.032		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	0.0451		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	81.9		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	69.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	106.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	75.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	90.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.42		0.10	pH		17-AUG-16	R3527654
Temperature, Client	21.7		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	141		1.0	CU		17-AUG-16	R3528517
pH	7.68		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	104	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1300	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	91.5		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	415		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0766		0.0028	mg/L		18-AUG-16	
Ammonia, Total (as N)	5.41	DLHC	0.20	mg/L		18-AUG-16	R3528572
Chloride (Cl)	61.3	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	15.6	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Anions and Nutrients							
Total Kjeldahl Nitrogen	5.97		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0449		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	519	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	9.2		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	0		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	100	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0035	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.10	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.0020	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	14.5	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	8.13	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0130	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.012	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	48		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0042		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528242
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	330		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	106.8		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	87.4		60-140	%		18-AUG-16	R3528242
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	0.0554		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	80.9		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-4 GW-45804-081616-TS-004 Sampled By: T. SAUNDERS on 16-AUG-16 @ 09:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Surrogate: d9-Acridine (SS)	64.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	96.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	75.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	95.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-5 GW-45804-081616-TS-005 Sampled By: T. SAUNDERS on 16-AUG-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.81		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.4		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	260		1.0	CU		17-AUG-16	R3528517
pH	7.63		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	9.0	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	810	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	66.0		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	322		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.00369		0.00011	mg/L		18-AUG-16	
Ammonia, Total (as N)	1.34	DLHC	0.040	mg/L		18-AUG-16	R3528572
Chloride (Cl)	101	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	2.07		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0156		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	223	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.5		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	6		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	50	DLM	10	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	3200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.00817		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Boron (B)-Dissolved	0.046		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	18-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.00194		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.00020		0.00020	mg/L	17-AUG-16	18-AUG-16	R3528168
Iron (Fe)-Dissolved	5.93		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-5 GW-45804-081616-TS-005 Sampled By: T. SAUNDERS on 16-AUG-16 @ 10:30 Matrix: WATER							
Dissolved Metals							
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.79	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.00983		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Nickel (Ni)-Dissolved	0.00436		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.0124		0.0010	mg/L	17-AUG-16	18-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	39		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0032		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	100.5		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	75.1		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	78.7		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	94.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	69.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	92.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.97		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.3		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	216	DLHC	2.0	CU		17-AUG-16	R3528517
pH	7.74		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	6.2		2.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	1550	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	60.3		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	518	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0285		0.00079	mg/L		18-AUG-16	
Ammonia, Total (as N)	7.18	DLHC	0.20	mg/L		18-AUG-16	R3528572

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Anions and Nutrients							
Chloride (Cl)	148	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	7.70		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0820		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	580	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.0		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	1		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	60	DLM	10	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	3900	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0016	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.11	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	4.96	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.37	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0107	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	44		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0060		0.0010	mg/L		20-AUG-16	R3530068
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	107.2		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	73.7		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-6 GW-45804-081616-TS-006 Sampled By: T. SAUNDERS on 16-AUG-16 @ 11:30 Matrix: WATER							
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	81.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	69.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	101.9		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	72.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	95.1		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-7 GW-45804-081616-TS-007 Sampled By: T. SAUNDERS on 16-AUG-16 @ 12:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.95		0.10	pH		17-AUG-16	R3527654
Temperature, Client	18.6		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	243		1.0	CU		17-AUG-16	R3528517
pH	7.54		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	20.2	DLHC	4.0	mg/L	20-AUG-16	20-AUG-16	R3530146
Total Dissolved Solids	2350	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	136		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	533	DLHC	20	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0669		0.0015	mg/L		18-AUG-16	
Ammonia, Total (as N)	17.4	DLHC	0.40	mg/L		18-AUG-16	R3528572
Chloride (Cl)	656	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	18.4	DLHC	0.30	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.135		0.0030	mg/L	18-AUG-16	18-AUG-16	R3528855
Sulfate (SO4)	405	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.4		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	1		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	23		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	600	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.0020	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	0.12	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-7 GW-45804-081616-TS-007 Sampled By: T. SAUNDERS on 16-AUG-16 @ 12:30 Matrix: WATER							
Dissolved Metals							
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	10.3	DLHC	0.10	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	3.58	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0174	DLHC	0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	74		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0056		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	98.7		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	72.0		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	67.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	64.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	97.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	60.6		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	81.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.26		0.10	pH		17-AUG-16	R3527654
Temperature, Client	14.6		-50	Deg. C		17-AUG-16	R3527654
Physical Tests							
Colour, Apparent	63.1		1.0	CU		17-AUG-16	R3528517
pH	7.69		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	22.3		2.0	mg/L	20-AUG-16	20-AUG-16	R3530133
Total Dissolved Solids	1370	DLDS	20	mg/L		21-AUG-16	R3530791
Turbidity	30.5		0.10	NTU		17-AUG-16	R3527518

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Physical Tests							
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	467		10	mg/L		17-AUG-16	R3528450
Unionized ammonia	0.0190		0.00058	mg/L		18-AUG-16	
Ammonia, Total (as N)	3.26	DLHC	0.10	mg/L		18-AUG-16	R3528572
Chloride (Cl)	107	DLDS	2.5	mg/L		18-AUG-16	R3529329
Nitrate (as N)	0.24	DLDS	0.10	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	3.43		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	0.0684		0.0030	mg/L	19-AUG-16	19-AUG-16	R3528874
Sulfate (SO4)	503	DLDS	1.5	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.7		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	15		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	200	DLM	100	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	0.00074		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Boron (B)-Dissolved	0.180		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	18-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Cobalt (Co)-Dissolved	0.00039		0.00010	mg/L	17-AUG-16	18-AUG-16	R3528168
Copper (Cu)-Dissolved	0.00056		0.00020	mg/L	17-AUG-16	18-AUG-16	R3528168
Iron (Fe)-Dissolved	0.838		0.010	mg/L	17-AUG-16	18-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Manganese (Mn)-Dissolved	1.06		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	0.0170		0.000050	mg/L	17-AUG-16	18-AUG-16	R3528168
Nickel (Ni)-Dissolved	0.00222		0.00050	mg/L	17-AUG-16	18-AUG-16	R3528168
Zinc (Zn)-Dissolved	0.0037		0.0010	mg/L	17-AUG-16	18-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	39		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0039		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		18-AUG-16	R3528097
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-8 GW-45804-081616-TS-008 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:00 Matrix: WATER							
Hydrocarbons							
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	108.2		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	74.5		60-140	%		18-AUG-16	R3528097
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	77.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	67.0		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	93.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	67.5		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	86.3		60-140	%	18-AUG-16	22-AUG-16	R3530792
L1814405-9 GW-45804-081616-TS-009 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:30 Matrix: WATER							
Physical Tests							
Colour, Apparent	<1.0		1.0	CU		17-AUG-16	R3528517
pH	7.11		0.10	pH units		18-AUG-16	R3528145
Total Suspended Solids	<2.0		2.0	mg/L	20-AUG-16	20-AUG-16	R3530133
Total Dissolved Solids	<10		10	mg/L		21-AUG-16	R3530791
Turbidity	0.15		0.10	NTU		17-AUG-16	R3527518
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	<10		10	mg/L		17-AUG-16	R3528450
Ammonia, Total (as N)	<0.020		0.020	mg/L		18-AUG-16	R3528572
Chloride (Cl)	<0.50		0.50	mg/L		18-AUG-16	R3529329
Nitrate (as N)	<0.020		0.020	mg/L		18-AUG-16	R3529329
Nitrite (as N)	<0.010		0.010	mg/L		18-AUG-16	R3529329
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	18-AUG-16	18-AUG-16	R3528765
Phosphorus, Total	<0.0030		0.0030	mg/L	19-AUG-16	19-AUG-16	R3528874
Sulfate (SO4)	<0.30		0.30	mg/L		18-AUG-16	R3529329
Organic / Inorganic Carbon							
Dissolved Organic Carbon	<1.0		1.0	mg/L		17-AUG-16	R3528829
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		18-AUG-16	R3528658
Fecal Coliforms	0		0	CFU/100mL		18-AUG-16	R3528644
Total Coliforms	0		0	CFU/100mL		18-AUG-16	R3528636
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					18-AUG-16	R3528239
Dissolved Metals Filtration Location	FIELD					17-AUG-16	R3527502
Arsenic (As)-Dissolved	<0.00010		0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Boron (B)-Dissolved	<0.010		0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	17-AUG-16	17-AUG-16	R3528168
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1814405-9 GW-45804-081616-TS-009 Sampled By: T. SAUNDERS on 16-AUG-16 @ 13:30 Matrix: WATER							
Dissolved Metals							
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	17-AUG-16	17-AUG-16	R3528168
Copper (Cu)-Dissolved	0.00021		0.00020	mg/L	17-AUG-16	17-AUG-16	R3528168
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	17-AUG-16	17-AUG-16	R3528168
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	17-AUG-16	R3528168
Manganese (Mn)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	18-AUG-16	18-AUG-16	R3528357
Molybdenum (Mo)-Dissolved	<0.000050		0.000050	mg/L	17-AUG-16	17-AUG-16	R3528168
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	17-AUG-16	17-AUG-16	R3528168
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	17-AUG-16	17-AUG-16	R3528168
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-AUG-16	22-AUG-16	R3530904
COD	12		10	mg/L		18-AUG-16	R3528872
Phenols (4AAP)	0.0042		0.0010	mg/L		21-AUG-16	R3530139
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		19-AUG-16	R3528930
F2 (C10-C16)	<100		100	ug/L	18-AUG-16	18-AUG-16	R3531531
F3 (C16-C34)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
F4 (C34-C50)	<250		250	ug/L	18-AUG-16	18-AUG-16	R3531531
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-AUG-16	
Chrom. to baseline at nC50	YES				18-AUG-16	18-AUG-16	R3531531
Surrogate: 2-Bromobenzotrifluoride	96.9		60-140	%	18-AUG-16	18-AUG-16	R3531531
Surrogate: 3,4-Dichlorotoluene	99.6		60-140	%		19-AUG-16	R3528930
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-AUG-16	22-AUG-16	R3530792
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Acenaphthene	77.2		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d9-Acridine (SS)	67.8		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d12-Chrysene	93.1		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d8-Naphthalene	68.4		60-140	%	18-AUG-16	22-AUG-16	R3530792
Surrogate: d10-Phenanthrene	86.7		60-140	%	18-AUG-16	22-AUG-16	R3530792

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Dissolved	DLHC	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Ammonia, Total (as N)	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1814405-1, -2, -3, -4, -5, -6, -7, -8, -9

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT Water Dissolved Organic Carbon APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT Water Chloride by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT Water Chemical Oxygen Demand APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT Water Colour APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT Water E. coli SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h. Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT Water Un-ionized ammonia CALCULATION

F1-F4-CALC-WT Water CCME Total Hydrocarbons CCME CWS-PHC, Pub #1310, Dec 2001-L

Reference Information

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.
4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The extracts are treated with silica gel to remove polar contaminants. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with

Reference Information

benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT	Water	pH & Temperature	Results supplied by client
PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3528450								
WG2369989-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			97.2		%		80-120	17-AUG-16
WG2369989-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			101.5		%		80-120	17-AUG-16
WG2369989-4 DUP		**L1813751-2**						
Alkalinity, Total (as CaCO3)		2090	2150		mg/L	2.8	20	17-AUG-16
WG2369989-8 DUP		**L1814405-5**						
Alkalinity, Total (as CaCO3)		322	325		mg/L	0.8	20	17-AUG-16
WG2369989-2 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	17-AUG-16
WG2369989-6 LCS								
Alkalinity, Total (as CaCO3)			99.5		%		85-115	17-AUG-16
WG2369989-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-AUG-16
WG2369989-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	17-AUG-16
BOD-C-WT	Water							
Batch R3530904								
WG2369592-10 DUP		**L1814273-1**						
BOD Carbonaceous		2.2	2.1		mg/L	1.9	20	22-AUG-16
WG2369592-6 DUP		**L1813702-1**						
BOD Carbonaceous		2.5	2.5		mg/L	2.4	20	22-AUG-16
WG2369592-11 LCS								
BOD Carbonaceous			98.5		%		85-115	22-AUG-16
WG2369592-7 LCS								
BOD Carbonaceous			92.9		%		85-115	22-AUG-16
WG2369592-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-AUG-16
WG2369592-9 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-AUG-16
C-DIS-ORG-WT	Water							
Batch R3528829								
WG2370083-3 DUP		**L1814405-9**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	17-AUG-16
WG2370083-2 LCS								
Dissolved Organic Carbon			99.6		%		80-120	17-AUG-16
WG2370083-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-DIS-ORG-WT	Water							
Batch R3528829								
WG2370083-4 MS		**L1814405-9**						
Dissolved Organic Carbon			99.0		%		70-130	17-AUG-16
CL-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Chloride (Cl)			101.2		%		70-130	18-AUG-16
WG2370306-11 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Chloride (Cl)			107.0		%		70-130	18-AUG-16
COD-T-WT	Water							
Batch R3528872								
WG2370939-3 DUP		**L1815800-6**						
COD		16	16		mg/L	1.3	20	18-AUG-16
WG2370939-2 LCS								
COD			102.3		%		85-115	18-AUG-16
WG2370939-1 MB								
COD			<10		mg/L		10	18-AUG-16
WG2370939-4 MS		**L1815800-6**						
COD			90.8		%		75-125	18-AUG-16
COLOUR-WT	Water							
Batch R3528517								
WG2369991-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			96.2		%		80-120	17-AUG-16
WG2369991-4 DUP		**L1814306-1**						
Colour, Apparent		15.7	17.0		CU	7.9	20	17-AUG-16
WG2369991-2 LCS								
Colour, Apparent			96.2		%		80-120	17-AUG-16
WG2369991-1 MB								
Colour, Apparent			<1.0		CU		1	17-AUG-16
EC-MF-WT	Water							

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3528658								
WG2369453-2 DUP		**WG2369453-4**						
E. Coli		4	3		CFU/100mL	29	65	18-AUG-16
WG2369453-1 MB								
E. Coli			0		CFU/100mL		1	18-AUG-16
F1-HS-WT	Water							
Batch R3528097								
WG2369753-4 DUP		**WG2369753-3**						
F1 (C6-C10)		130	150		ug/L	13	50	18-AUG-16
WG2369753-1 LCS								
F1 (C6-C10)			81.1		%		80-120	18-AUG-16
WG2369753-2 MB								
F1 (C6-C10)			<100		ug/L		100	18-AUG-16
Surrogate: 3,4-Dichlorotoluene			79.8		%		60-140	18-AUG-16
Batch R3528242								
WG2367593-4 DUP		**WG2367593-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	18-AUG-16
WG2367593-1 LCS								
F1 (C6-C10)			96.3		%		80-120	18-AUG-16
WG2367593-2 MB								
F1 (C6-C10)			<100		ug/L		100	18-AUG-16
Surrogate: 3,4-Dichlorotoluene			99.4		%		60-140	18-AUG-16
Batch R3528930								
WG2364295-4 DUP		**WG2364295-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	19-AUG-16
WG2364295-1 LCS								
F1 (C6-C10)			95.9		%		80-120	19-AUG-16
WG2364295-2 MB								
F1 (C6-C10)			<100		ug/L		100	19-AUG-16
Surrogate: 3,4-Dichlorotoluene			102.1		%		60-140	19-AUG-16
F2-F4-WT	Water							
Batch R3531531								
WG2370152-2 LCS								
F2 (C10-C16)			99.96		%		65-135	18-AUG-16
F3 (C16-C34)			98.4		%		65-135	18-AUG-16
F4 (C34-C50)			97.8		%		65-135	18-AUG-16
WG2370152-3 LCSD		**WG2370152-2**						
F2 (C10-C16)		99.96	93.1		%	7.1	50	18-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3531531								
WG2370152-3 LCSD		**WG2370152-2**						
F3 (C16-C34)		98.4	93.7		%	4.9	50	18-AUG-16
F4 (C34-C50)		97.8	92.9		%	5.2	50	18-AUG-16
WG2370152-1 MB								
F2 (C10-C16)			<100		ug/L		100	18-AUG-16
F3 (C16-C34)			<250		ug/L		250	18-AUG-16
F4 (C34-C50)			<250		ug/L		250	18-AUG-16
Surrogate: 2-Bromobenzotrifluoride			100.2		%		60-140	18-AUG-16
FC-MF-WT	Water							
Batch R3528644								
WG2369450-2 DUP		**WG2369450-4**						
Fecal Coliforms		0	0		CFU/100mL	0.0	65	18-AUG-16
WG2369450-1 MB								
Fecal Coliforms			0		CFU/100mL		1	18-AUG-16
HG-D-CVAA-WT	Water							
Batch R3528357								
WG2370370-3 DUP		**L1814405-1**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	18-AUG-16
WG2370370-2 LCS								
Mercury (Hg)-Dissolved			103.0		%		80-120	18-AUG-16
WG2370370-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	18-AUG-16
WG2370370-4 MS		**L1814405-2**						
Mercury (Hg)-Dissolved			99.3		%		70-130	18-AUG-16
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-4 DUP		**WG2369579-3**						
Arsenic (As)-Dissolved		0.0087	0.0085		mg/L	1.6	20	17-AUG-16
Boron (B)-Dissolved		0.12	0.12		mg/L	0.1	20	17-AUG-16
Cadmium (Cd)-Dissolved		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	17-AUG-16
Chromium (Cr)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-AUG-16
Cobalt (Co)-Dissolved		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	17-AUG-16
Copper (Cu)-Dissolved		<0.0020	<0.0020	RPD-NA	mg/L	N/A	20	17-AUG-16
Iron (Fe)-Dissolved		7.07	7.13		mg/L	0.8	20	17-AUG-16
Lead (Pb)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	17-AUG-16
Manganese (Mn)-Dissolved		1.09	1.09		mg/L	0.6	20	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-4 DUP		**WG2369579-3**						
Molybdenum (Mo)-Dissolved		0.0160	0.0160		mg/L	0.2	20	17-AUG-16
Nickel (Ni)-Dissolved		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	17-AUG-16
Zinc (Zn)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	17-AUG-16
WG2369579-2 LCS								
Arsenic (As)-Dissolved			94.4		%		80-120	17-AUG-16
Boron (B)-Dissolved			95.5		%		80-120	17-AUG-16
Cadmium (Cd)-Dissolved			96.7		%		80-120	17-AUG-16
Chromium (Cr)-Dissolved			97.1		%		80-120	17-AUG-16
Cobalt (Co)-Dissolved			96.8		%		80-120	17-AUG-16
Copper (Cu)-Dissolved			94.5		%		80-120	17-AUG-16
Iron (Fe)-Dissolved			97.2		%		80-120	17-AUG-16
Lead (Pb)-Dissolved			96.7		%		80-120	17-AUG-16
Manganese (Mn)-Dissolved			98.4		%		80-120	17-AUG-16
Molybdenum (Mo)-Dissolved			97.5		%		80-120	17-AUG-16
Nickel (Ni)-Dissolved			95.4		%		80-120	17-AUG-16
Zinc (Zn)-Dissolved			90.3		%		80-120	17-AUG-16
WG2369579-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	17-AUG-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	17-AUG-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	17-AUG-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	17-AUG-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	17-AUG-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	17-AUG-16
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	17-AUG-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	17-AUG-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	17-AUG-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	17-AUG-16
WG2369579-5 MS		**WG2369579-3**						
Arsenic (As)-Dissolved			76.5		%		70-130	17-AUG-16
Boron (B)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Cadmium (Cd)-Dissolved			93.8		%		70-130	17-AUG-16
Chromium (Cr)-Dissolved			93.3		%		70-130	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3528168								
WG2369579-5 MS		**WG2369579-3**						
Cobalt (Co)-Dissolved			91.6		%		70-130	17-AUG-16
Copper (Cu)-Dissolved			89.7		%		70-130	17-AUG-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Lead (Pb)-Dissolved			90.4		%		70-130	17-AUG-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Molybdenum (Mo)-Dissolved			N/A	MS-B	%		-	17-AUG-16
Nickel (Ni)-Dissolved			91.3		%		70-130	17-AUG-16
Zinc (Zn)-Dissolved			88.5		%		70-130	17-AUG-16
NH3-WT	Water							
Batch R3528572								
WG2370267-3 DUP		**L1813939-1**						
Ammonia, Total (as N)		0.127	0.119		mg/L	6.6	20	18-AUG-16
WG2370267-2 LCS								
Ammonia, Total (as N)			102.2		%		85-115	18-AUG-16
WG2370267-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	18-AUG-16
WG2370267-4 MS		**L1813939-1**						
Ammonia, Total (as N)			84.7		%		75-125	18-AUG-16
NO2-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Nitrite (as N)			99.7		%		70-130	18-AUG-16
WG2370306-11 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Nitrite (as N)			104.8		%		70-130	18-AUG-16
NO3-IC-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-AUG-16
WG2370306-12 LCS								
Nitrate (as N)			101.0		%		70-130	18-AUG-16
WG2370306-11 MB								
Nitrate (as N)			<0.020				0.02	

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R3529329								
WG2370306-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Nitrate (as N)			105.3		%		70-130	18-AUG-16
P-T-COL-WT	Water							
Batch R3528855								
WG2370110-3 DUP		**L1814017-6**						
Phosphorus, Total		0.0985	0.0858		mg/L	14	20	19-AUG-16
WG2370110-2 LCS								
Phosphorus, Total			98.3		%		80-120	18-AUG-16
WG2370110-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-AUG-16
WG2370110-4 MS		**L1814017-6**						
Phosphorus, Total			79.0		%		70-130	18-AUG-16
Batch R3528874								
WG2370974-3 DUP		**L1814405-8**						
Phosphorus, Total		0.0684	0.0638		mg/L	7.0	20	19-AUG-16
WG2370974-2 LCS								
Phosphorus, Total			103.3		%		80-120	19-AUG-16
WG2370974-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	19-AUG-16
WG2370974-4 MS		**L1814405-8**						
Phosphorus, Total			81.3		%		70-130	19-AUG-16
PAH-CCME-WT	Water							
Batch R3530792								
WG2370536-2 LCS								
Anthracene			102.4		%		50-140	22-AUG-16
Benzo(a)pyrene			104.8		%		60-130	22-AUG-16
WG2370536-1 MB								
Anthracene			<0.020		ug/L		0.02	22-AUG-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	22-AUG-16
Surrogate: d8-Naphthalene			97.4		%		60-140	22-AUG-16
Surrogate: d10-Phenanthrene			99.8		%		60-140	22-AUG-16
Surrogate: d12-Chrysene			104.1		%		60-140	22-AUG-16
Surrogate: d10-Acenaphthene			97.7		%		60-140	22-AUG-16
Surrogate: d9-Acridine (SS)			88.6		%		60-140	22-AUG-16
PH-WT	Water							

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3528145								
WG2369275-6 DUP		**WG2369275-5**						
pH		7.22	7.22	J	pH units	0.01	0.2	18-AUG-16
WG2369275-9 DUP		**WG2369275-8**						
pH		7.65	7.69	J	pH units	0.04	0.2	18-AUG-16
WG2369275-4 LCS								
pH			7.00		pH units		6.9-7.1	18-AUG-16
WG2369275-7 LCS								
pH			7.00		pH units		6.9-7.1	18-AUG-16
PHENOLS-4AAP-WT	Water							
Batch R3530068								
WG2372085-11 DUP		**L1813345-2**						
Phenols (4AAP)		0.0017	0.0018		mg/L	4.9	20	20-AUG-16
WG2372085-7 DUP		**L1813323-10**						
Phenols (4AAP)		0.0017	0.0015		mg/L	12	20	20-AUG-16
WG2372085-10 LCS								
Phenols (4AAP)			93.9		%		85-115	20-AUG-16
WG2372085-6 LCS								
Phenols (4AAP)			94.3		%		85-115	20-AUG-16
WG2372085-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	20-AUG-16
WG2372085-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	20-AUG-16
WG2372085-12 MS		**L1813345-2**						
Phenols (4AAP)			93.8		%		75-125	20-AUG-16
WG2372085-8 MS		**L1813323-10**						
Phenols (4AAP)			90.9		%		75-125	20-AUG-16
Batch R3530139								
WG2372255-3 DUP		**L1814677-2**						
Phenols (4AAP)		0.0023	0.0020		mg/L	11	20	21-AUG-16
WG2372255-2 LCS								
Phenols (4AAP)			95.4		%		85-115	21-AUG-16
WG2372255-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	21-AUG-16
WG2372255-4 MS		**L1814677-2**						
Phenols (4AAP)			92.5		%		75-125	21-AUG-16
SO4-IC-N-WT	Water							

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3529329								
WG2370306-14 DUP		**WG2370306-15**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	18-AUG-16
WG2370306-12 LCS								
Sulfate (SO4)			101.2		%		90-110	18-AUG-16
WG2370306-11 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-AUG-16
WG2370306-13 MS		**WG2370306-15**						
Sulfate (SO4)			107.3		%		75-125	18-AUG-16
SOLIDS-TDS-WT	Water							
Batch R3530791								
WG2372189-3 DUP		**L1813878-4**						
Total Dissolved Solids		255	255		mg/L	0.2	20	21-AUG-16
WG2372189-2 LCS								
Total Dissolved Solids			98.3		%		85-115	21-AUG-16
WG2372189-1 MB								
Total Dissolved Solids			<10		mg/L		10	21-AUG-16
SOLIDS-TSS-WT	Water							
Batch R3530133								
WG2371669-3 DUP		**WG2371669-4**						
Total Suspended Solids		18200	16600		mg/L	9.2	20	20-AUG-16
WG2371669-2 LCS								
Total Suspended Solids			100.6		%		85-115	20-AUG-16
WG2371669-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-AUG-16
Batch R3530146								
WG2371665-3 DUP		**L1816197-3**						
Total Suspended Solids		2950	2950		mg/L	0.0	20	20-AUG-16
WG2371665-2 LCS								
Total Suspended Solids			97.4		%		85-115	20-AUG-16
WG2371665-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-AUG-16
TC-MF-WT	Water							
Batch R3528636								
WG2369452-3 DUP		**WG2369452-4**						
Total Coliforms		0	0		CFU/100mL	0.0	65	18-AUG-16
WG2369452-1 MB								
Total Coliforms			0		CFU/100mL		1	18-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3528765								
WG2370098-3 DUP		**L1814452-1**						
Total Kjeldahl Nitrogen		15.6	16.4		mg/L	4.9	20	18-AUG-16
WG2370098-2 LCS								
Total Kjeldahl Nitrogen			93.7		%		75-125	18-AUG-16
WG2370098-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	18-AUG-16
WG2370098-4 MS		**L1814452-1**						
Total Kjeldahl Nitrogen			92.2		%		70-130	18-AUG-16
TURBIDITY-WT	Water							
Batch R3527518								
WG2369239-6 DUP		**L1814306-1**						
Turbidity		3.56	3.45		NTU	3.1	15	17-AUG-16
WG2369239-9 DUP		**L1814405-5**						
Turbidity		66.0	67.3		NTU	2.0	15	17-AUG-16
WG2369239-5 LCS								
Turbidity			108.0		%		85-115	17-AUG-16
WG2369239-8 LCS								
Turbidity			99.5		%		85-115	17-AUG-16
WG2369239-4 MB								
Turbidity			<0.10		NTU		0.1	17-AUG-16
WG2369239-7 MB								
Turbidity			<0.10		NTU		0.1	17-AUG-16

Quality Control Report

Workorder: L1814405 Report Date: 23-AUG-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

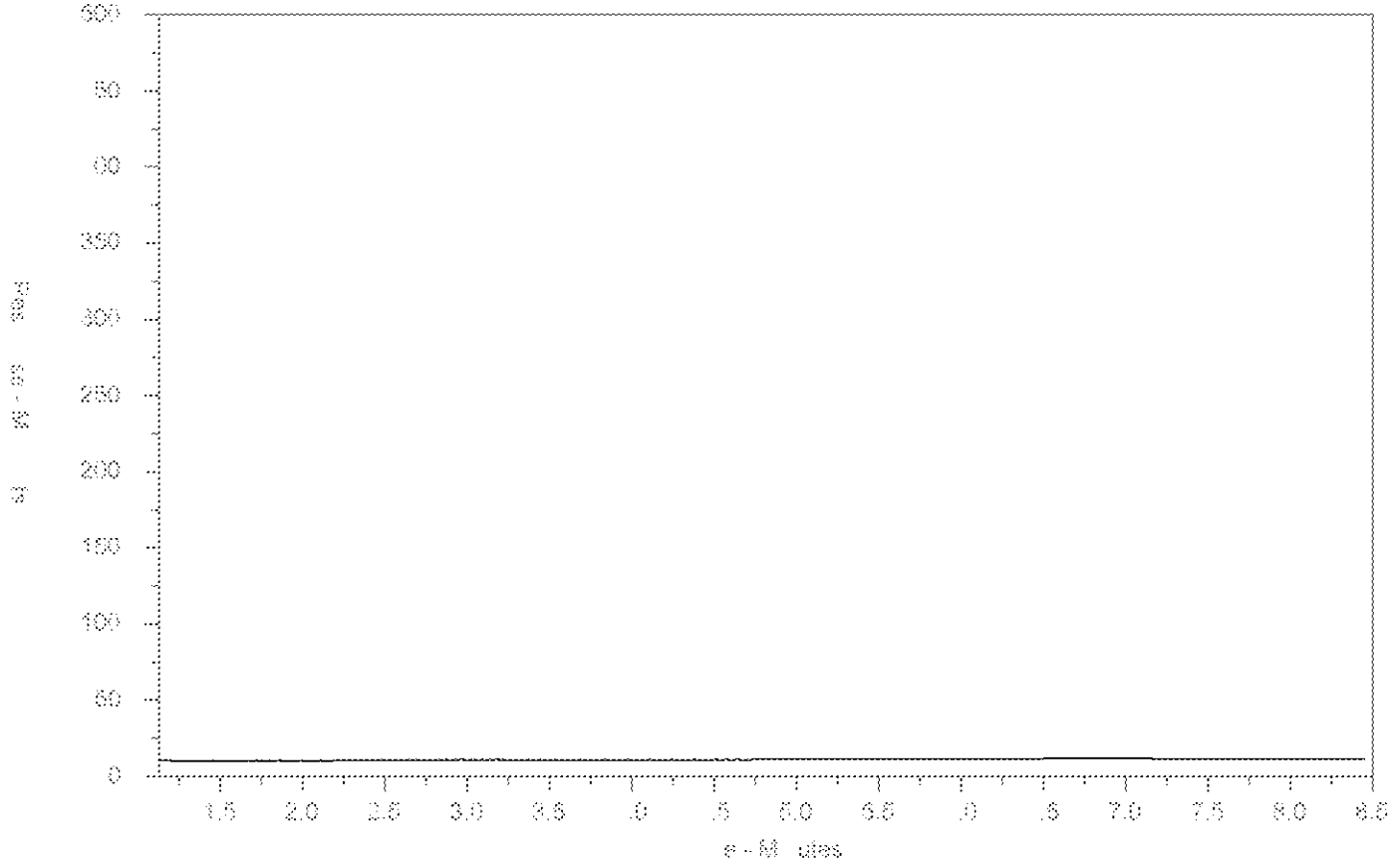
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-1
Client Sample ID: GW-45804-081616-TS-001



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

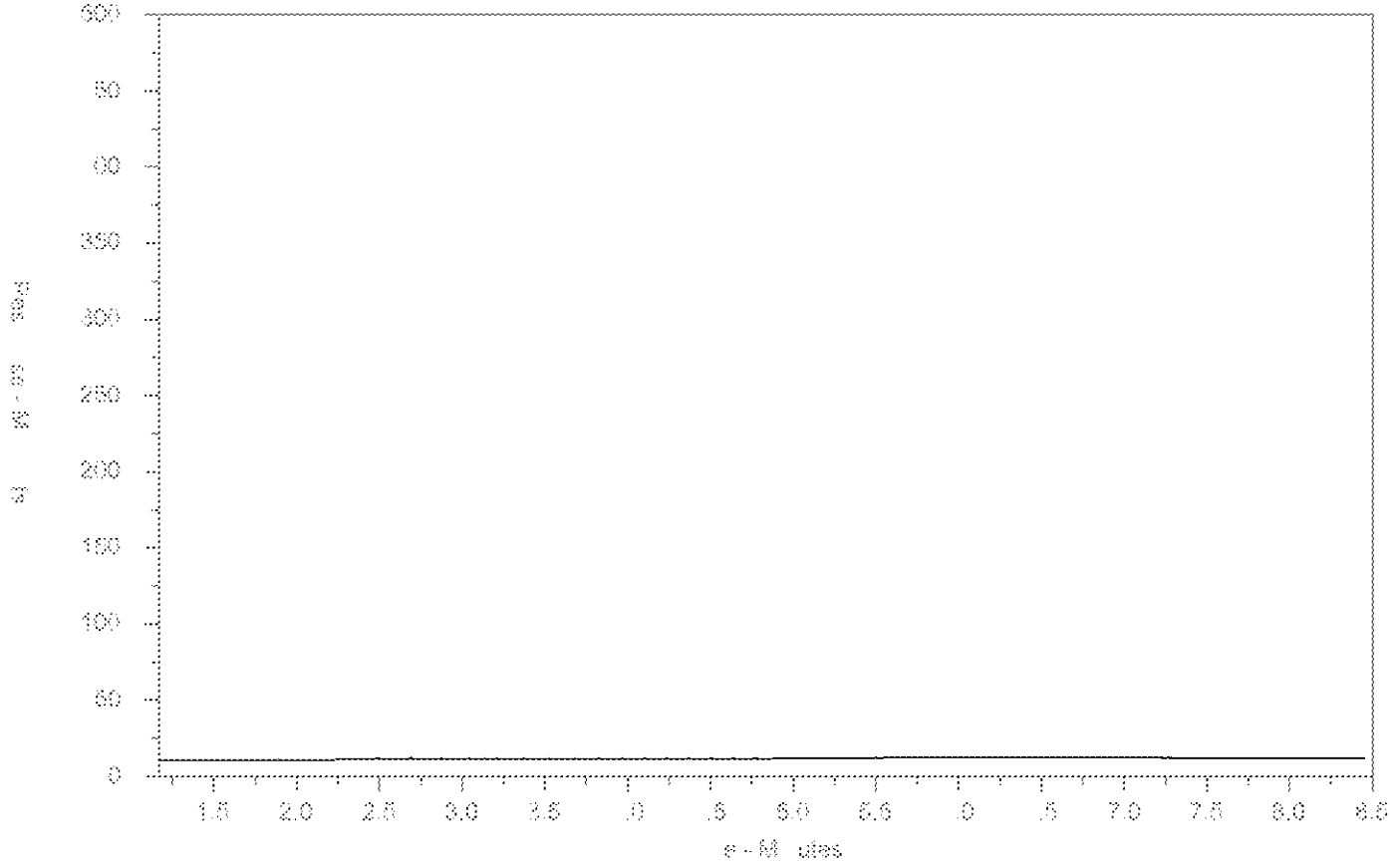
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-2
Client Sample ID: GW-45804-081616-TS-002



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

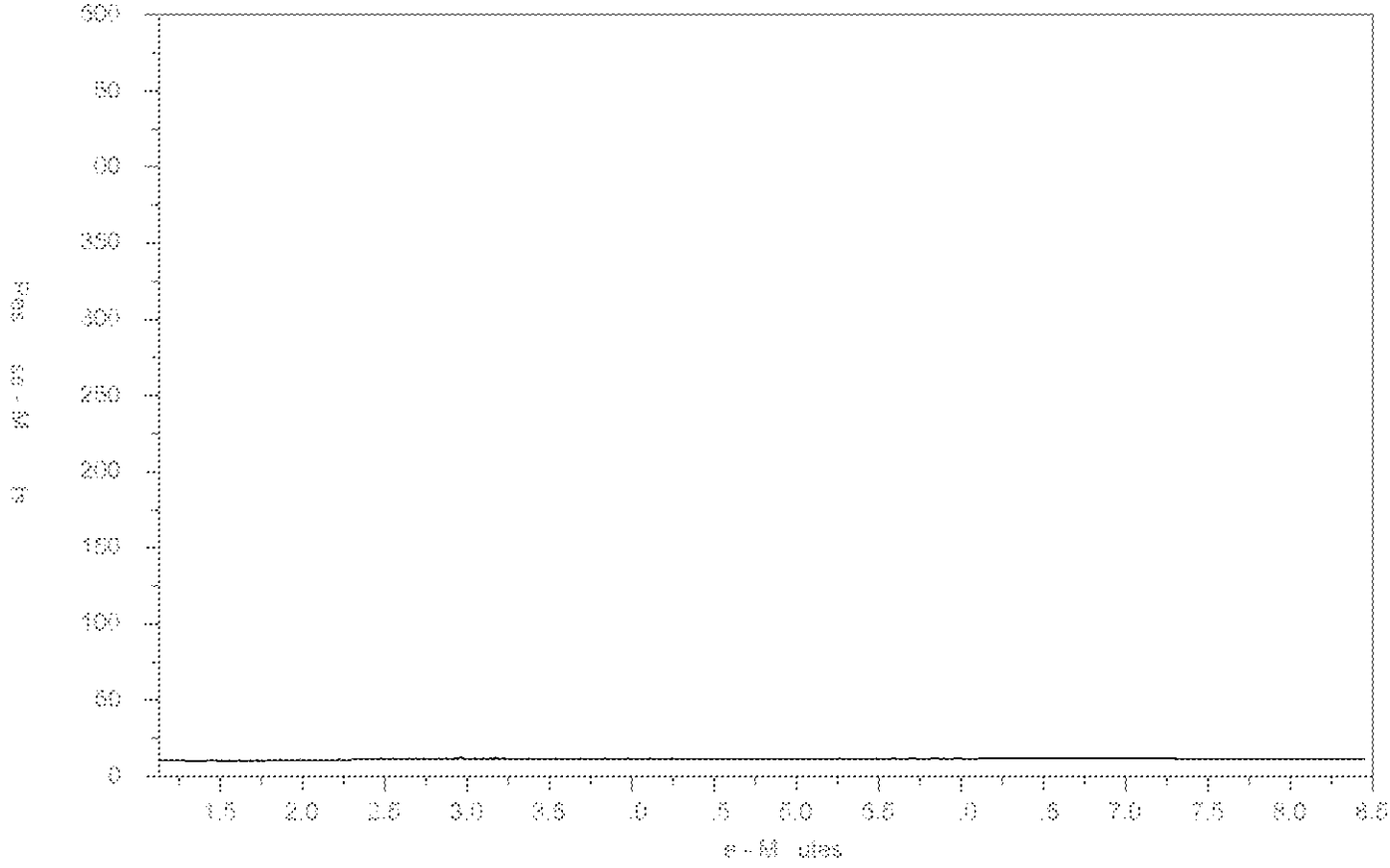
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-3
Client Sample ID: GW-45804-081616-TS-003



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

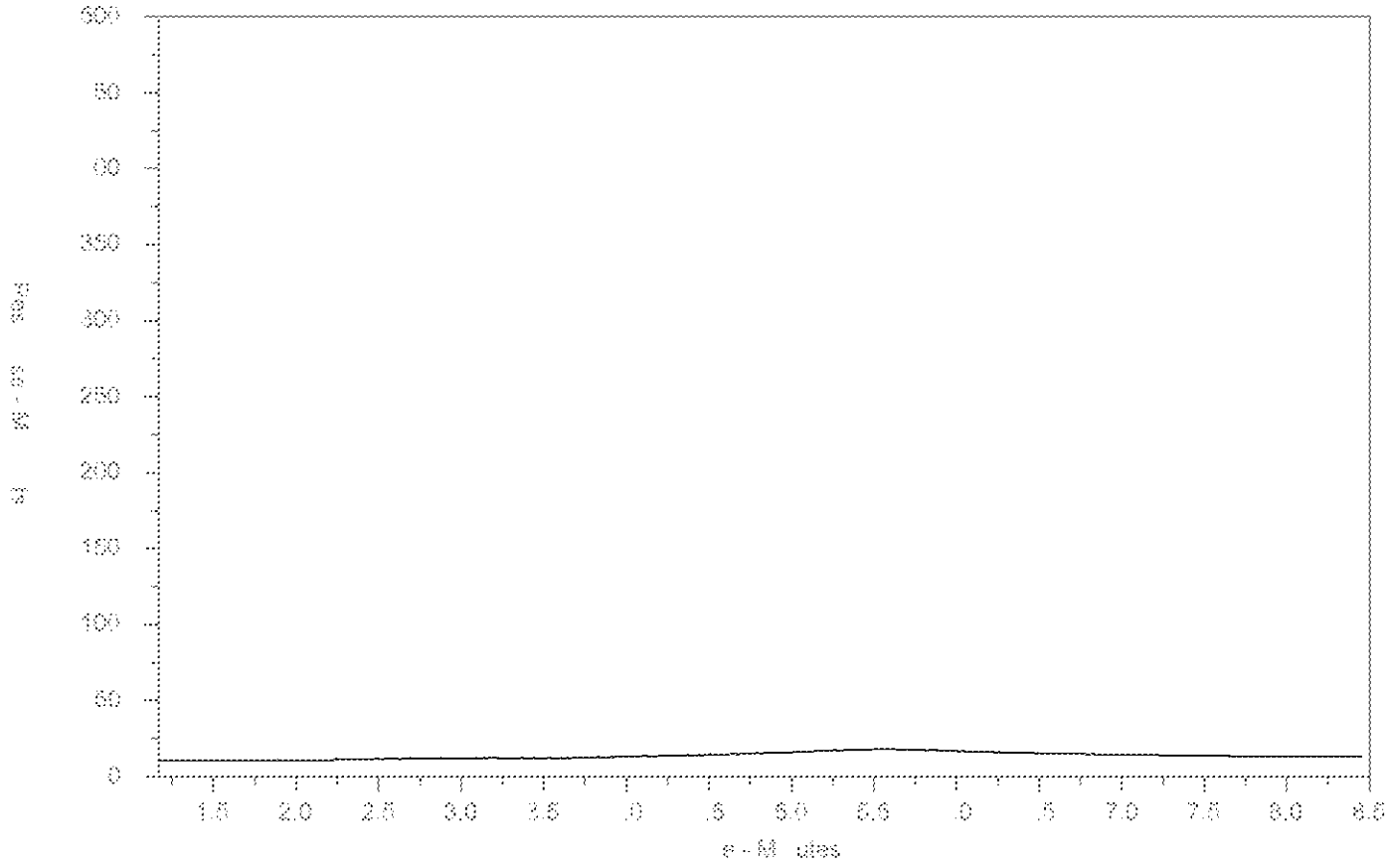
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-4
Client Sample ID: GW-45804-081616-TS-004



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

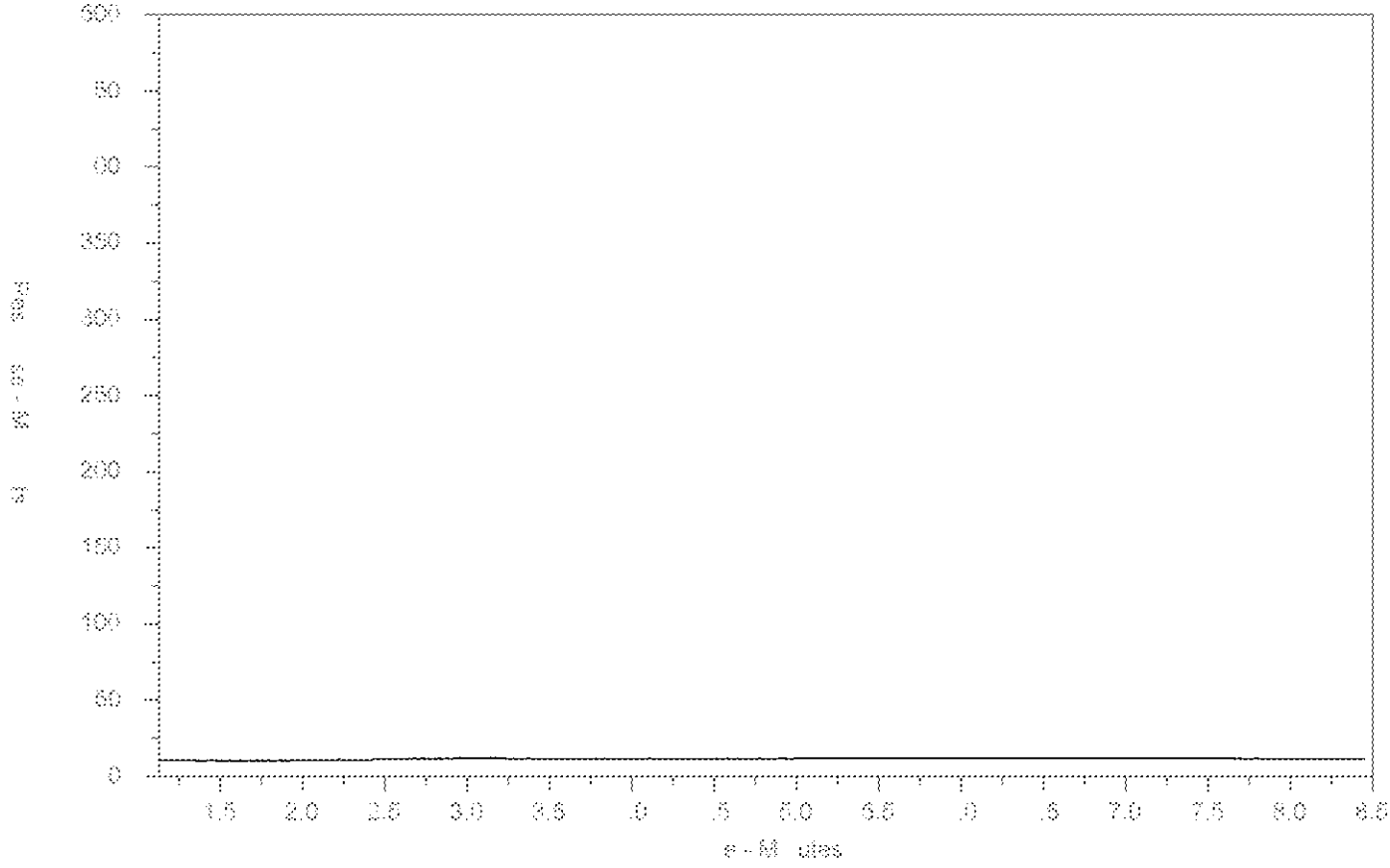
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-5
Client Sample ID: GW-45804-081616-TS-005



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

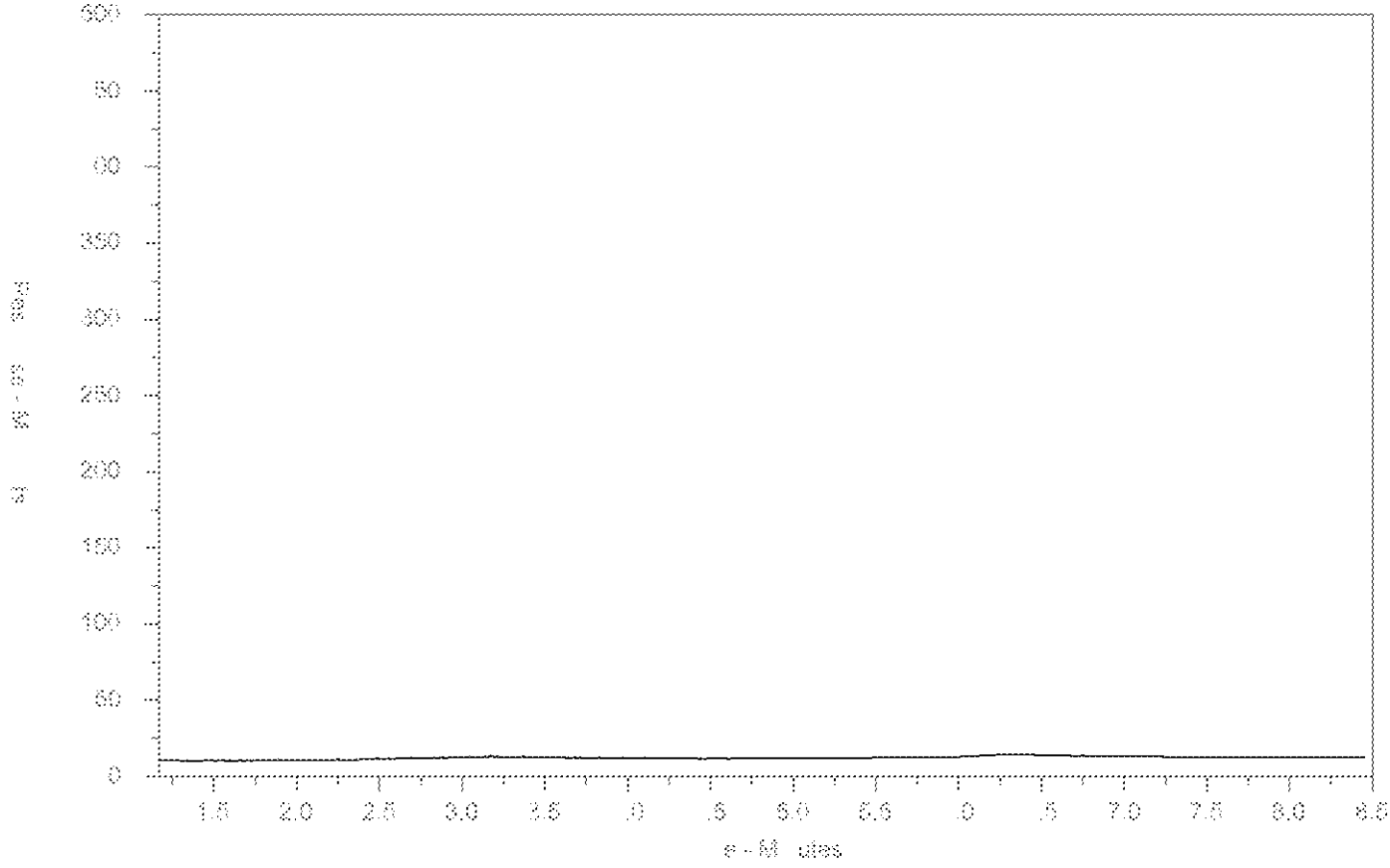
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-6
Client Sample ID: GW-45804-081616-TS-006



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

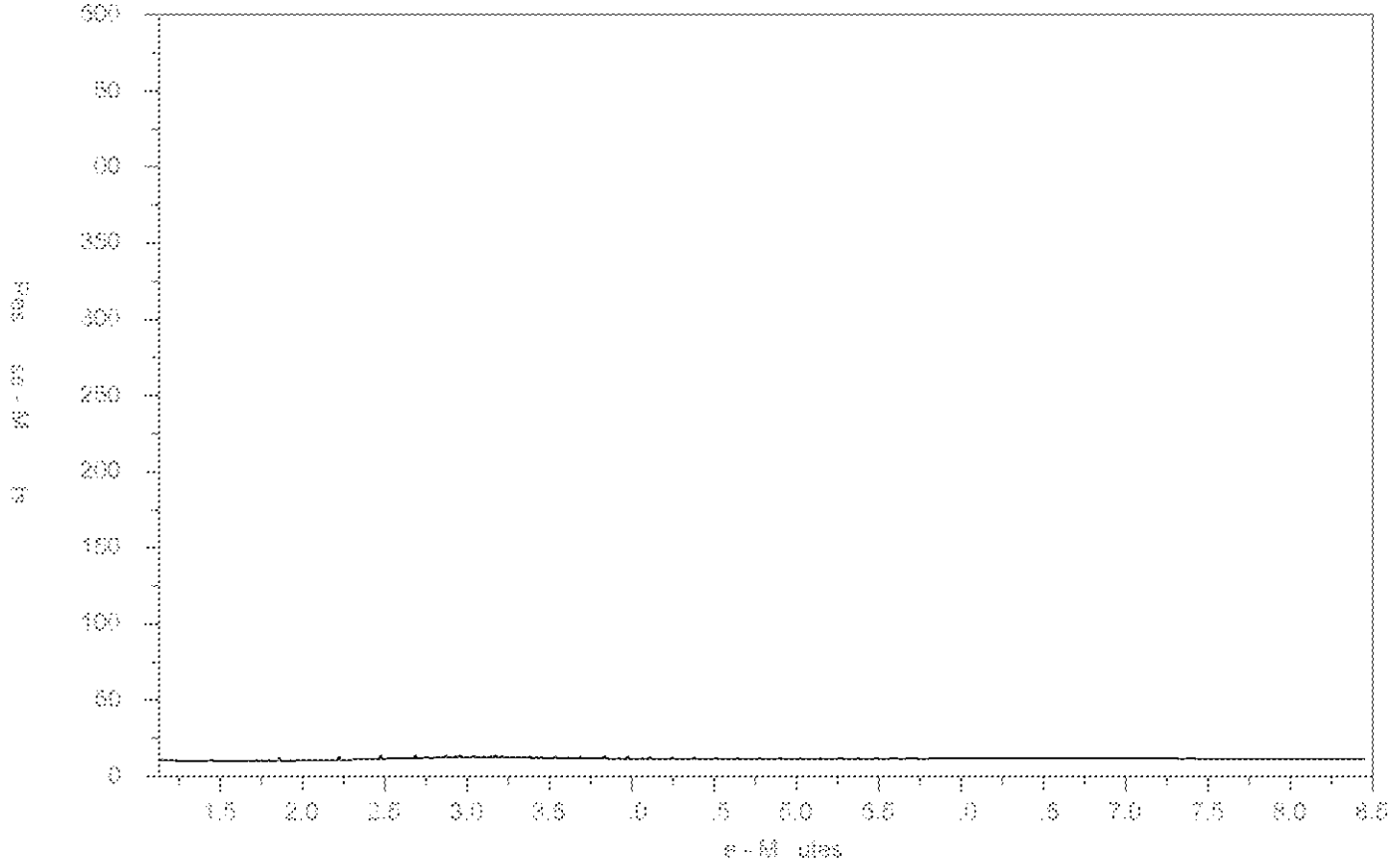
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-7
Client Sample ID: GW-45804-081616-TS-007



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

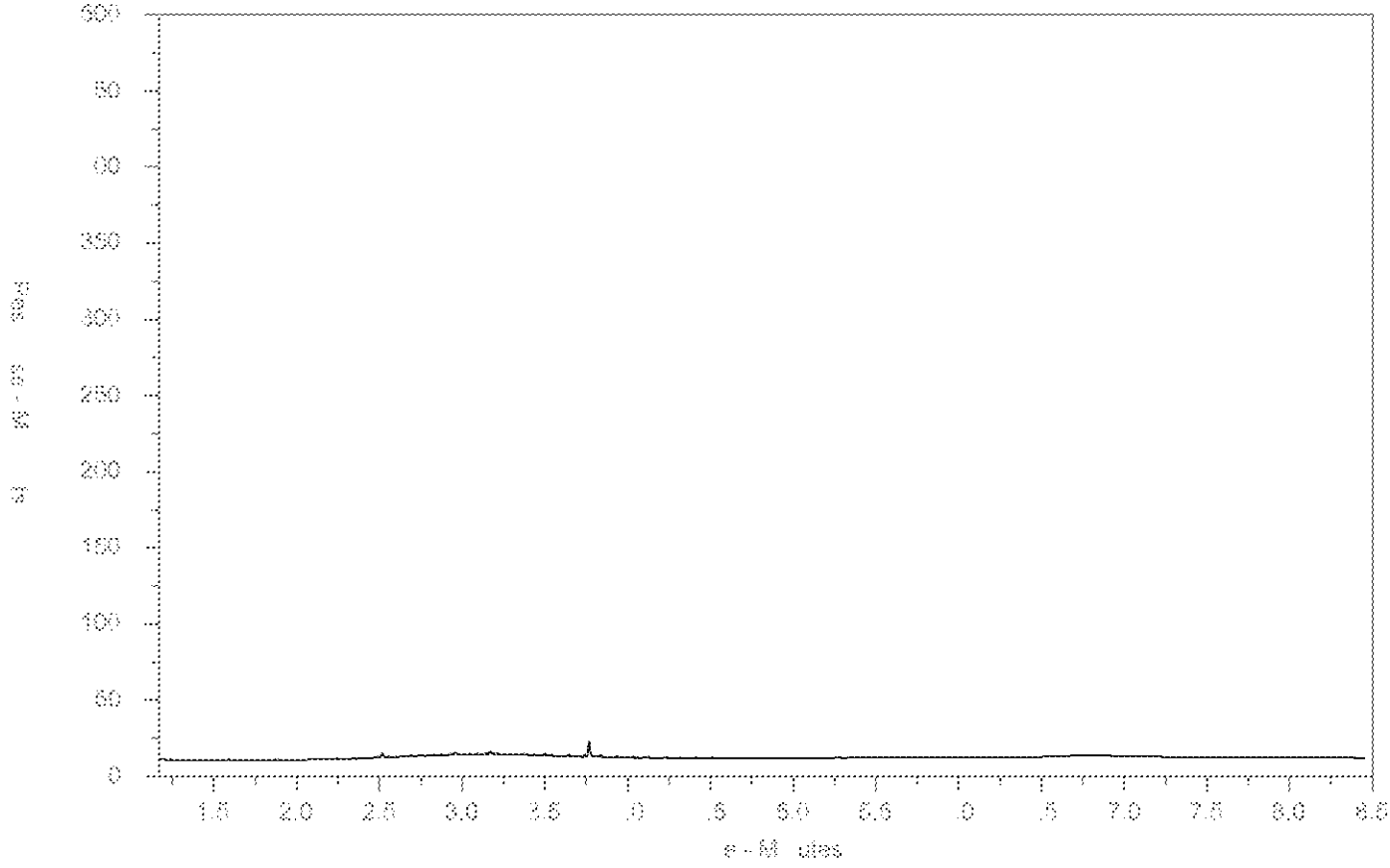
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-8
Client Sample ID: GW-45804-081616-TS-008



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

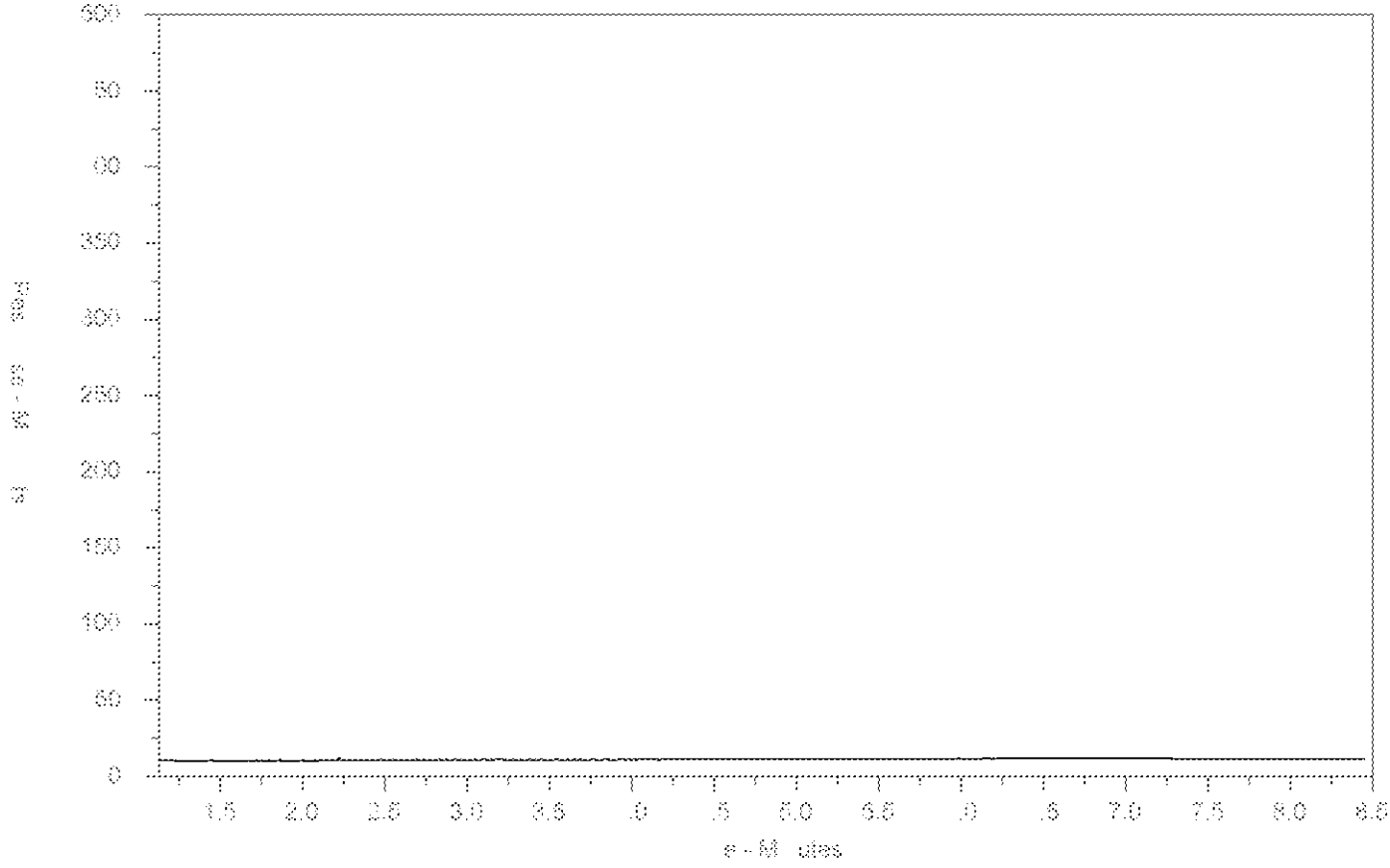
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1814405-9
Client Sample ID: GW-45804-081616-TS-009



← F2 →	← F3 →	← F4 →	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
← Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

C of C # XXXXX

PAGE _1__ OF _1__

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791

PROJECT MANAGER: AIRESSE MACPHEE

JOB #: 45804-58

PO #: 73502328

DUE DATE:

CRITERIA: Criteria on report (y/n) ___ Reg 153/04 Table___ TCLP ___ MISA ___ PWQO ___ OTHER _CLASSDETAILQCPLUS_ALS____

REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED

EMAIL_X___ FAX_____

EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com___

EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com

EMAIL_Wayne.Williams@ghd.com_____

SELECT: pdf____ digital____ both__X____

ANALYSIS REQUEST

L1814405-COFC

INDICATE BOTTLES FIELD FILTERED/ PRESERVED (F/P)

SUBMISSION #: L1814405

ENTERED BY:

DATE/TIME ENTERED: 17 Aug 16 1601

BIN #: 17A

SAMPLING INFORMATION

Sample Date/Time		TYPE		MATRIX								
Date (yy/mm/dd)	Time (24 hr)	COMP	GRAB	WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT		FIELD PH	FIELD TEMP	COMMENTS	LAB ID
16/8/16	0745			X			GW-45804- 08/Aug/16 -TS-001	15	X		6.73	21.89		1
	0745			X			GW-45804- -TS-002	15	X		6.73	21.89		2
	0830			X			GW-45804- -TS-003	15	X		6.72	22.70		3
	0930			X			GW-45804- -TS-004	15	X		7.42	21.68		4
	1030			X			GW-45804- -TS-005	15	X		6.81	18.38		5
	1130			X			GW-45804- -TS-006	15	X		6.97	18.83		6
	1230			X			GW-45804- -TS-007	15	X		6.95	18.56		7
	1300			X			GW-45804- -TS-008	15	X		7.26	14.60		8
	1330			X			GW-45804- -TS-009	15	X		BLANK			9
							GW-45804- -TS-010	15	X					

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.

GROUNDWATER METALS ARE FIELD FILTERED.

********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	18.2
COOLING INITIATED X	
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___	INIT

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	8/16/16	Tommy Anderson	8/16/16 2:10 pm
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME
			17Aug16 0900

NOTES AND CONDITIONS:

1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

003562

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 14-NOV-16
Report Date: 21-NOV-16 13:41 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1857475
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-1 SW-45804-111416-TS-001 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.1		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	98.4		2.0	CU		15-NOV-16	R3596197
pH	8.12		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	24.6		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	507	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	19.4		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	176		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00659		0.00021	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.26	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	57.3		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	<0.020		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.023		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	4.52		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.215		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	149		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.6		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	20		10	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	60		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00070		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.030		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	0.00150		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00053		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0015		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.646		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00036		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.291		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00388		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00212		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0036		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	10.6		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	67		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0051		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-1 SW-45804-111416-TS-001 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		21-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	98.2		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	80.2		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	21-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Acenaphthene	82.3		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	78.1		40-130	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d12-Chrysene	86.9		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d8-Naphthalene	105.7		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Phenanthrene	113.0		60-140	%	16-NOV-16	21-NOV-16	R3597671
L1857475-2 SW-45804-111416-TS-002 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.1		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	91.9		2.0	CU		15-NOV-16	R3596197
pH	8.08		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	33.3		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	424	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	20.9		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	174		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00650		0.00021	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.25	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	57.6		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	<0.020		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.023		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	3.76		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.234		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	149		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.1		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-2 SW-45804-111416-TS-002 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:00 Matrix: WATER							
Bacteriological Tests							
E. Coli	30		10	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	90		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	1000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00075		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.031		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	0.00166		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00056		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0015		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.710		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00036		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.322		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00409		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00216		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0038		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	10.1		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	71		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0067		0.0010	mg/L		16-NOV-16	R3596956
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		21-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	95.1		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	89.5		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	21-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Acenaphthene	87.7		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	81.0		40-130	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d12-Chrysene	79.1		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d8-Naphthalene	113.1		60-140	%	16-NOV-16	21-NOV-16	R3597671
Surrogate: d10-Phenanthrene	97.3		60-140	%	16-NOV-16	21-NOV-16	R3597671
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.11		0.10	pH		15-NOV-16	R3595100
Temperature, Client	8.2		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	5.6		2.0	CU		15-NOV-16	R3596197
pH	7.63		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	3.0		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	1280	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	1.04		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	238		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	<0.000051		0.000051	mg/L		18-NOV-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	163		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	1.03		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	<0.010		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.39		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0044		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	683		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.0		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	2		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	10		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	1000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.095		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.00020	DLM	0.00020	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00079		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	0.0011		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	<0.050		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00016		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0314		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.276		0.000050	mg/L	15-NOV-16	15-NOV-16	R3595929
Nickel (Ni)-Total	0.00955		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	0.0068		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	130	DLM	100	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0017		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-3 SW-45804-111416-TS-003 Sampled By: T. SAUNDERS on 14-NOV-16 @ 10:30 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	90.9		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	84.4		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	94.2		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	74.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	87.8		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	89.0		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	92.1		60-140	%	16-NOV-16	18-NOV-16	R3597671
Report Remarks : DLM - Cd RL increased due to potential interference from Mo							
L1857475-4 SW-45804-111416-TS-004 Sampled By: T. SAUNDERS on 14-NOV-16 @ 11:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.47		0.10	pH		15-NOV-16	R3595100
Temperature, Client	6.5		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	26.2		2.0	CU		15-NOV-16	R3596197
pH	7.98		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	8.1		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	798	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	4.41		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	236		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00032		0.00010	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.064		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	141		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	0.280		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.017		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.42		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0141		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	276		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.3		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-4 SW-45804-111416-TS-004 Sampled By: T. SAUNDERS on 14-NOV-16 @ 11:30 Matrix: WATER							
Bacteriological Tests							
E. Coli	23		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	50		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00030		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.044		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00025		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	<0.0010		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.186		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00010		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0837		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.00887		0.000050	mg/L	15-NOV-16	16-NOV-16	R3595929
Nickel (Ni)-Total	0.00263		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	22		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0044		0.0010	mg/L		16-NOV-16	R3596956
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	89.2		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	91.9		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	87.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	76.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	83.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	76.6		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	89.7		60-140	%	16-NOV-16	18-NOV-16	R3597671
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Field Tests							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.66		0.10	pH		15-NOV-16	R3595100
Temperature, Client	5.6		-50	Deg. C		15-NOV-16	R3595100
Physical Tests							
Colour, Apparent	22.2		2.0	CU		15-NOV-16	R3596197
pH	7.99		0.10	pH units		16-NOV-16	R3596618
Total Suspended Solids	3.6		2.0	mg/L	18-NOV-16	20-NOV-16	R3598798
Total Dissolved Solids	882	DLDS	20	mg/L		19-NOV-16	R3599517
Turbidity	2.31		0.10	NTU		15-NOV-16	R3595629
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	244		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00029		0.00014	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.041		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	141		0.50	mg/L		17-NOV-16	R3596991
Nitrate (as N)	0.359		0.020	mg/L		17-NOV-16	R3596991
Nitrite (as N)	0.015		0.010	mg/L		17-NOV-16	R3596991
Total Kjeldahl Nitrogen	0.36		0.15	mg/L	16-NOV-16	16-NOV-16	R3596321
Phosphorus, Total	0.0125		0.0030	mg/L	16-NOV-16	17-NOV-16	R3596574
Sulfate (SO4)	332		0.30	mg/L		17-NOV-16	R3596991
Organic / Inorganic Carbon							
Dissolved Organic Carbon	6.2		1.0	mg/L		16-NOV-16	R3597475
Bacteriological Tests							
E. Coli	29		0	CFU/100mL		16-NOV-16	R3597276
Fecal Coliforms	40		10	CFU/100mL		16-NOV-16	R3597175
Total Coliforms	2000		1000	CFU/100mL		16-NOV-16	R3597164
Total Metals							
Arsenic (As)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Boron (B)-Total	0.049		0.010	mg/L	15-NOV-16	15-NOV-16	R3595929
Cadmium (Cd)-Total	<0.000030	DLM	0.000030	mg/L	15-NOV-16	15-NOV-16	R3595929
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Cobalt (Co)-Total	0.00031		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Copper (Cu)-Total	<0.0010		0.0010	mg/L	15-NOV-16	15-NOV-16	R3595929
Iron (Fe)-Total	0.177		0.050	mg/L	15-NOV-16	15-NOV-16	R3595929
Lead (Pb)-Total	0.00012		0.00010	mg/L	15-NOV-16	15-NOV-16	R3595929
Manganese (Mn)-Total	0.0848		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-NOV-16	R3595274
Molybdenum (Mo)-Total	0.0515		0.000050	mg/L	15-NOV-16	16-NOV-16	R3595929
Nickel (Ni)-Total	0.00370		0.00050	mg/L	15-NOV-16	15-NOV-16	R3595929
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	15-NOV-16	15-NOV-16	R3595929
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	15-NOV-16	20-NOV-16	R3599571
COD	18		10	mg/L		17-NOV-16	R3597507
Phenols (4AAP)	0.0035		0.0010	mg/L		16-NOV-16	R3596956

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1857475-5 SW-45804-111416-TS-005 Sampled By: T. SAUNDERS on 14-NOV-16 @ 12:30 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		16-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	15-NOV-16	16-NOV-16	R3596674
F3 (C16-C34)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
F4 (C34-C50)	<250		250	ug/L	15-NOV-16	16-NOV-16	R3596674
Total Hydrocarbons (C6-C50)	<380		380	ug/L		18-NOV-16	
Chrom. to baseline at nC50	YES				15-NOV-16	16-NOV-16	R3596674
Surrogate: 2-Bromobenzotrifluoride	104.1		60-140	%	15-NOV-16	16-NOV-16	R3596674
Surrogate: 3,4-Dichlorotoluene	79.8		60-140	%		16-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	16-NOV-16	18-NOV-16	R3597671
Benzo(a)pyrene	<0.0050		0.0050	ug/L	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Acenaphthene	93.3		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d9-Acridine (SS)	78.4		40-130	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d12-Chrysene	94.9		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d8-Naphthalene	89.1		60-140	%	16-NOV-16	18-NOV-16	R3597671
Surrogate: d10-Phenanthrene	94.8		60-140	%	16-NOV-16	18-NOV-16	R3597671
Report Remarks : DLM - Cd RL increased due to potential interference from Mo							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Iron (Fe)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Manganese (Mn)-Total	MS-B	L1857475-1, -2, -3, -4, -5
Matrix Spike	Ammonia, Total (as N)	MS-B	L1857475-1, -2, -3, -4, -5

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT	Water	Colour	APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.

Reference Information

4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-T-CVAA-WT Water Total Mercury in Water by CVAAS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT Water Total Metals by CRC ICPMS EPA 200.2/6020A (mod)
Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

SOLIDS-TSS-WT Water Suspended solids APHA 2540 D-Gravimetric
A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT Water Total Coliforms SM 9222B

Reference Information

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT Water Total Kjeldahl Nitrogen APHA 4500-N
Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT Water Turbidity APHA 2130 B
Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3598522								
WG2435073-3 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			105.2		%		80-120	18-NOV-16
WG2435073-4 DUP		**L1857051-1**						
Alkalinity, Total (as CaCO3)		165	164		mg/L	0.4	20	18-NOV-16
WG2435073-2 LCS								
Alkalinity, Total (as CaCO3)			97.7		%		85-115	18-NOV-16
WG2435073-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-NOV-16
BOD-C-WT	Water							
Batch R3599571								
WG2433289-2 DUP		**L1857475-3**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	20-NOV-16
WG2433289-3 LCS								
BOD Carbonaceous			102.0		%		85-115	20-NOV-16
WG2433289-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	20-NOV-16
C-DIS-ORG-WT	Water							
Batch R3597475								
WG2434305-3 DUP		**L1857475-5**						
Dissolved Organic Carbon		6.2	6.5		mg/L	3.7	20	16-NOV-16
WG2434305-2 LCS								
Dissolved Organic Carbon			97.9		%		80-120	16-NOV-16
WG2434305-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-NOV-16
WG2434305-4 MS		**L1857475-5**						
Dissolved Organic Carbon			91.1		%		70-130	16-NOV-16
CL-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Chloride (Cl)		26.8	26.9		mg/L	0.1	25	17-NOV-16
WG2434308-2 LCS								
Chloride (Cl)			100.9		%		70-130	17-NOV-16
WG2434308-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Chloride (Cl)			94.6		%		70-130	17-NOV-16
COD-T-WT	Water							

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3597507								
WG2435181-3 DUP		**L1857475-5**						
COD		18	23	J	mg/L	5	20	17-NOV-16
WG2435181-2 LCS								
COD			98.2		%		85-115	17-NOV-16
WG2435181-1 MB								
COD			<10		mg/L		10	17-NOV-16
WG2435181-4 MS		**L1857475-5**						
COD			94.6		%		75-125	17-NOV-16
COLOUR-WT	Water							
Batch R3596197								
WG2433858-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			97.2		%		80-120	15-NOV-16
WG2433858-4 DUP		**L1857475-1**						
Colour, Apparent		98.4	98.4		CU	0.0	20	15-NOV-16
WG2433858-2 LCS								
Colour, Apparent			102.9		%		80-120	15-NOV-16
WG2433858-1 MB								
Colour, Apparent			<2.0		CU		2	15-NOV-16
EC-MF-WT	Water							
Batch R3597276								
WG2432721-2 DUP		**WG2432721-4**						
E. Coli		10	10		CFU/100mL	0.0	65	16-NOV-16
WG2432721-1 MB								
E. Coli			0		CFU/100mL		1	16-NOV-16
F1-HS-WT	Water							
Batch R3596982								
WG2432549-4 DUP		**WG2432549-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2432549-1 LCS								
F1 (C6-C10)			103.5		%		80-120	16-NOV-16
WG2432549-2 MB								
F1 (C6-C10)			<100		ug/L		100	16-NOV-16
Surrogate: 3,4-Dichlorotoluene			100.8		%		60-140	16-NOV-16
F2-F4-WT	Water							

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F2-F4-WT	Water							
Batch R3596674								
WG2432818-2 LCS								
F2 (C10-C16)			106.9		%		65-135	16-NOV-16
F3 (C16-C34)			104.0		%		65-135	16-NOV-16
F4 (C34-C50)			103.0		%		65-135	16-NOV-16
WG2432818-3 LCSD		**WG2432818-2**						
F2 (C10-C16)		106.9	92.7		%	14	50	16-NOV-16
F3 (C16-C34)		104.0	97.6		%	6.4	50	16-NOV-16
F4 (C34-C50)		103.0	97.4		%	5.6	50	16-NOV-16
WG2432818-1 MB								
F2 (C10-C16)			<100		ug/L		100	16-NOV-16
F3 (C16-C34)			<250		ug/L		250	16-NOV-16
F4 (C34-C50)			<250		ug/L		250	16-NOV-16
Surrogate: 2-Bromobenzotrifluoride			93.6		%		60-140	16-NOV-16
FC-MF-WT	Water							
Batch R3597175								
WG2432718-1 MB								
Fecal Coliforms			0		CFU/100mL		1	16-NOV-16
HG-T-CVAA-WT	Water							
Batch R3595274								
WG2432707-3 DUP		**L1857475-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	15-NOV-16
WG2432707-2 LCS								
Mercury (Hg)-Total			108.0		%		80-120	15-NOV-16
WG2432707-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	15-NOV-16
WG2432707-4 MS		**L1857475-2**						
Mercury (Hg)-Total			89.6		%		70-130	15-NOV-16
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-4 DUP		**WG2432748-3**						
Arsenic (As)-Total		0.00039	0.00041		mg/L	5.4	20	15-NOV-16
Boron (B)-Total		0.246	0.270		mg/L	9.3	20	15-NOV-16
Cadmium (Cd)-Total		0.000011	0.000011		mg/L	0.0	20	15-NOV-16
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	15-NOV-16
Cobalt (Co)-Total		<0.00010	0.00010	RPD-NA	mg/L	N/A	20	15-NOV-16

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-4 DUP		**WG2432748-3**						
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	15-NOV-16
Iron (Fe)-Total		0.118	0.136		mg/L	15	20	15-NOV-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	15-NOV-16
Manganese (Mn)-Total		0.275	0.288		mg/L	4.5	20	15-NOV-16
Molybdenum (Mo)-Total		0.000394	0.000452		mg/L	14	20	15-NOV-16
Nickel (Ni)-Total		<0.00050	0.00056	RPD-NA	mg/L	N/A	20	15-NOV-16
Zinc (Zn)-Total		<0.0030	<0.0030	RPD-NA	mg/L	N/A	20	15-NOV-16
WG2432748-2 LCS								
Arsenic (As)-Total			99.3		%		80-120	15-NOV-16
Boron (B)-Total			98.2		%		80-120	15-NOV-16
Cadmium (Cd)-Total			96.8		%		80-120	15-NOV-16
Chromium (Cr)-Total			98.4		%		80-120	15-NOV-16
Cobalt (Co)-Total			98.6		%		80-120	15-NOV-16
Copper (Cu)-Total			97.9		%		80-120	15-NOV-16
Iron (Fe)-Total			93.2		%		80-120	15-NOV-16
Lead (Pb)-Total			102.6		%		80-120	15-NOV-16
Manganese (Mn)-Total			98.6		%		80-120	15-NOV-16
Molybdenum (Mo)-Total			97.7		%		80-120	15-NOV-16
Nickel (Ni)-Total			98.5		%		80-120	15-NOV-16
Zinc (Zn)-Total			91.6		%		80-120	15-NOV-16
WG2432748-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	15-NOV-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	15-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	15-NOV-16
Iron (Fe)-Total			<0.050		mg/L		0.05	15-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	15-NOV-16
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	15-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	15-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	15-NOV-16
WG2432748-5 MS		**WG2432748-3**						

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3595929								
WG2432748-5 MS		**WG2432748-3**						
Arsenic (As)-Total			99.0		%		70-130	15-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	15-NOV-16
Cadmium (Cd)-Total			95.1		%		70-130	15-NOV-16
Chromium (Cr)-Total			97.6		%		70-130	15-NOV-16
Cobalt (Co)-Total			93.9		%		70-130	15-NOV-16
Copper (Cu)-Total			96.2		%		70-130	15-NOV-16
Iron (Fe)-Total			N/A	MS-B	%		-	15-NOV-16
Lead (Pb)-Total			91.9		%		70-130	15-NOV-16
Manganese (Mn)-Total			N/A	MS-B	%		-	15-NOV-16
Molybdenum (Mo)-Total			97.4		%		70-130	15-NOV-16
Nickel (Ni)-Total			92.4		%		70-130	15-NOV-16
Zinc (Zn)-Total			95.3		%		70-130	15-NOV-16
NH3-WT	Water							
Batch R3597795								
WG2433623-3 DUP		**L1856916-1**						
Ammonia, Total (as N)		2.16	2.23		mg/L	3.2	20	16-NOV-16
WG2433623-2 LCS								
Ammonia, Total (as N)			99.3		%		85-115	16-NOV-16
WG2433623-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	16-NOV-16
WG2433623-4 MS		**L1856916-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	16-NOV-16
NO2-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	17-NOV-16
WG2434308-2 LCS								
Nitrite (as N)			101.9		%		70-130	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Nitrite (as N)			96.0		%		70-130	17-NOV-16
NO3-IC-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Nitrate (as N)		0.282	0.273		mg/L	3.0	25	17-NOV-16
WG2434308-2 LCS								

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R3596991								
WG2434308-2 LCS								
Nitrate (as N)			100.3		%		70-130	17-NOV-16
WG2434308-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Nitrate (as N)			96.1		%		70-130	17-NOV-16
P-T-COL-WT	Water							
Batch R3596574								
WG2433515-3 DUP		**L1857036-3**						
Phosphorus, Total		0.0154	0.0173		mg/L	12	20	17-NOV-16
WG2433515-2 LCS								
Phosphorus, Total			104.5		%		80-120	17-NOV-16
WG2433515-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	17-NOV-16
WG2433515-4 MS		**L1857036-3**						
Phosphorus, Total			90.6		%		70-130	17-NOV-16
PAH-CCME-WT	Water							
Batch R3597671								
WG2433461-2 LCS								
Anthracene			81.1		%		50-140	18-NOV-16
Benzo(a)pyrene			75.0		%		60-130	18-NOV-16
WG2433461-3 LCSD		**WG2433461-2**						
Anthracene		81.1	87.3		%	7.3	50	18-NOV-16
Benzo(a)pyrene		75.0	87.3		%	15	50	18-NOV-16
WG2433461-1 MB								
Anthracene			<0.020		ug/L		0.02	18-NOV-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	18-NOV-16
Surrogate: d8-Naphthalene			90.9		%		60-140	18-NOV-16
Surrogate: d10-Phenanthrene			88.2		%		60-140	18-NOV-16
Surrogate: d12-Chrysene			90.8		%		60-140	18-NOV-16
Surrogate: d10-Acenaphthene			88.8		%		60-140	18-NOV-16
Surrogate: d9-Acridine (SS)			76.3		%		40-130	18-NOV-16
PH-WT	Water							

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3596618								
WG2433572-3 DUP		**WG2433572-2**						
pH		8.12	8.14	J	pH units	0.02	0.2	16-NOV-16
WG2433572-1 LCS								
pH			7.02		pH units		6.9-7.1	16-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3596956								
WG2433971-11 DUP		**L1857251-2**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	16-NOV-16
WG2433971-10 LCS								
Phenols (4AAP)			97.0		%		85-115	16-NOV-16
WG2433971-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-NOV-16
WG2433971-12 MS		**L1857251-2**						
Phenols (4AAP)			89.8		%		75-125	16-NOV-16
SO4-IC-N-WT	Water							
Batch R3596991								
WG2434308-4 DUP		**WG2434308-3**						
Sulfate (SO4)		25.8	25.9		mg/L	0.3	20	17-NOV-16
WG2434308-2 LCS								
Sulfate (SO4)			100.9		%		90-110	17-NOV-16
WG2434308-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	17-NOV-16
WG2434308-5 MS		**WG2434308-3**						
Sulfate (SO4)			95.2		%		75-125	17-NOV-16
SOLIDS-TDS-WT	Water							
Batch R3599517								
WG2436190-3 DUP		**L1857475-1**						
Total Dissolved Solids		507	489		mg/L	3.6	20	19-NOV-16
WG2436190-2 LCS								
Total Dissolved Solids			91.6		%		85-115	19-NOV-16
WG2436190-1 MB								
Total Dissolved Solids			<10		mg/L		10	19-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3598798								
WG2435295-3 DUP		**L1857897-1**						
Total Suspended Solids		406	374		mg/L	8.4	20	20-NOV-16
WG2435295-2 LCS								

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R3598798								
WG2435295-2 LCS								
Total Suspended Solids			98.8		%		85-115	20-NOV-16
WG2435295-1 MB								
Total Suspended Solids			<2.0		mg/L		2	20-NOV-16
TC-MF-WT	Water							
Batch R3597164								
WG2432725-1 MB								
Total Coliforms			0		CFU/100mL		1	16-NOV-16
TKN-WT	Water							
Batch R3596321								
WG2433469-3 DUP		**L1855344-2**						
Total Kjeldahl Nitrogen		0.20	0.20		mg/L	1.2	20	16-NOV-16
WG2433469-2 LCS								
Total Kjeldahl Nitrogen			106.2		%		75-125	16-NOV-16
WG2433469-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	16-NOV-16
WG2433469-4 MS		**L1855344-2**						
Total Kjeldahl Nitrogen			110.6		%		70-130	16-NOV-16
TURBIDITY-WT	Water							
Batch R3595629								
WG2433059-3 DUP		**L1857475-1**						
Turbidity		19.4	17.6		NTU	9.7	15	15-NOV-16
WG2433059-2 LCS								
Turbidity			103.0		%		85-115	15-NOV-16
WG2433059-1 MB								
Turbidity			<0.10		NTU		0.1	15-NOV-16

Quality Control Report

Workorder: L1857475 Report Date: 21-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

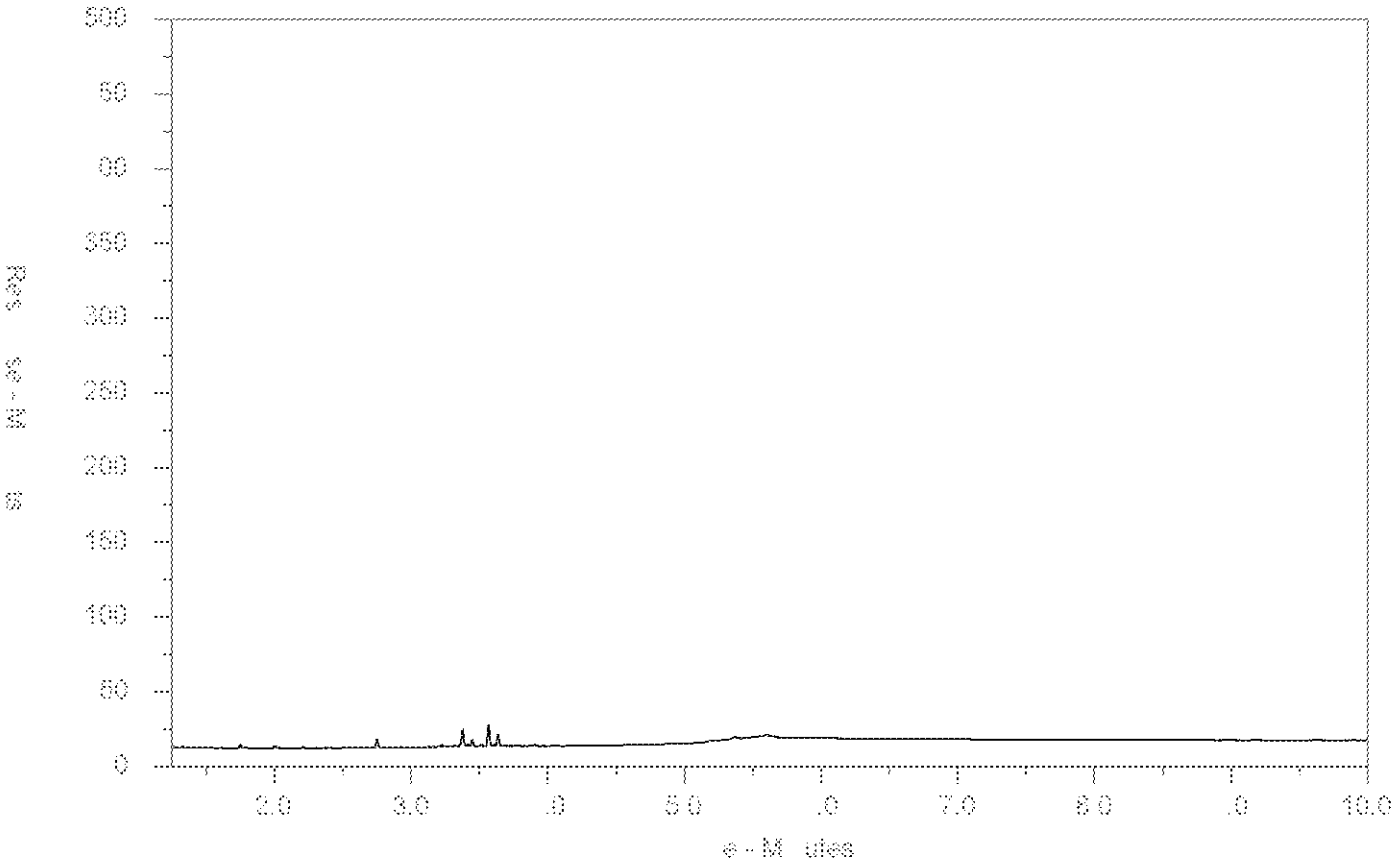
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-1
Client Sample ID: SW-45804-111416-TS-001



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

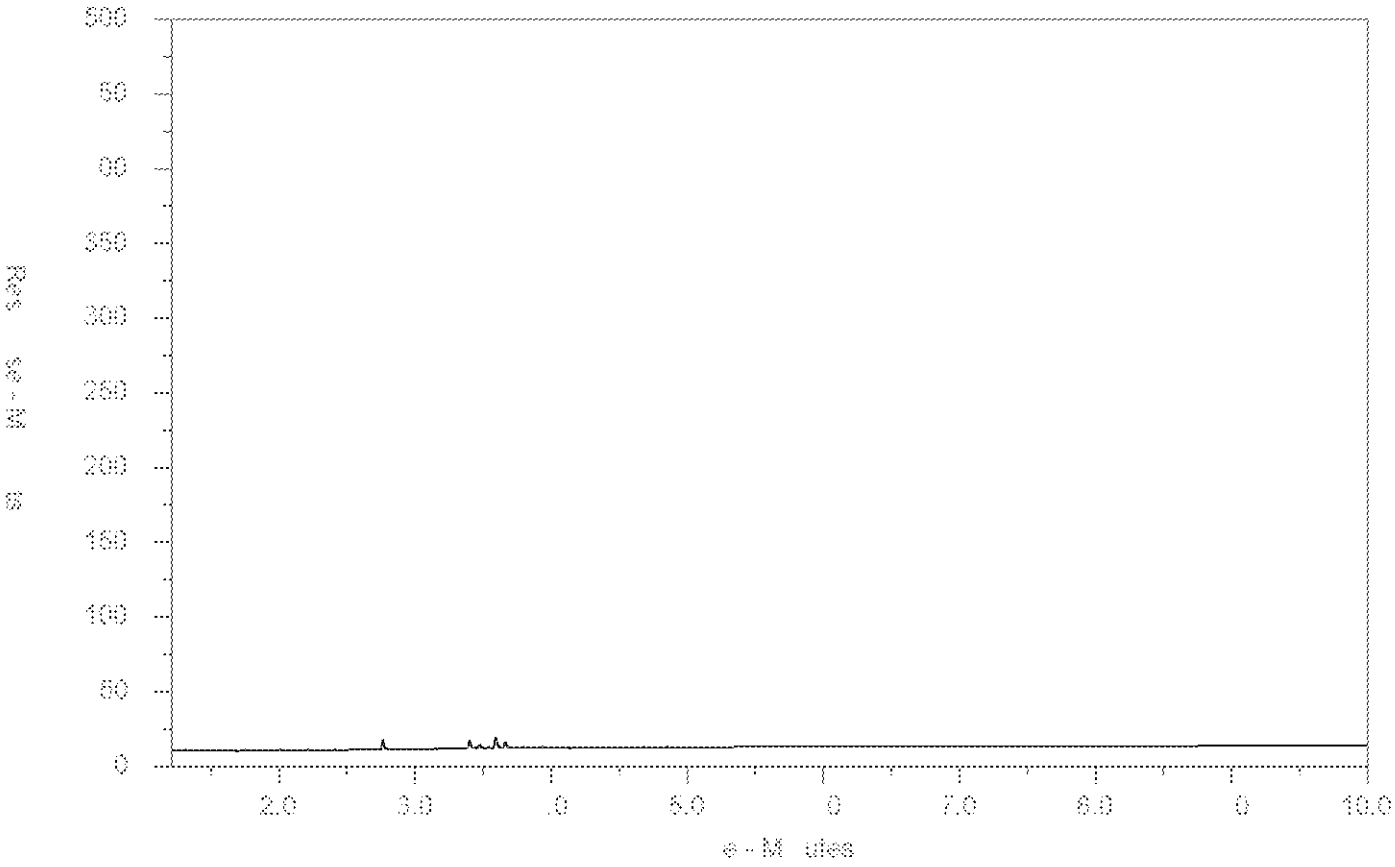
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-2
Client Sample ID: SW-45804-111416-TS-002



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

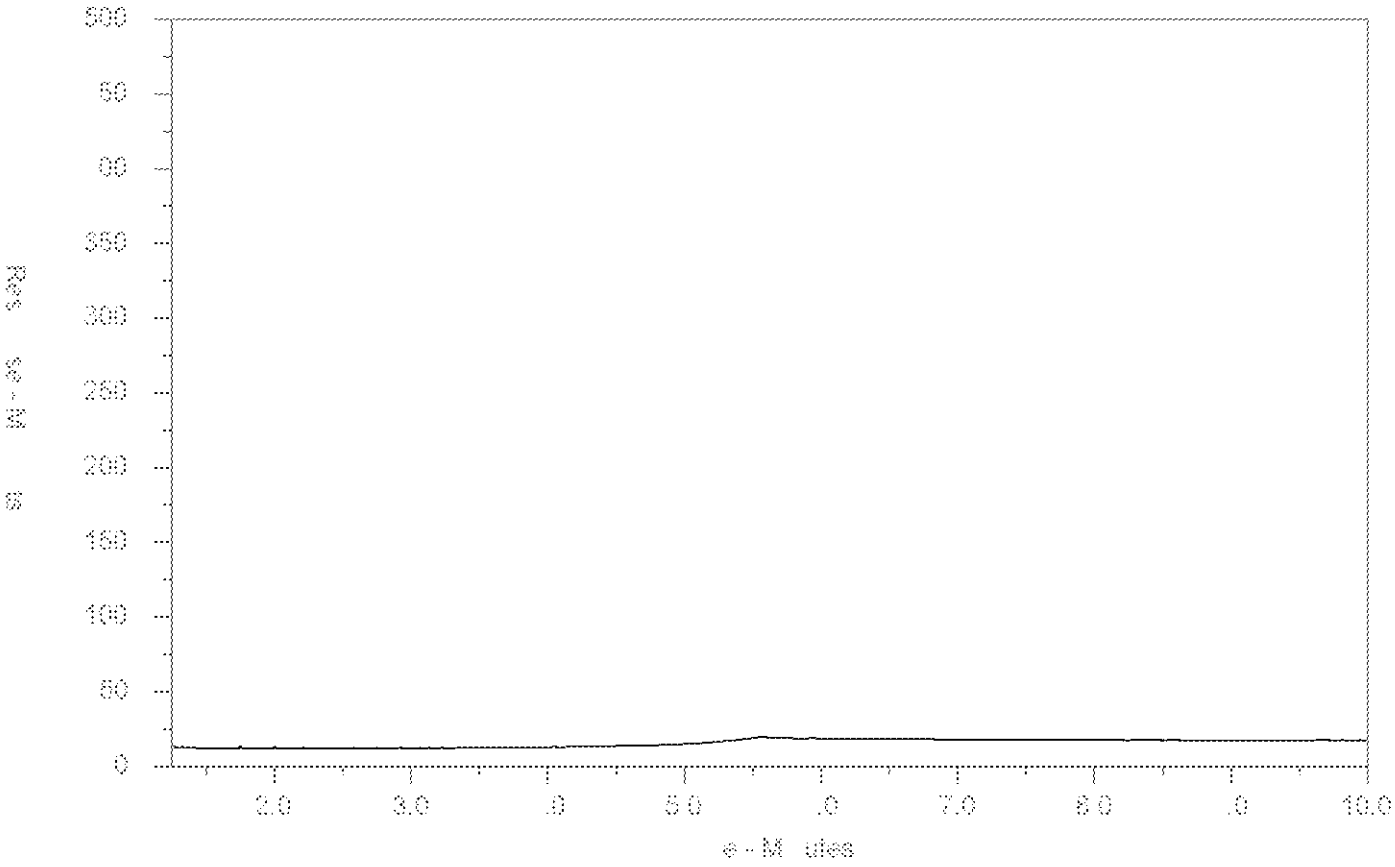
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-3
Client Sample ID: SW-45804-111416-TS-003



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

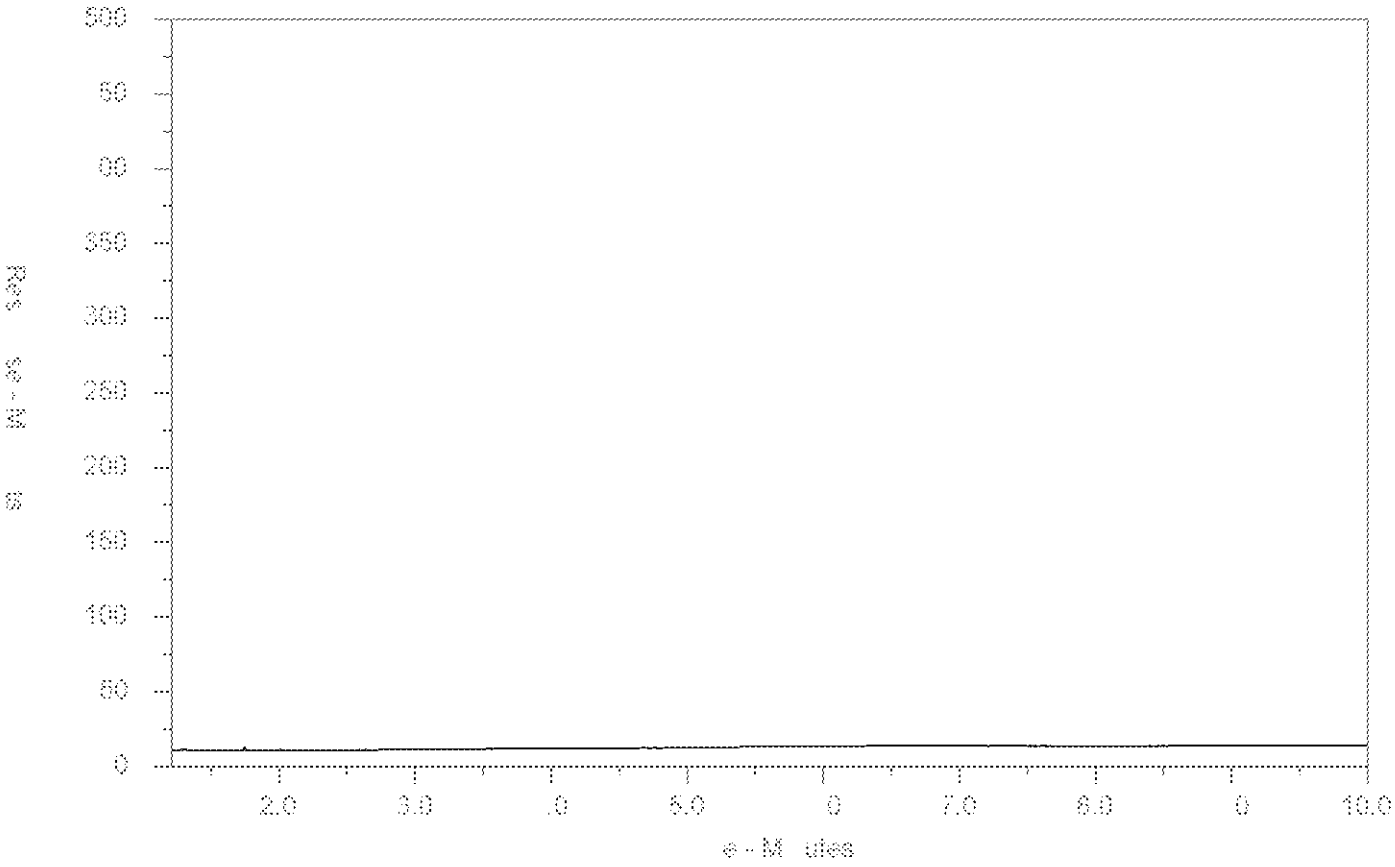
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-4
Client Sample ID: SW-45804-111416-TS-004



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

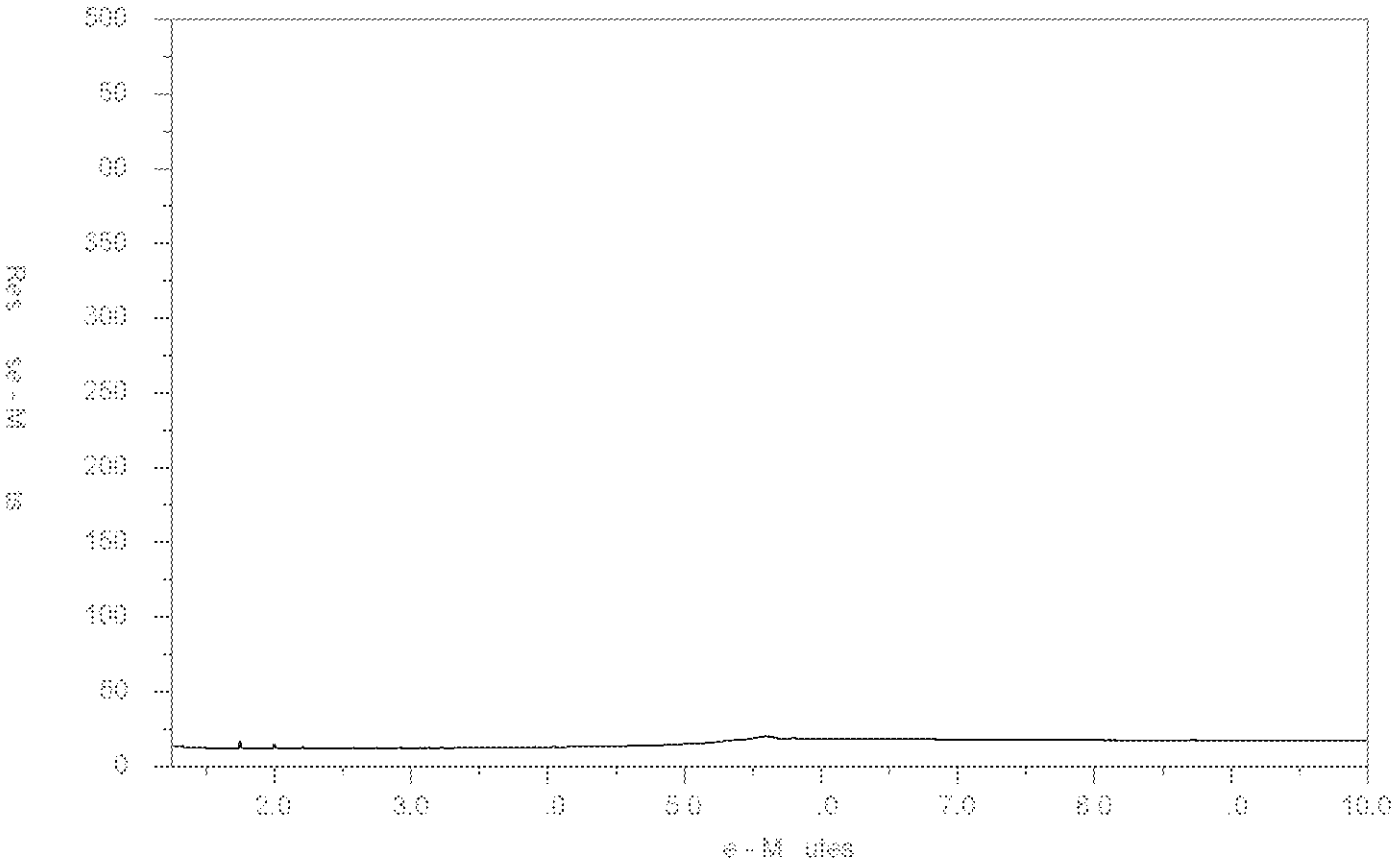
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1857475-5
Client Sample ID: SW-45804-111416-TS-005



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental

60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-668-9878

CH

L1857475-COFC

S REQUEST FORM

C of C # XXXXX
PAGE _1__ OF _1__

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME 13791: GHD LIMITED
PROJECT MANAGER: AIRESSE MACPHEE
JOB #: 45804-58
PO #: 73502328
DUE DATE:

CRITERIA | Criteria on report (y/n) ____
Reg 153/04
Table____
TCLP ____ MISA____ PWQO ____
OTHER CLASSDETAILQCPLUS_ALS
REPORT DISTRIBUTION | ALL FINAL RESULTS WILL BE MAILED
EMAIL X FAX____
EMAIL aresse.macphee@ghd.com,Ben.Kempel@ghd.com
EMAIL ben.constable@ghd.com,Trevor.Saunders@ghd.com
EMAIL Wayne.Williams@ghd.com
SELECT: pdf____ digital____ both X

SUBMISSION # L1857475
ENTERED BY: SH
DATE/TIME ENTERED: 15-NOV-16
BIN # 15A

SAMPLING INFORMATION

Sample Date/Time Date (yy/mm/dd)	Time (24 hr)	TYPE COMP	TYPE GRAB	MATRIX WATER	MATRIX SOIL	MATRIX OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
11/14/16	1000			X			SW-45804-11/14/16-TS-001	15		X	7.43	8.10		1
	1000			X			SW-45804-____-TS-002	15		X	7.43	8.10		2
	1030			X			SW-45804-____-TS-003	15		X	7.11	8.23		3
	1130			X			SW-45804-____-TS-004	15		X	7.47	6.47		4
	1230			X			SW-45804-____-TS-005	15		X	7.66	5.59		5
				X			SW-45804-____-TS-006	15		X				
				X			SW-45804-____-TS-007	15		X				
				X			SW-45804-____-TS-008	15		X				
				X			SW-45804-____-TS-009	15		X				

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.
GROUNDWATER METALS ARE FIELD FILTERED.
********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity
45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

FROZEN	MEAN TEMP
COLD	9.4
COOLING INITIATED ✓	
AMBIENT	
CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ____	INIT
	SH

SAMPLED BY:	DATE & TIME	RECEIVED BY:	DATE & TIME
Trevor Saunders	11/14/16 1350	Tammy Andrews	NOV. 14th 2016 13:50
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY: SH	DATE & TIME 15-NOV-16 900

NOTES AND CONDITIONS:
1. Quote number must be provided to ensure proper pricing.
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

White - report copy YELLOW - File copy PINK - Customer Copy

9.2

003589

GHD Limited (Waterloo)
ATTN: AIRESSE MACPHEE
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4

Date Received: 15-NOV-16
Report Date: 23-NOV-16 12:16 (MT)
Version: FINAL

Client Phone: 613-727-0510

Certificate of Analysis

Lab Work Order #: L1858227
Project P.O. #: 73502328
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

LAURA ERMETA
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-1 GW-45804-111516-TS-001 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	6.70		0.10	pH		16-NOV-16	R3596150
Temperature, Client	18.6		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	56.9		2.0	CU		16-NOV-16	R3597156
pH	6.94		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	8.3		2.0	mg/L	18-NOV-16	21-NOV-16	R3599494
Total Dissolved Solids	1790	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	28.8		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	406		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0258		0.00087	mg/L		18-NOV-16	
Ammonia, Total (as N)	11.9	DLHC	0.40	mg/L		16-NOV-16	R3597795
Chloride (Cl)	94.1	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	12.8	DLHC	0.30	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0306		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	947	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	3.8		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	200	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0303	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	2.20	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.852	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00710	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-1 GW-45804-111516-TS-001 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Aggregate Organics							
COD	20		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0016		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3597251
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	90.8		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	84.7		60-140	%		17-NOV-16	R3597251
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-2 GW-45804-111516-TS-002 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.43		0.10	pH		16-NOV-16	R3596150
Temperature, Client	10.4		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	38.4		2.0	CU		16-NOV-16	R3597156
pH	7.39		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	8.7		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	777	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	43.8		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	301		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00036		0.00012	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.057		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	81.2		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	0.487		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.30		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0160		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	271		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.9		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-2 GW-45804-111516-TS-002 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Bacteriological Tests							
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	0.27	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0607	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.0256	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0847	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	13		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0048		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	85.0		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	95.0		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	71.9		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	8.57		0.10	pH		16-NOV-16	R3596150
Temperature, Client	11.4		-50	Deg. C		16-NOV-16	R3596150

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
Physical Tests							
Colour, Apparent	31.6		2.0	CU		16-NOV-16	R3597156
pH	8.82		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	5.1		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	241	DLDS	20	mg/L		20-NOV-16	R3599531
Turbidity	12.3		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	102		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0029		0.0017	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.033		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	86.5		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.020		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.23		0.15	mg/L	21-NOV-16	21-NOV-16	R3600501
Phosphorus, Total	0.0060		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	0.34		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	4.5		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.023		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0539		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	0.199		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	0.000078		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.0486		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00131		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	0.0021		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	5.2		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	21		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0025		0.0010	mg/L		18-NOV-16	R3598334

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-3 GW-45804-111516-TS-003 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Aggregate Organics							
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.5		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	99.3		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.4		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-4 GW-45804-111516-TS-004 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.06		0.10	pH		16-NOV-16	R3596150
Temperature, Client	12.0		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	343	DLHC	4.0	CU		16-NOV-16	R3597156
pH	7.11		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	10.3		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	897	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	111		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	329		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00431		0.00012	mg/L		18-NOV-16	
Ammonia, Total (as N)	1.43	DLHC	0.040	mg/L		16-NOV-16	R3597795
Chloride (Cl)	83.5		0.50	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.020		0.020	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.010		0.010	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	2.62		0.15	mg/L	21-NOV-16	21-NOV-16	R3600501
Phosphorus, Total	0.0243		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	283		0.30	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-4 GW-45804-111516-TS-004 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.0101		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.044		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00022		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0403		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	8.40		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	0.000107		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	4.29	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00371		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00078		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	0.0024		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	44		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0011		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	84.2		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	87.0		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	69.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.4		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.00		0.10	pH		16-NOV-16	R3596150
Temperature, Client	11.2		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	448	DLHC	4.0	CU		16-NOV-16	R3597156
pH	6.96		0.10	pH units		17-NOV-16	R3596954

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Physical Tests							
Total Suspended Solids	12.1		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1360	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	107		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	273		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.00227		0.000050	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.917		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	101	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.79		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.147		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	689	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	7.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	100	DLM	100	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00161		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.026		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00058		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	8.11		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	2.09	DLHC	0.0050	mg/L	16-NOV-16	21-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00180		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00065		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	33		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0024		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-5 GW-45804-111516-TS-005 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Hydrocarbons							
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.8		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	97.4		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.7		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	62.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-6 GW-45804-111516-TS-006 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.10		0.10	pH		16-NOV-16	R3596150
Temperature, Client	13.5		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	196		2.0	CU		16-NOV-16	R3597156
pH	7.34		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	2.6		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1580	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	50.9		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	558	DLHC	20	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.0254		0.00074	mg/L		18-NOV-16	
Ammonia, Total (as N)	6.85	DLHC	0.20	mg/L		16-NOV-16	R3597795
Chloride (Cl)	128	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	5.62		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0943		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	511	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	10.9		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-6 GW-45804-111516-TS-006 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Arsenic (As)-Dissolved	0.00108		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.078		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00027		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00058		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	4.06		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	2.50	DLHC	0.0050	mg/L	16-NOV-16	21-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.00679		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00105		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	45		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0022		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	81.9		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	67.5		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	65.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.09		0.10	pH		16-NOV-16	R3596150
Temperature, Client	12.0		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	13.2		2.0	CU		16-NOV-16	R3597156
pH	7.24		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	9.5		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1460	DLDS	20	mg/L		20-NOV-16	R3599545

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Physical Tests							
Turbidity	3.99		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	313		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.000237		0.000065	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.073		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	77.2	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.16		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0063		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	710	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.3		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	0.00017		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Boron (B)-Dissolved	0.074		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Cadmium (Cd)-Dissolved	0.000021		0.000010	mg/L	16-NOV-16	16-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Cobalt (Co)-Dissolved	0.00036		0.00010	mg/L	16-NOV-16	16-NOV-16	R3596203
Copper (Cu)-Dissolved	0.00287		0.00020	mg/L	16-NOV-16	16-NOV-16	R3596203
Iron (Fe)-Dissolved	0.410		0.010	mg/L	16-NOV-16	16-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.000050		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.126		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0450		0.000050	mg/L	16-NOV-16	16-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.00142		0.00050	mg/L	16-NOV-16	16-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.0010		0.0010	mg/L	16-NOV-16	16-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	14		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0034		0.0010	mg/L		18-NOV-16	R3598334
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-7 GW-45804-111516-TS-007 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Hydrocarbons							
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	87.4		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	80.8		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	72.5		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	63.8		60-140	%	18-NOV-16	23-NOV-16	R3601165
L1858227-8 GW-45804-111516-TS-008 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Field Tests							
pH, Client Supplied	7.24		0.10	pH		16-NOV-16	R3596150
Temperature, Client	10.4		-50	Deg. C		16-NOV-16	R3596150
Physical Tests							
Colour, Apparent	<2.0		2.0	CU		16-NOV-16	R3597156
pH	7.08		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	<2.0		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Total Dissolved Solids	1620	DLDS	20	mg/L		20-NOV-16	R3599545
Turbidity	1.21		0.10	NTU		17-NOV-16	R3597595
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	342		10	mg/L		18-NOV-16	R3598522
Unionized ammonia	0.000194		0.000081	mg/L		18-NOV-16	
Ammonia, Total (as N)	0.048		0.020	mg/L		16-NOV-16	R3597795
Chloride (Cl)	95.9	DLDS	2.5	mg/L		18-NOV-16	R3599717
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	0.15		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.0038		0.0030	mg/L	18-NOV-16	20-NOV-16	R3599045
Sulfate (SO4)	816	DLDS	1.5	mg/L		18-NOV-16	R3599717
Organic / Inorganic Carbon							
Dissolved Organic Carbon	1.1		1.0	mg/L		17-NOV-16	R3599042
Bacteriological Tests							
E. Coli	0		0	CFU/100mL		17-NOV-16	R3597315
Fecal Coliforms	0		0	CFU/100mL		17-NOV-16	R3597308
Total Coliforms	0		0	CFU/100mL		17-NOV-16	R3597304
Dissolved Metals							
Dissolved Mercury Filtration Location	FIELD					17-NOV-16	R3596862
Dissolved Metals Filtration Location	FIELD					16-NOV-16	R3596226
Arsenic (As)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858227-8 GW-45804-111516-TS-008 Sampled By: T. SAUNDERS on 15-NOV-16 Matrix: WATER							
Dissolved Metals							
Cadmium (Cd)-Dissolved	<0.00010	DLHC	0.00010	mg/L	16-NOV-16	17-NOV-16	R3596203
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	16-NOV-16	17-NOV-16	R3596203
Copper (Cu)-Dissolved	0.0517	DLHC	0.0020	mg/L	16-NOV-16	17-NOV-16	R3596203
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	16-NOV-16	17-NOV-16	R3596203
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Manganese (Mn)-Dissolved	0.160	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Mercury (Hg)-Dissolved	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597024
Molybdenum (Mo)-Dissolved	0.0211	DLHC	0.00050	mg/L	16-NOV-16	17-NOV-16	R3596203
Nickel (Ni)-Dissolved	0.0064	DLHC	0.0050	mg/L	16-NOV-16	17-NOV-16	R3596203
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	16-NOV-16	17-NOV-16	R3596203
Aggregate Organics							
BOD Carbonaceous	<2.0		2.0	mg/L	17-NOV-16	22-NOV-16	R3600653
COD	10		10	mg/L		20-NOV-16	R3599056
Phenols (4AAP)	0.0020		0.0010	mg/L		17-NOV-16	R3597693
Hydrocarbons							
F1 (C6-C10)	<100		100	ug/L		17-NOV-16	R3596982
F2 (C10-C16)	<100		100	ug/L	17-NOV-16	21-NOV-16	R3597062
F3 (C16-C34)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
F4 (C34-C50)	<250		250	ug/L	17-NOV-16	21-NOV-16	R3597062
Total Hydrocarbons (C6-C50)	<380		380	ug/L		23-NOV-16	
Chrom. to baseline at nC50	YES				17-NOV-16	21-NOV-16	R3597062
Surrogate: 2-Bromobenzotrifluoride	82.4		60-140	%	17-NOV-16	21-NOV-16	R3597062
Surrogate: 3,4-Dichlorotoluene	81.4		60-140	%		17-NOV-16	R3596982
Polycyclic Aromatic Hydrocarbons							
Anthracene	<0.020		0.020	ug/L	18-NOV-16	23-NOV-16	R3601165
Benzo(a)pyrene	<0.0050		0.0050	ug/L	18-NOV-16	23-NOV-16	R3601165
Surrogate: d12-Chrysene	73.0		60-140	%	18-NOV-16	23-NOV-16	R3601165
Surrogate: d10-Phenanthrene	64.1		60-140	%	18-NOV-16	23-NOV-16	R3601165

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1858227-1, -2, -3, -4, -5, -6, -7, -8

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

CL-IC-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

COLOUR-WT	Water	Colour	APHA 2120

Apparent Colour is measured spectrophotometrically by comparison to platinum-cobalt standards using the single wavelength method after sample decanting. Colour measurements can be highly pH dependent, and apply to the pH of the sample as received (at time of testing), without pH adjustment. Concurrent measurement of sample pH is recommended.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

ETL-NH3-UNION-CLI-WT	Water	Un-ionized ammonia	CALCULATION
F1-F4-CALC-WT	Water	CCME Total Hydrocarbons	CCME CWS-PHC, Pub #1310, Dec 2001-L

Analytical methods used for analysis of CCME Petroleum Hydrocarbons have been validated and comply with the Reference Method for the CWS PHC.

In cases where results for both F4 and F4G are reported, the greater of the two results must be used in any application of the CWS PHC guidelines and the gravimetric heavy hydrocarbons cannot be added to the C6 to C50 hydrocarbons.
In samples where BTEX and F1 were analyzed , F1-BTEX represents a value where the sum of Benzene, Toluene, Ethylbenzene and total Xylenes has been subtracted from F1.

In samples where PAHs, F2 and F3 were analyzed, F2-Naphth represents the result where Naphthalene has been subtracted from F2. F3-PAH represents a result where the sum of Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenzo(a,h)anthracene, Fluoranthene, Indeno(1,2,3-cd)pyrene, Phenanthrene, and Pyrene has been subtracted from F3.

Unless otherwise qualified, the following quality control criteria have been met for the F1 hydrocarbon range:
1. All extraction and analysis holding times were met.
2. Instrument performance showing response factors for C6 and C10 within 30% of the response factor for toluene.
3. Linearity of gasoline response within 15% throughout the calibration range.

Unless otherwise qualified, the following quality control criteria have been met for the F2-F4 hydrocarbon ranges:
1. All extraction and analysis holding times were met.
2. Instrument performance showing C10, C16 and C34 response factors within 10% of their average.
3. Instrument performance showing the C50 response factor within 30% of the average of the C10, C16 and C34 response factors.

Reference Information

4. Linearity of diesel or motor oil response within 15% throughout the calibration range.

F1-HS-WT Water F1 (O.Reg.153/04) E3421/CCME (HS)
Fraction F1 is determined by analyzing by headspace-GC/FID.

F2-F4-WT Water F2-F4 (O.Reg.153/04) MOE DECPH-E3421/CCME TIER 1
The petroleum hydrocarbons are extracted from the aqueous samples using solvent partition. The final concentrated extract is analyzed by gas chromatography (GC) using flame ionization detection (FID) and a 100% polydimethylsiloxane column.

The F2 fraction is determined by integrating the area in the chromatogram from the apex of nC10 to the apex nC16 and quantitating using external calibration using a standard mix containing nC10, nC16 and nC34. Similarly, the F3 fraction extends from the apex of nC16 to the apex nC34 and the F4 fraction covers the area from the apex nC34 to the apex nC50. If the chromatogram does not return to the baseline by the time nC50 elutes, a gravimetric determination of the F4 is performed.

FC-MF-WT Water Fecal Coliforms SM 9222D
A 100mL volume of sample is filtered through a membrane, the membrane is placed on mFC agar and incubated at 24–2h@44.5–0.2 C. Method ID: WT-TM-1200

HG-D-CVAA-WT Water Dissolved Mercury in Water by CVAAS EPA 1631E (mod)
Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

MET-D-CCMS-WT Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT Water Ammonia, Total as N EPA 350.1
Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT Water Nitrite in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT Water Nitrate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT Water Total P in Water by Colour APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PAH-CCME-WT Water CCME PAHs SW846 8270
Sample is extracted at neutral pH using separate aliquots of dichloromethane with a modified separatory funnel technique, extracts are then concentrated and analyzed by GC/MSD. Depending on the analytical GC/MS column used benzo(j)fluoranthene may chromatographically co-elute with benzo(b)fluoranthene or benzo(k)fluoranthene.

PH,TEMP-CLIENT-WT Water pH & Temperature Results supplied by client

PH-WT Water pH APHA 4500 H-Electrode
Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT Water Phenol (4AAP) EPA 9066
An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT Water Sulfate in Water by IC EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT Water Total Dissolved Solids APHA 2540C
A well-mixed sample is filtered though glass fibres filter. A known volume of the filtrate is evaporated and dried at 105–5 C overnight and then 180–10 C for 1hr.

Reference Information

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TC-MF-WT	Water	Total Coliforms	SM 9222B

A 100mL volume of sample is filtered through a membrane, the membrane is placed on mENDO LES agar and incubated at 35–0.5 C for 24–2h.
Method ID: WT-TM-1200

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

TURBIDITY-WT	Water	Turbidity	APHA 2130 B

Sample result is based on a comparison of the intensity of the light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension under the same conditions. Sample readings are obtained from a Nephelometer.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R3598522								
WG2435073-7 CRM		**WT-ALK-CRM**						
Alkalinity, Total (as CaCO3)			100.0		%		80-120	18-NOV-16
WG2435073-8 DUP		**L1857583-11**						
Alkalinity, Total (as CaCO3)		259	262		mg/L	1.0	20	18-NOV-16
WG2435073-6 LCS								
Alkalinity, Total (as CaCO3)			100.9		%		85-115	18-NOV-16
WG2435073-5 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	18-NOV-16
BOD-C-WT	Water							
Batch R3600653								
WG2434531-2 DUP		**L1858105-3**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	22-NOV-16
WG2434531-3 LCS								
BOD Carbonaceous			93.4		%		85-115	22-NOV-16
WG2434531-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	22-NOV-16
C-DIS-ORG-WT	Water							
Batch R3599042								
WG2435178-3 DUP		**L1858227-1**						
Dissolved Organic Carbon		3.8	3.8		mg/L	0.1	20	17-NOV-16
WG2435178-2 LCS								
Dissolved Organic Carbon			94.2		%		80-120	17-NOV-16
WG2435178-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	17-NOV-16
WG2435178-4 MS		**L1858227-1**						
Dissolved Organic Carbon			92.5		%		70-130	17-NOV-16
CL-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Chloride (Cl)		86.4	86.5		mg/L	0.1	25	18-NOV-16
WG2435860-2 LCS								
Chloride (Cl)			101.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Chloride (Cl)			94.7		%		70-130	18-NOV-16
COD-T-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
COD-T-WT	Water							
Batch R3599056								
WG2436599-3 DUP		**L1859400-6**						
COD		18	23	J	mg/L	4	20	20-NOV-16
WG2436599-2 LCS								
COD			105.2		%		85-115	20-NOV-16
WG2436599-1 MB								
COD			<10		mg/L		10	20-NOV-16
WG2436599-4 MS		**L1859400-6**						
COD			87.5		%		75-125	20-NOV-16
COLOUR-WT	Water							
Batch R3597156								
WG2434274-3 CRM		**WT-COLOUR-CRM**						
Colour, Apparent			94.6		%		80-120	16-NOV-16
WG2434274-4 DUP		**L1857803-1**						
Colour, Apparent		30.1	29.8		CU	0.9	20	16-NOV-16
WG2434274-2 LCS								
Colour, Apparent			100.1		%		80-120	16-NOV-16
WG2434274-1 MB								
Colour, Apparent			<2.0		CU		2	16-NOV-16
EC-MF-WT	Water							
Batch R3597315								
WG2433785-2 DUP		**WG2433785-4**						
E. Coli		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433785-1 MB								
E. Coli			0		CFU/100mL		1	17-NOV-16
F1-HS-WT	Water							
Batch R3596982								
WG2432549-4 DUP		**WG2432549-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2432549-1 LCS								
F1 (C6-C10)			103.5		%		80-120	16-NOV-16
WG2432549-2 MB								
F1 (C6-C10)			<100		ug/L		100	16-NOV-16
Surrogate: 3,4-Dichlorotoluene			100.8		%		60-140	16-NOV-16
Batch R3597251								
WG2433655-4 DUP		**WG2433655-3**						
F1 (C6-C10)		<100	<100	RPD-NA	ug/L	N/A	50	17-NOV-16
WG2433655-1 LCS								

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
F1-HS-WT	Water							
Batch R3597251								
WG2433655-1 LCS								
F1 (C6-C10)			99.1		%		80-120	17-NOV-16
WG2433655-2 MB								
F1 (C6-C10)			<100		ug/L		100	17-NOV-16
Surrogate: 3,4-Dichlorotoluene			95.0		%		60-140	17-NOV-16
F2-F4-WT	Water							
Batch R3597062								
WG2434303-2 LCS								
F2 (C10-C16)			102.7		%		65-135	17-NOV-16
F3 (C16-C34)			92.6		%		65-135	17-NOV-16
F4 (C34-C50)			104.7		%		65-135	17-NOV-16
WG2434303-3 LCSD		**WG2434303-2**						
F2 (C10-C16)		102.7	94.9		%	7.9	50	17-NOV-16
F3 (C16-C34)		92.6	96.0		%	3.6	50	17-NOV-16
F4 (C34-C50)		104.7	101.0		%	3.6	50	17-NOV-16
WG2434303-1 MB								
F2 (C10-C16)			<100		ug/L		100	17-NOV-16
F3 (C16-C34)			<250		ug/L		250	17-NOV-16
F4 (C34-C50)			<250		ug/L		250	17-NOV-16
Surrogate: 2-Bromobenzotrifluoride			84.7		%		60-140	17-NOV-16
FC-MF-WT	Water							
Batch R3597308								
WG2433787-1 MB								
Fecal Coliforms			0		CFU/100mL		1	17-NOV-16
HG-D-CVAA-WT	Water							
Batch R3597024								
WG2434581-4 DUP		**WG2434581-3**						
Mercury (Hg)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-NOV-16
WG2434581-2 LCS								
Mercury (Hg)-Dissolved			101.0		%		80-120	17-NOV-16
WG2434581-1 MB								
Mercury (Hg)-Dissolved			<0.000010		mg/L		0.00001	17-NOV-16
WG2434581-6 MS		**WG2434581-5**						
Mercury (Hg)-Dissolved			109.5		%		70-130	17-NOV-16
MET-D-CCMS-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3596203								
WG2433917-4 DUP		**WG2433917-3**						
Arsenic (As)-Dissolved		0.00042	0.00041		mg/L	1.9	20	16-NOV-16
Boron (B)-Dissolved		0.089	0.089		mg/L	0.3	20	16-NOV-16
Cadmium (Cd)-Dissolved		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	16-NOV-16
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	16-NOV-16
Cobalt (Co)-Dissolved		0.00019	0.00018		mg/L	8.4	20	16-NOV-16
Copper (Cu)-Dissolved		0.0302	0.0303		mg/L	0.1	20	16-NOV-16
Iron (Fe)-Dissolved		2.22	2.22		mg/L	0.1	20	16-NOV-16
Lead (Pb)-Dissolved		0.000075	0.000075		mg/L	0.3	20	16-NOV-16
Manganese (Mn)-Dissolved		0.872	0.881		mg/L	1.1	20	16-NOV-16
Molybdenum (Mo)-Dissolved		0.00664	0.00670		mg/L	0.9	20	16-NOV-16
Nickel (Ni)-Dissolved		0.00140	0.00140		mg/L	0.2	20	16-NOV-16
Zinc (Zn)-Dissolved		0.0017	0.0016		mg/L	4.2	20	16-NOV-16
WG2433917-2 LCS								
Arsenic (As)-Dissolved			97.3		%		80-120	16-NOV-16
Boron (B)-Dissolved			101.2		%		80-120	16-NOV-16
Cadmium (Cd)-Dissolved			97.5		%		80-120	16-NOV-16
Chromium (Cr)-Dissolved			97.6		%		80-120	16-NOV-16
Cobalt (Co)-Dissolved			97.0		%		80-120	16-NOV-16
Copper (Cu)-Dissolved			95.6		%		80-120	16-NOV-16
Iron (Fe)-Dissolved			92.4		%		80-120	16-NOV-16
Lead (Pb)-Dissolved			98.4		%		80-120	16-NOV-16
Manganese (Mn)-Dissolved			99.6		%		80-120	16-NOV-16
Molybdenum (Mo)-Dissolved			97.4		%		80-120	16-NOV-16
Nickel (Ni)-Dissolved			97.1		%		80-120	16-NOV-16
Zinc (Zn)-Dissolved			90.6		%		80-120	16-NOV-16
WG2433917-1 MB								
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	16-NOV-16
Boron (B)-Dissolved			<0.010		mg/L		0.01	16-NOV-16
Cadmium (Cd)-Dissolved			<0.000010		mg/L		0.00001	16-NOV-16
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	16-NOV-16
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	16-NOV-16
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	16-NOV-16
Lead (Pb)-Dissolved			<0.000050				0.00005	

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R3596203								
WG2433917-1 MB								
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	16-NOV-16
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	16-NOV-16
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	16-NOV-16
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	16-NOV-16
WG2433917-5 MS		**WG2433917-3**						
Arsenic (As)-Dissolved			119.8		%		70-130	16-NOV-16
Boron (B)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Cadmium (Cd)-Dissolved			101.6		%		70-130	16-NOV-16
Chromium (Cr)-Dissolved			100.8		%		70-130	16-NOV-16
Cobalt (Co)-Dissolved			97.4		%		70-130	16-NOV-16
Copper (Cu)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Iron (Fe)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Lead (Pb)-Dissolved			96.6		%		70-130	16-NOV-16
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	16-NOV-16
Molybdenum (Mo)-Dissolved			101.7		%		70-130	16-NOV-16
Nickel (Ni)-Dissolved			94.4		%		70-130	16-NOV-16
Zinc (Zn)-Dissolved			92.3		%		70-130	16-NOV-16
NH3-WT	Water							
Batch R3597795								
WG2433623-15 DUP		**L1858343-2**						
Ammonia, Total (as N)		0.332	0.338		mg/L	2.0	20	16-NOV-16
WG2433623-14 LCS								
Ammonia, Total (as N)			96.2		%		85-115	16-NOV-16
WG2433623-13 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	16-NOV-16
WG2433623-16 MS		**L1858343-2**						
Ammonia, Total (as N)			92.6		%		75-125	16-NOV-16
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrite (as N)			102.4		%		70-130	18-NOV-16
WG2435860-1 MB								

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrite (as N)			102.5		%		70-130	18-NOV-16
NO3-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrate (as N)			100.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrate (as N)			102.5		%		70-130	18-NOV-16
P-T-COL-WT	Water							
Batch R3599045								
WG2435220-3 DUP		**L1858227-1**						
Phosphorus, Total		0.0306	0.0341		mg/L	11	20	20-NOV-16
WG2435220-2 LCS								
Phosphorus, Total			103.1		%		80-120	20-NOV-16
WG2435220-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	20-NOV-16
WG2435220-4 MS		**L1858227-1**						
Phosphorus, Total			81.9		%		70-130	20-NOV-16
PAH-CCME-WT	Water							
Batch R3601165								
WG2435271-2 LCS								
Anthracene			58.1		%		50-140	23-NOV-16
Benzo(a)pyrene			89.7		%		60-130	23-NOV-16
WG2435271-3 LCSD		**WG2435271-2**						
Anthracene		58.1	57.7		%	0.8	50	23-NOV-16
Benzo(a)pyrene		89.7	86.9		%	3.1	50	23-NOV-16
WG2435271-1 MB								
Anthracene			<0.020		ug/L		0.02	23-NOV-16
Benzo(a)pyrene			<0.0050		ug/L		0.005	23-NOV-16
Surrogate: d10-Phenanthrene			67.6		%		60-140	23-NOV-16
Surrogate: d12-Chrysene			73.1		%		60-140	23-NOV-16

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R3596954								
WG2434422-3 DUP		**WG2434422-2**						
pH		6.96	7.09	J	pH units	0.13	0.2	17-NOV-16
WG2434422-6 DUP		**WG2434422-5**						
pH		6.96	6.97	J	pH units	0.01	0.2	17-NOV-16
WG2434422-1 LCS								
pH			6.98		pH units		6.9-7.1	17-NOV-16
WG2434422-4 LCS								
pH			7.02		pH units		6.9-7.1	17-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3597693								
WG2434828-7 DUP		**L1857251-20**						
Phenols (4AAP)		0.0018	0.0019		mg/L	8.7	20	17-NOV-16
WG2434828-6 LCS								
Phenols (4AAP)			92.0		%		85-115	17-NOV-16
WG2434828-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	17-NOV-16
WG2434828-8 MS		**L1857251-20**						
Phenols (4AAP)			89.9		%		75-125	17-NOV-16
Batch R3598334								
WG2435662-11 DUP		**L1857541-1**						
Phenols (4AAP)		0.0036	0.0037		mg/L	1.8	20	18-NOV-16
WG2435662-15 DUP		**L1858227-5**						
Phenols (4AAP)		0.0024	0.0022		mg/L	6.9	20	18-NOV-16
WG2435662-10 LCS								
Phenols (4AAP)			99.6		%		85-115	18-NOV-16
WG2435662-14 LCS								
Phenols (4AAP)			98.2		%		85-115	18-NOV-16
WG2435662-13 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-NOV-16
WG2435662-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	18-NOV-16
WG2435662-12 MS		**L1857541-1**						
Phenols (4AAP)			101.7		%		75-125	18-NOV-16
WG2435662-16 MS		**L1858227-5**						
Phenols (4AAP)			92.5		%		75-125	18-NOV-16
SO4-IC-N-WT	Water							

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-IC-N-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Sulfate (SO4)		<0.30	<0.30	RPD-NA	mg/L	N/A	20	18-NOV-16
WG2435860-2 LCS								
Sulfate (SO4)			101.2		%		90-110	18-NOV-16
WG2435860-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Sulfate (SO4)			104.2		%		75-125	18-NOV-16
SOLIDS-TDS-WT	Water							
Batch R3599531								
WG2436459-3 DUP		**L1857359-1**						
Total Dissolved Solids		368	364		mg/L	1.1	20	20-NOV-16
WG2436459-2 LCS								
Total Dissolved Solids			96.9		%		85-115	20-NOV-16
WG2436459-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-NOV-16
Batch R3599545								
WG2436466-3 DUP		**L1857079-1**						
Total Dissolved Solids		849	850		mg/L	0.2	20	20-NOV-16
WG2436466-2 LCS								
Total Dissolved Solids			96.5		%		85-115	20-NOV-16
WG2436466-1 MB								
Total Dissolved Solids			<10		mg/L		10	20-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3599494								
WG2435298-3 DUP		**L1857783-2**						
Total Suspended Solids		4.0	3.0	J	mg/L	1.0	4	21-NOV-16
WG2435298-2 LCS								
Total Suspended Solids			97.6		%		85-115	21-NOV-16
WG2435298-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
Batch R3599510								
WG2435300-3 DUP		**L1858237-1**						
Total Suspended Solids		27.9	30.1		mg/L	7.6	20	21-NOV-16
WG2435300-2 LCS								
Total Suspended Solids			98.0		%		85-115	21-NOV-16
WG2435300-1 MB								
							2	

Quality Control Report

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TSS-WT	Water							
Batch R3599510								
WG2435300-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
TC-MF-WT	Water							
Batch R3597304								
WG2433783-3 DUP		**WG2433783-4**						
Total Coliforms		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433783-1 MB								
Total Coliforms			0		CFU/100mL		1	17-NOV-16
TKN-WT	Water							
Batch R3597465								
WG2434415-3 DUP		**L1858125-6**						
Total Kjeldahl Nitrogen		1.41	1.53		mg/L	8.4	20	17-NOV-16
WG2434415-2 LCS								
Total Kjeldahl Nitrogen			102.3		%		75-125	17-NOV-16
WG2434415-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	17-NOV-16
WG2434415-4 MS		**L1858125-6**						
Total Kjeldahl Nitrogen			115.3		%		70-130	17-NOV-16
Batch R3600501								
WG2436699-3 DUP		**L1857908-5**						
Total Kjeldahl Nitrogen		0.61	0.69		mg/L	12	20	21-NOV-16
WG2436699-2 LCS								
Total Kjeldahl Nitrogen			109.7		%		75-125	21-NOV-16
WG2436699-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	21-NOV-16
WG2436699-4 MS		**L1857908-5**						
Total Kjeldahl Nitrogen			98.5		%		70-130	21-NOV-16
TURBIDITY-WT	Water							
Batch R3597595								
WG2434432-3 DUP		**L1858125-2**						
Turbidity		0.77	0.73		NTU	4.8	15	17-NOV-16
WG2434432-2 LCS								
Turbidity			104.0		%		85-115	17-NOV-16
WG2434432-1 MB								
Turbidity			<0.10		NTU		0.1	17-NOV-16

Quality Control Report

Workorder: L1858227 Report Date: 23-NOV-16

Client: GHD Limited (Waterloo)
179 Colonnade Road, Suite 400
Ottawa ON K2E 7J4
Contact: AIRESSE MACPHEE

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

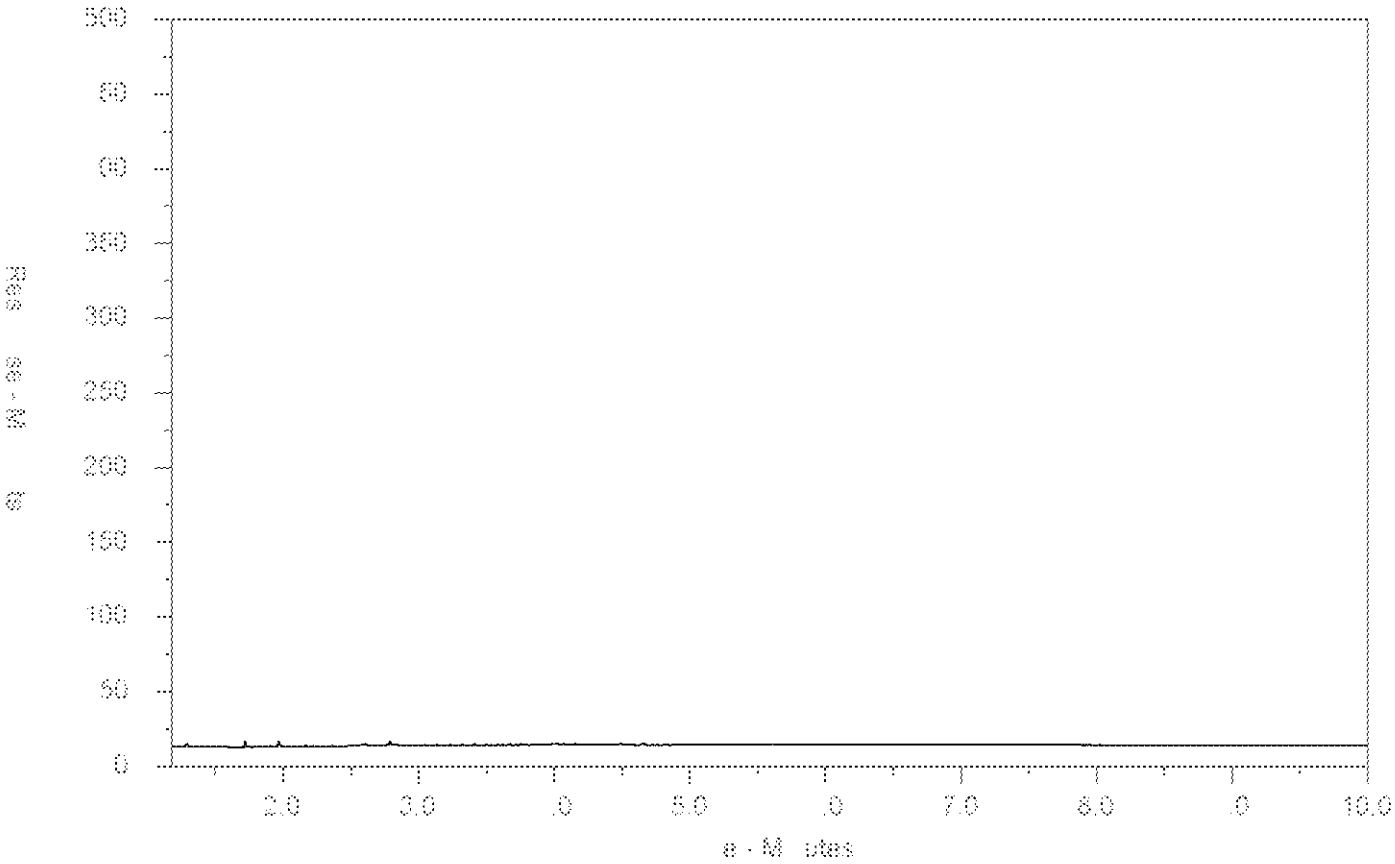
ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-1
Client Sample ID: GW-45804-111516-TS-001



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

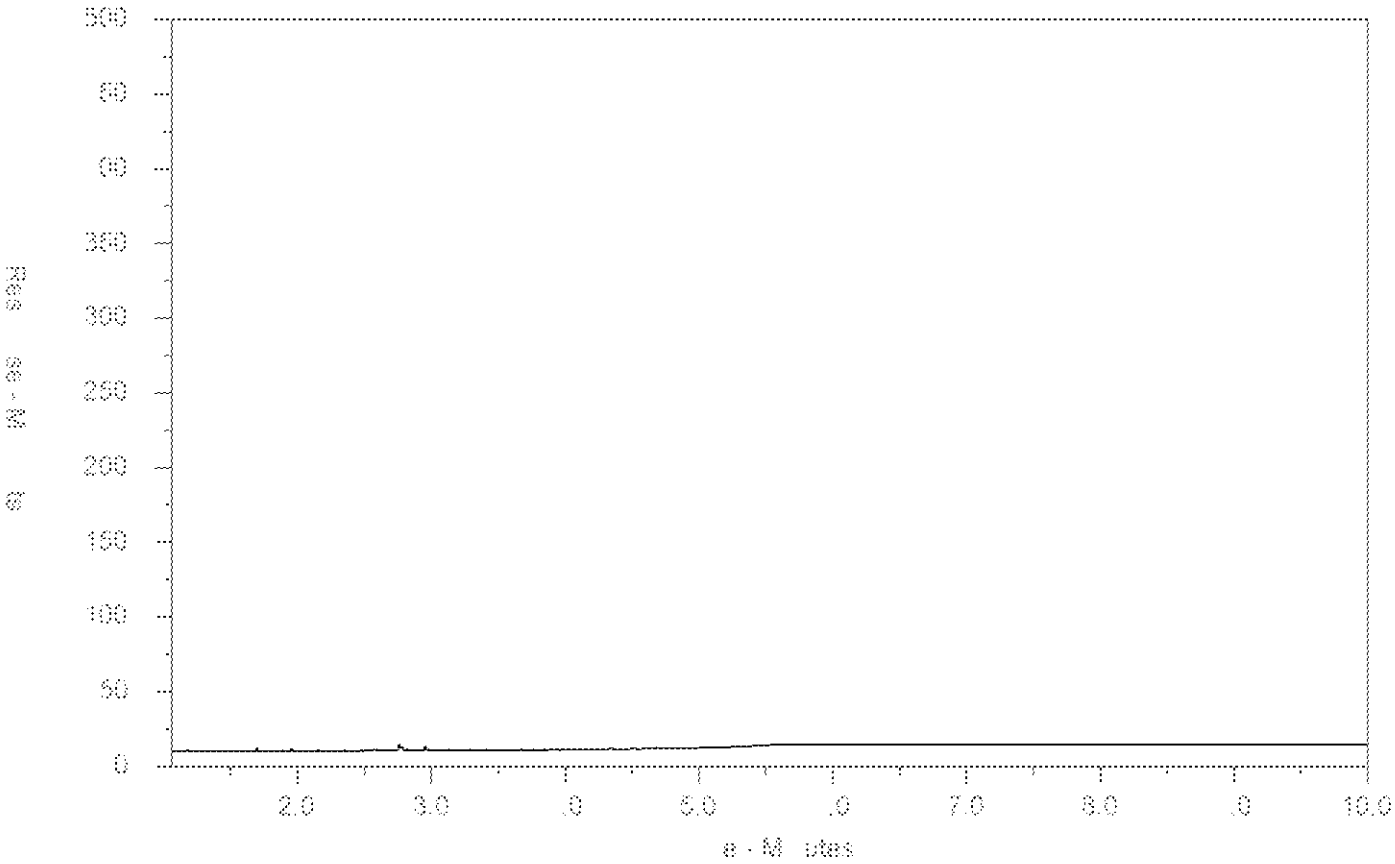
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-2
Client Sample ID: GW-45804-111516-TS-002



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

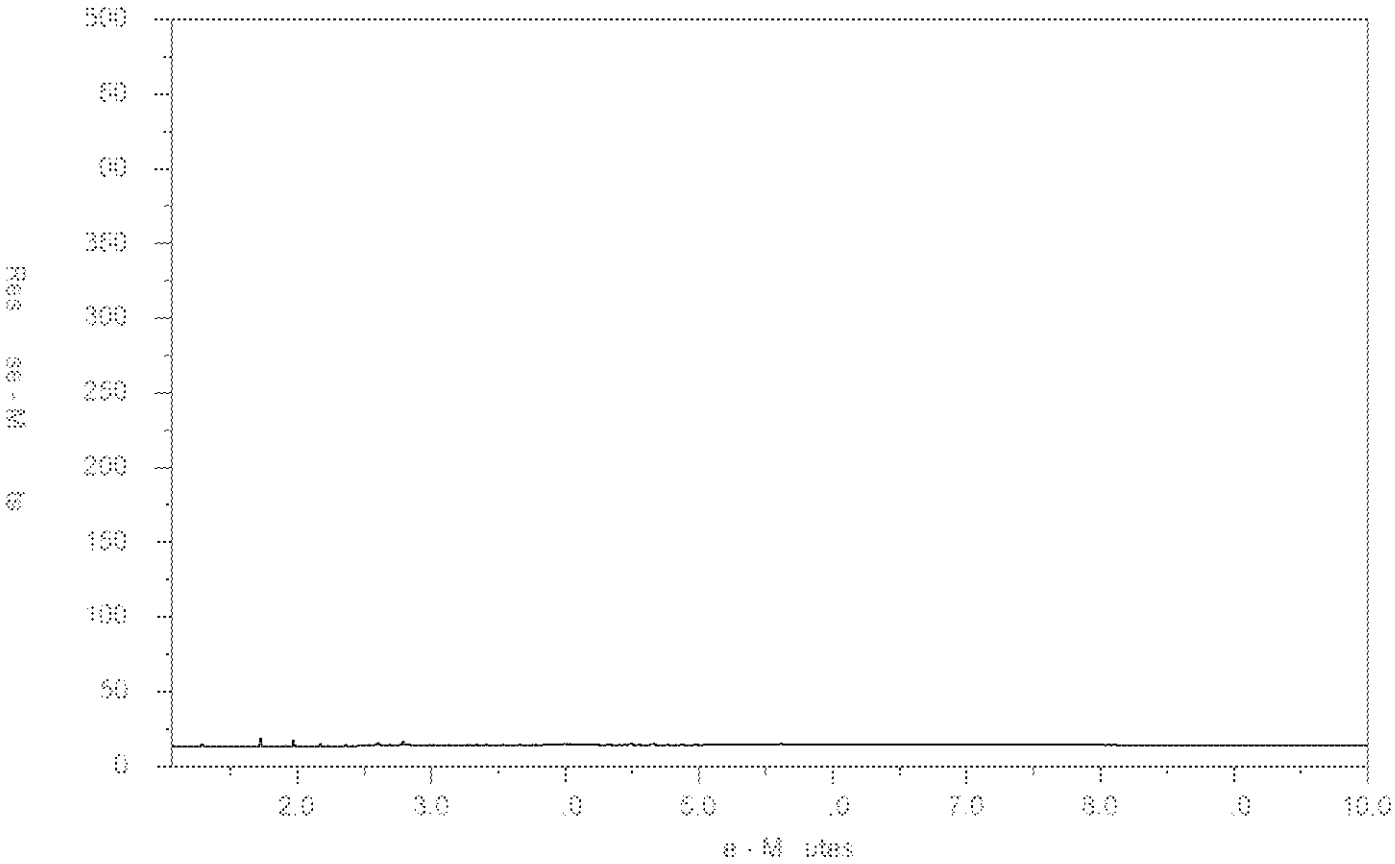
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-3
Client Sample ID: GW-45804-111516-TS-003



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

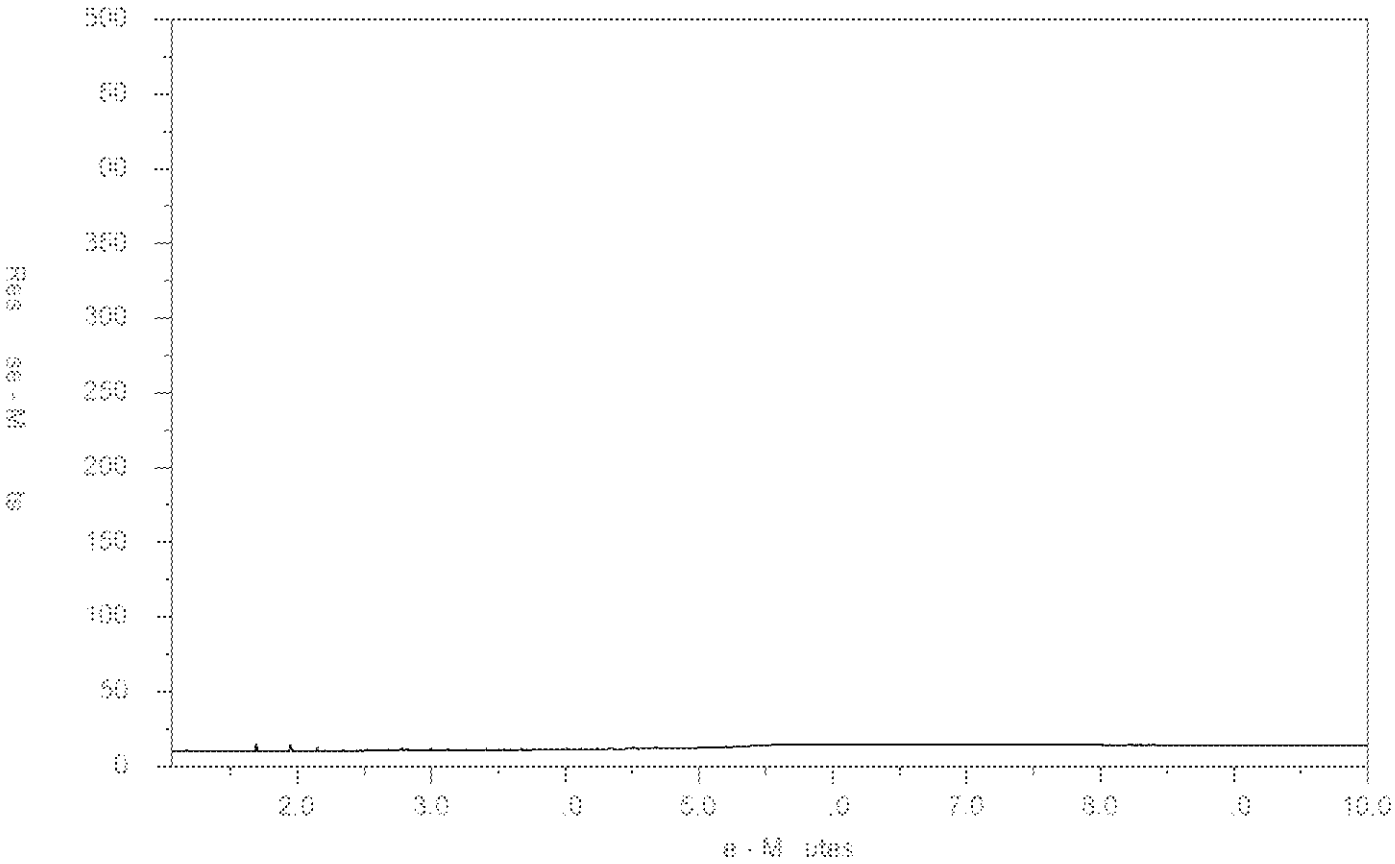
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-4
Client Sample ID: GW-45804-111516-TS-004



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

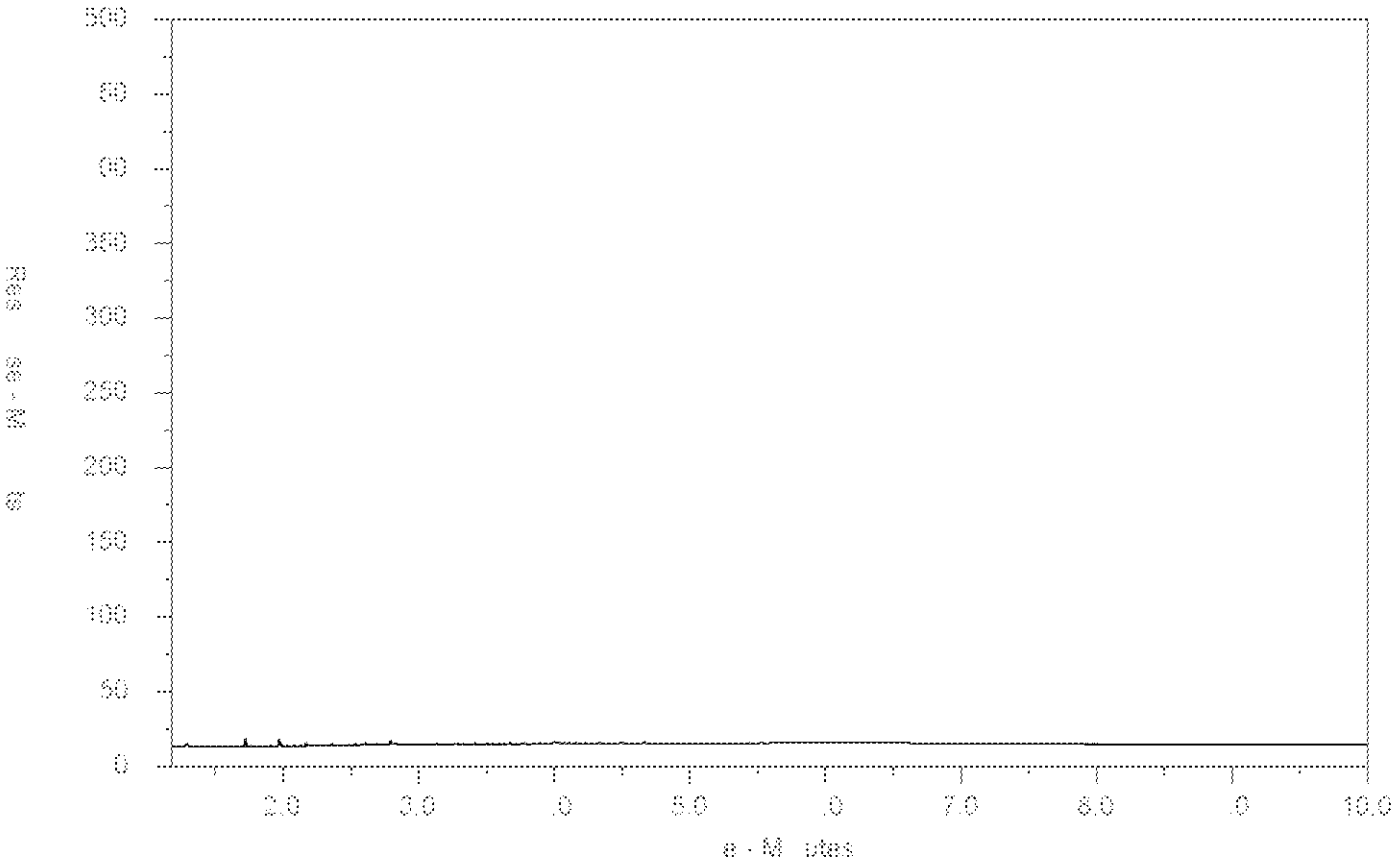
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-5
Client Sample ID: GW-45804-111516-TS-005



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

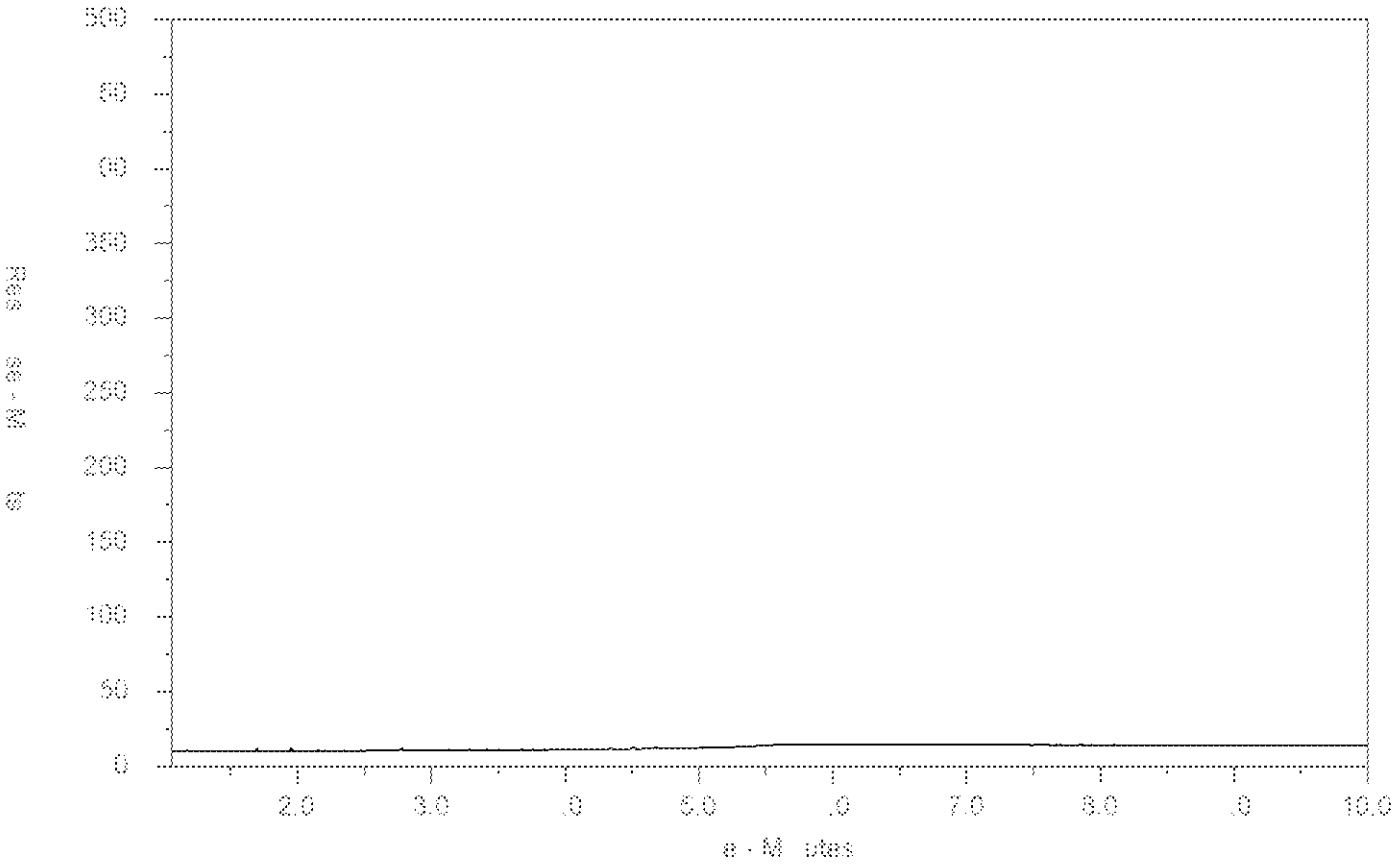
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-6
Client Sample ID: GW-45804-111516-TS-006



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

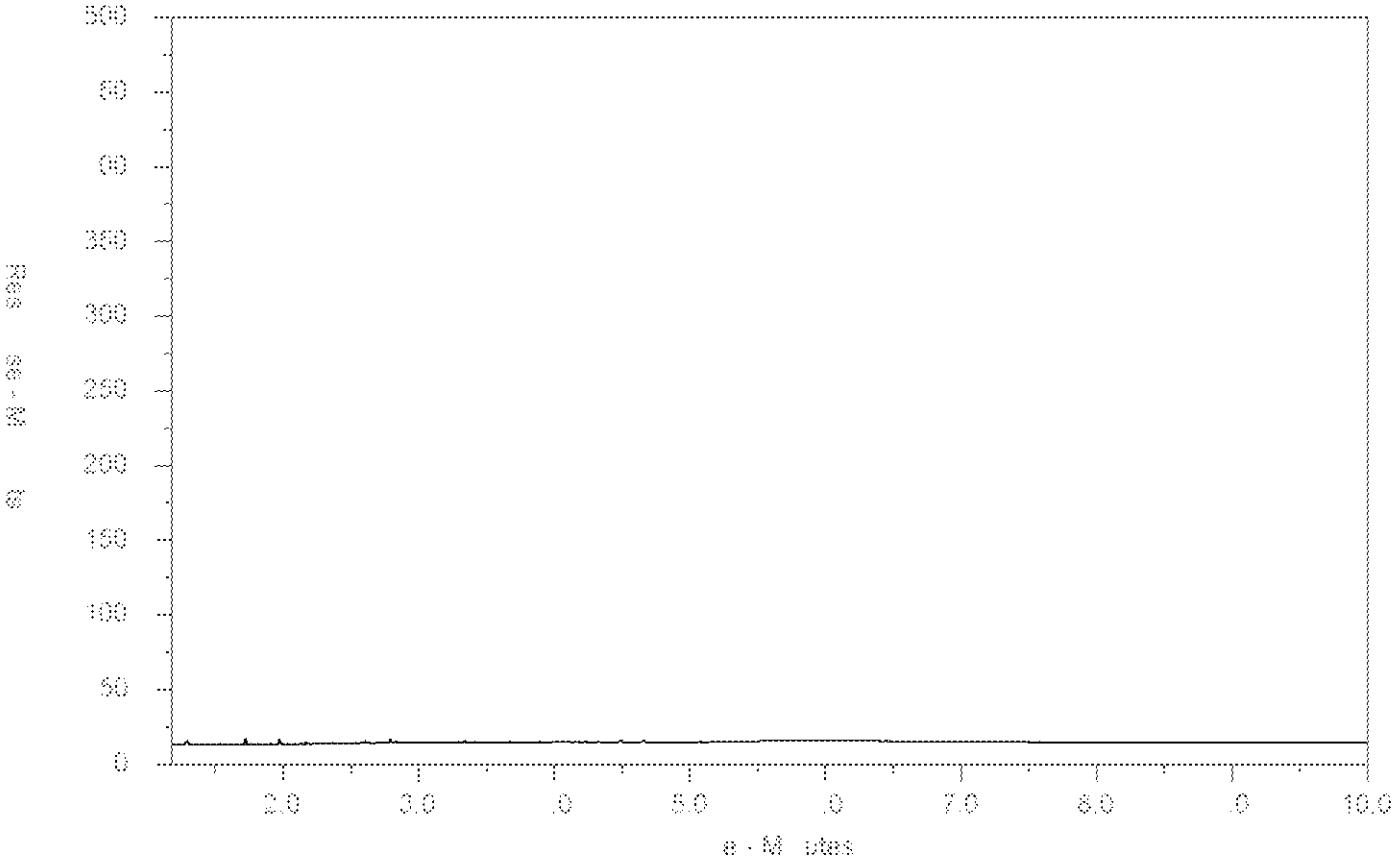
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-7
Client Sample ID: GW-45804-111516-TS-007



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

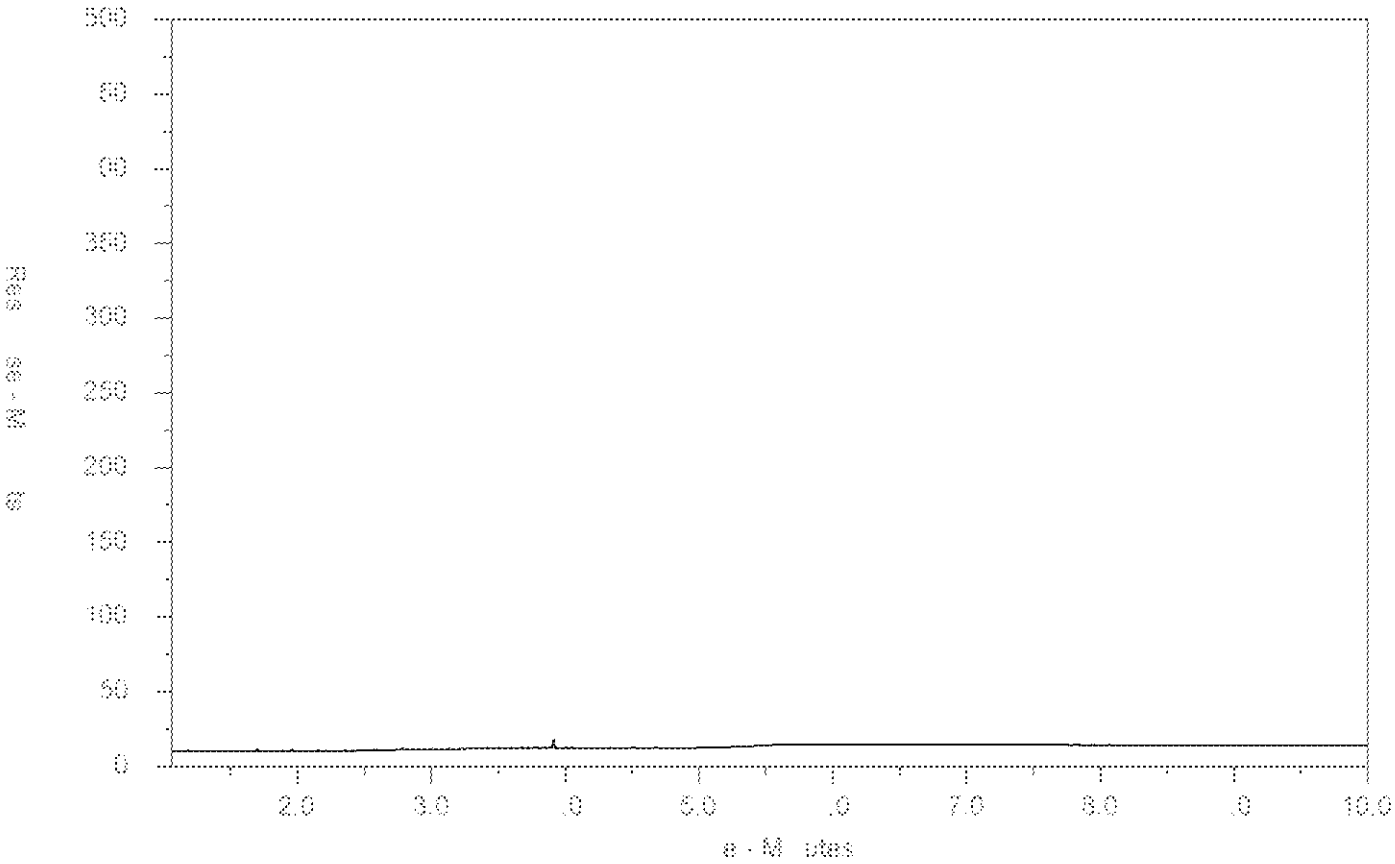
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: L1858227-8
Client Sample ID: GW-45804-111516-TS-008



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →	← Motor Oils/Lube Oils/Grease →		
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

10.5°

C of C # XXXXX

PAGE _1__ OF _1__

ALS Environmental
60 NORTHLAND ROAD, UNIT 1
WATERLOO, ON N2V 2B8
Phone: (519) 886-6910
Fax: (519) 886-9047
CANADA TOLL FREE: 1-800-66

CHAIN OF CUSTODY / ANALYTICAL SERVICES REQUEST FORM

L1858227-COFC

Service Requested:	X	Regular (default)
Date Required:		Priority (50% surcharge)
		Emergency (100% surcharge)

COMPANY NAME: GHD LIMITED 13791

PROJECT MANAGER: AIRESSE MACPHEE

JOB #: 45804-58

PO #: 73502328

DUE DATE:

CRITE
Reg 153/(
Table

TCLP _____ MISA _____ PWQO _____

OTHER CLASSDETAILQCPLUS_ALS

REPORT DISTRIBUTION: ALL FINAL RESULTS WILL BE MAILED

EMAIL_X___ FAX_____

EMAIL_airesse.macphee@ghd.com,Ben.Kempel@ghd.com___

EMAIL_ben.constable@ghd.com,Trevor.Saunders@ghd.com

EMAIL_Wayne.Williams@ghd.com

SELECT pdf____ digital____ both___X___

ANALYSIS REQUEST

(INDICATE BOTTLES FIELD FILTERED)

⇦ PRESERVED (F/P)

SUBMISSION # 1185A227

ENTERED BY: RH

DATE/TIME ENTERED: 16/11/16

BIN # 16B

SAMPLING INFORMATION

Sample Date/Time: Date (yy/mm/dd)	Time (24 hr)	TYPE: COMP	GRAB	MATRIX: WATER	SOIL	OTHER	SAMPLE DESCRIPTION TO APPEAR ON REPORT	NUMBER OF CONTAINERS	45804-GW-P-WT	45804-SW-P-WT	FIELD PH	FIELD TEMP	COMMENTS	LAB ID
11/15/16				X			GW-45804- 111516 -TS-001	15	X		6.70	18.57		1
				X			GW-45804- -TS-002	15	X		7.43	10.39		2
				X			GW-45804- -TS-003	15	X		8.57	11.36		3
				X			GW-45804- -TS-004	15	X		7.06	11.98		4
				X			GW-45804- -TS-005	15	X		7.00	11.23		5
				X			GW-45804- -TS-006	15	X		7.10	13.50		6
				X			GW-45804- -TS-007	15	X		7.09	11.96		7
				X			GW-45804- -TS-008	15	X		7.24	10.39		8
				X			GW-45804- -TS-009	15	X					
				X			GW-45804- -TS-010	15	X					
				X			GW-45804- -TS-011	15	X					
				X			GW-45804- -TS-012	15	X					
				X			GW-45804- -TS-013	15	X					

SPECIAL INSTRUCTIONS/COMMENTS

PLEASE INCLUDE FIELD PH AND FIELD TEMP FOR UN-IONIZED AMMONIA CALCULATION.

GROUNDWATER METALS ARE FIELD FILTERED.

********** Short Hold Time for Micro & Turbidity **********

45804-GW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Diss. Metals & Hg, TP, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

45804-SW-P-WT List: Alk, CBOD, DOC, anions 4, COD, Colour, Micro (EC,TC,FC), F1-F4, Tot. Metals & Hg, TP low level, PAH, NH3, Phenols, TDS, TSS, TKN, Turbidity

SAMPLE CONDITION

	MEAN TEMP
FROZEN	
COLD	
COOLING INITIATED ✓	13.2
AMBIENT	

SAMPLED BY: Trevor Saunders	DATE & TIME: 11/15/16	RECEIVED BY: Tammy Andrews	DATE & TIME: 11/15/16 2:30
RELINQUISHED BY:	DATE & TIME	RECEIVED AT LAB BY:	DATE & TIME: 16/NOV/16 @ 1000

CONDITION ACCEPTABLE UPON RECEIPT (Y/N) ___ INIT: RH

NOTES AND CONDITIONS:

1. Quote number must be provided to ensure proper pricing
2. TAT may vary dependent on complexity of analysis and lab workload at time of submission. Please contact the lab to confirm TATs.
3. Any known or suspected hazards relating to a sample must be noted on the chain of custody in comments section.

9.9°

White - report copy YELLOW - File copy PINK - Customer Copy

003624

PM

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

COC Number: 14 -

Affix ALS barcode label here (lab use only)

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☐ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☑ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143	Email 1 or Fax npora@orgaworld.ca	Specify Date Required for E2,E or P:
	613-822-2056 ext#142 (Leigh Moulton)	Email 2 lmoulton@orgaworld.ca	
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution	Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca	
Contact:	Nick Pora	Email 2 lmoulton@orgaworld.ca	
Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		ALS Contact: Alison	Sampler: Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As, Bo, Cd, Cr, Co, Cu, Pb, Hg, Ni, Z	Total Phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	16-Mar-16	9:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temperature: -2°C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	Ice packs	Yes ☐	No ☐
Cooling Initiated	☐	Custody seal intact	Yes ☐	No ☐			

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: Mar 16/16	Time:	Received by:	Date: Mar/16/16	Time: 1:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS FM-0220a v09 Front/04 January

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

003625

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1745718-1 STORM WATER POND Sampled By: JESSICA BLACK on 16-MAR-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	-2.0		-50	Deg. C		17-MAR-16	R3420803
Physical Tests							
Conductivity	496		3.0	umhos/cm		17-MAR-16	R3421700
Oxygen, Dissolved	8.71	PEHR	0.050	mg/L		17-MAR-16	R3421088
pH	7.80		0.10	pH units		17-MAR-16	R3421697
Total Suspended Solids	6.5		2.0	mg/L	17-MAR-16	18-MAR-16	R3421791
Anions and Nutrients							
Unionized ammonia	0.00431		0.00020	mg/L		21-MAR-16	
Ammonia, Total (as N)	0.814	DLM	0.040	mg/L		18-MAR-16	R3422878
Nitrate and Nitrite as N	0.061		0.022	mg/L		21-MAR-16	
Nitrate (as N)	0.048		0.020	mg/L		18-MAR-16	R3422885
Nitrite (as N)	0.013		0.010	mg/L		18-MAR-16	R3422885
Total Kjeldahl Nitrogen	1.86		0.15	mg/L	18-MAR-16	18-MAR-16	R3421354
Phosphorus, Total	0.244		0.030	mg/L	18-MAR-16	18-MAR-16	R3422219
Organic / Inorganic Carbon							
Dissolved Organic Carbon	11.0		1.0	mg/L		17-MAR-16	R3421171
acteriological Tests							
E. Coli	24	DLM	2	CFU/100mL	17-MAR-16	18-MAR-16	R3422148
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Boron (B)-Total	0.015		0.010	mg/L	17-MAR-16	18-MAR-16	R3421966
Cadmium (Cd)-Total	0.000013		0.000010	mg/L	17-MAR-16	18-MAR-16	R3421966
Chromium (Cr)-Total	0.00072		0.00050	mg/L	17-MAR-16	18-MAR-16	R3421966
Cobalt (Co)-Total	0.00044		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Copper (Cu)-Total	0.0022		0.0010	mg/L	17-MAR-16	18-MAR-16	R3421966
Lead (Pb)-Total	0.00038		0.00010	mg/L	17-MAR-16	18-MAR-16	R3421966
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-MAR-16	R3421198
Nickel (Ni)-Total	0.0014		0.0010	mg/L	17-MAR-16	18-MAR-16	R3421966
Zinc (Zn)-Total	0.0090		0.0030	mg/L	17-MAR-16	18-MAR-16	R3421966
Aggregate Organics							
BOD	3.3		2.0	mg/L	17-MAR-16	22-MAR-16	R3423413
BOD Carbonaceous	3.1		2.0	mg/L	17-MAR-16	22-MAR-16	R3423420
COD	38		10	mg/L		20-MAR-16	R3422624
Oil and Grease, Total	<2.0		2.0	mg/L	17-MAR-16	17-MAR-16	R3422914
Phenols (4AAP)	0.0064		0.0010	mg/L		18-MAR-16	R3422238
Report Remarks : Dilution due to undetermined matrix interference.							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD (#23523)	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☐ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 x143	Email 1 or Fax	npora@orgaworld.ca, mmyre@orgaworld.ca	Specify Date Required for E2,E or P:
	613-822-2056 x142 (Leigh Moulton/Michele Myre)	Email 2	lmoulton@orgaworld.ca	

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
	Copy of Invoice with Report ☑ Yes ☐ No	Email 1 or Fax	npora@orgaworld.ca, mmyre@orgaworld.ca
Company:	ORGAWORLD	Email 2	lmoulton@orgaworld.ca
Contact:	Nick Pora		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only):

ALS Contact: Andrew Sampler: Jessica Black

Analysis Request — Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD, CBOD	PH, CONDUCTIVITY, TSS, NO2, NO3	TKN-TP, PHENOL, NH3-UN-ION-LAB, COD	METALS & HG	As, Ba, Cd, Cr, Co, Cu, Pb, Ni, Zn	TOTAL O&G	DOC	DISSOLVED OXYGEN	E.COLI	T-AMM	Temperature	EC		Number of Containers
	Storm Water Pond	15-Apr-16	10:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R		10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temperature @ sampling: -1°C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: 15-Apr-16	Time:	Received by:	Date: Apr/15/16	Time: 1:00	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

ALS-FM-0325e v09 Front/04 January

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

003627

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1756583-1 STORM WATER POND Sampled By: JESSICA BLACK on 15-APR-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	-1.0		-50	Deg. C		18-APR-16	R3440642
Physical Tests							
Conductivity	1120		3.0	umhos/cm		17-APR-16	R3440651
Oxygen, Dissolved	11.5	PEHR	0.050	mg/L		18-APR-16	R3440759
pH	8.42		0.10	pH units		17-APR-16	R3440609
Total Suspended Solids	8.7		2.0	mg/L	19-APR-16	20-APR-16	R3441600
Anions and Nutrients							
Unionized ammonia	0.00802		0.00040	mg/L		19-APR-16	
Ammonia, Total (as N)	0.338		0.020	mg/L		18-APR-16	R3440910
Nitrate and Nitrite as N	<0.11		0.11	mg/L		20-APR-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		19-APR-16	R3441674
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		19-APR-16	R3441674
Total Kjeldahl Nitrogen	1.99		0.15	mg/L	19-APR-16	19-APR-16	R3441411
Phosphorus, Total	0.0998		0.0030	mg/L	20-APR-16	21-APR-16	R3442141
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.9		1.0	mg/L		17-APR-16	R3440838
acteriological Tests							
Escherichia Coli	8	DLM	2	MPN/100mL		17-APR-16	R3439618
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Boron (B)-Total	0.031		0.010	mg/L	17-APR-16	19-APR-16	R3440858
Cadmium (Cd)-Total	0.000011		0.000010	mg/L	17-APR-16	19-APR-16	R3440858
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	17-APR-16	19-APR-16	R3440858
Cobalt (Co)-Total	0.00021		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-APR-16	19-APR-16	R3440858
Lead (Pb)-Total	0.00011		0.00010	mg/L	17-APR-16	19-APR-16	R3440858
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		18-APR-16	R3439744
Nickel (Ni)-Total	0.0023		0.0010	mg/L	17-APR-16	19-APR-16	R3440858
Zinc (Zn)-Total	0.0068		0.0030	mg/L	17-APR-16	19-APR-16	R3440858
Aggregate Organics							
BOD	4.1		2.0	mg/L	16-APR-16	21-APR-16	R3442251
BOD Carbonaceous	4.5		2.0	mg/L	16-APR-16	21-APR-16	R3442252
COD	47		10	mg/L		19-APR-16	R3441447
Oil and Grease, Total	<2.0		2.0	mg/L	19-APR-16	19-APR-16	R3443233
Phenols (4AAP)	<0.0010		0.0010	mg/L		16-APR-16	R3440631

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No Copy of Invoice with Report ☑ Yes ☐ No	**Invoice Distribution** Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	**Analysis Request** Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	
Contact:	Leigh Moulton		
Project Information		**Oil and Gas Required Fields (client use)**	
ALS Quote #:		Approver ID: Cost Center:	
Job #:	Storm Water Pond	GL Account: Routing Code:	
PO / AFE:		Activity Code:	
LSD:		Location:	
ALS Lab Work Order # (lab use only)		**ALS Contact:** Alison **Sampler:** Jessica Black	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total Phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	11-May-16	8:30am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Temperature: 4°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Leigh Moulton	May 11/16			May/11/16	2:10			

REFER TO BACK FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA FM-0326a v09 Front/04 June

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

003629

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1767554-1 STORM WATER POND Sampled By: JESSICA BLACK on 11-MAY-16 @ 08:30 Matrix: WATER							
Field Tests							
Temperature, Client	4.0		-50	Deg. C		12-MAY-16	R3456212
Physical Tests							
Conductivity	1170		3.0	umhos/cm		12-MAY-16	R3456823
Oxygen, Dissolved	9.09	PEHR	0.050	mg/L		12-MAY-16	R3456695
pH	8.17		0.10	pH units		12-MAY-16	R3456817
Total Suspended Solids	5.2		2.0	mg/L	13-MAY-16	14-MAY-16	R3457581
Anions and Nutrients							
Unionized ammonia	0.00316		0.00030	mg/L		13-MAY-16	
Ammonia, Total (as N)	0.154		0.020	mg/L		12-MAY-16	R3457077
Nitrate and Nitrite as N	<0.11		0.11	mg/L		16-MAY-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		13-MAY-16	R3458727
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		13-MAY-16	R3458727
Total Kjeldahl Nitrogen	1.21		0.15	mg/L	13-MAY-16	16-MAY-16	R3459015
Phosphorus, Total	0.0477		0.0030	mg/L	13-MAY-16	16-MAY-16	R3457888
Organic / Inorganic Carbon							
Dissolved Organic Carbon	12.5		1.0	mg/L		16-MAY-16	R3459089
acteriological Tests							
Escherichia Coli	2	DLM	2	MPN/100mL		13-MAY-16	R3457224
Total Metals							
Arsenic (As)-Total	0.00052		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Boron (B)-Total	0.032		0.010	mg/L	13-MAY-16	16-MAY-16	R3457014
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	13-MAY-16	16-MAY-16	R3457014
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	13-MAY-16	16-MAY-16	R3457014
Cobalt (Co)-Total	0.00022		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Copper (Cu)-Total	<0.0010		0.0010	mg/L	13-MAY-16	16-MAY-16	R3457014
Lead (Pb)-Total	0.00013		0.00010	mg/L	13-MAY-16	16-MAY-16	R3457014
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		13-MAY-16	R3457041
Nickel (Ni)-Total	0.0019		0.0010	mg/L	13-MAY-16	16-MAY-16	R3457014
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	13-MAY-16	16-MAY-16	R3457014
Aggregate Organics							
BOD	<2.0		2.0	mg/L	12-MAY-16	17-MAY-16	R3459525
BOD Carbonaceous	<2.0		2.0	mg/L	12-MAY-16	17-MAY-16	R3459537
COD	38		10	mg/L		16-MAY-16	R3459132
Oil and Grease, Total	<2.0		2.0	mg/L	13-MAY-16	13-MAY-16	R3459491
Phenols (4AAP)	0.0027		0.0010	mg/L		12-MAY-16	R3456776

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution	Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3	☑ Criteria on Report - provide details below if box checked Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX	E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	Specify Date Required for E2,E or P:
Invoice To	Same as Report To ☑ Yes ☐ No Copy of Invoice with Report ☑ Yes ☐ No	Invoice Distribution Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX	Analysis Request Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca Email 2 lmoulton@orgaworld.ca	
Contact:	Leigh Moulton		
Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID: / Cost Center:	
Job #:	Storm Water Pond	GL Account: / Routing Code:	
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Alison

Sampler: Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBOD5	Temperature	E. Coli	Number of Containers
	Storm Water Pond	16-Jun-16	10:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	9

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Temp 16°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐
Ice packs Yes ☐ No ☐ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Leigh Moulton	Date: Jun 16/16	Time:	Received by:	Date: Jun/16/16	Time: 1:00	Received by:	Date:	Time:

REFER TO BACK FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0220e v09 Front 04 Janu

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

003631

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1784860-1 STORM WATER POND Sampled By: JESSICA BLACK on 16-JUN-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	16.0		-50	Deg. C		17-JUN-16	R3482670
Physical Tests							
Conductivity	1010		3.0	umhos/cm		17-JUN-16	R3483313
Oxygen, Dissolved	9.49	PEHR	0.050	mg/L		17-JUN-16	R3482964
pH	9.04		0.10	pH units		17-JUN-16	R3483310
Total Suspended Solids	11.3		2.0	mg/L	18-JUN-16	20-JUN-16	R3483795
Anions and Nutrients							
Unionized ammonia	<0.0050		0.0050	mg/L		21-JUN-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		20-JUN-16	R3485263
Nitrate and Nitrite as N	<0.11		0.11	mg/L		21-JUN-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		20-JUN-16	R3486154
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		20-JUN-16	R3486154
Total Kjeldahl Nitrogen	1.38		0.15	mg/L	21-JUN-16	21-JUN-16	R3486367
Phosphorus, Total	0.0723		0.0030	mg/L	20-JUN-16	21-JUN-16	R3484898
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.3		1.0	mg/L		20-JUN-16	R3486460
ıcteriological Tests							
E. Coli	8	DLM	2	CFU/100mL		18-JUN-16	R3483211
Total Metals							
Arsenic (As)-Total	0.00059		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Boron (B)-Total	0.033		0.010	mg/L	17-JUN-16	20-JUN-16	R3483517
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-JUN-16	20-JUN-16	R3483517
Chromium (Cr)-Total	<0.00050		0.00050	mg/L	17-JUN-16	20-JUN-16	R3483517
Cobalt (Co)-Total	0.00018		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Copper (Cu)-Total	<0.0010		0.0010	mg/L	17-JUN-16	20-JUN-16	R3483517
Lead (Pb)-Total	<0.00010		0.00010	mg/L	17-JUN-16	20-JUN-16	R3483517
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		20-JUN-16	R3483818
Nickel (Ni)-Total	0.0013		0.0010	mg/L	17-JUN-16	20-JUN-16	R3483517
Zinc (Zn)-Total	<0.0030		0.0030	mg/L	17-JUN-16	20-JUN-16	R3483517
Aggregate Organics							
BOD	5.3		2.0	mg/L	17-JUN-16	22-JUN-16	R3486896
BOD Carbonaceous	3.6		2.0	mg/L	17-JUN-16	22-JUN-16	R3486903
COD	43		10	mg/L		20-JUN-16	R3484893
Oil and Grease, Total	<2.0		2.0	mg/L	23-JUN-16	23-JUN-16	R3489011
Phenols (4AAP)	0.0025		0.0010	mg/L		18-JUN-16	R3484996

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Affix ALS barcode label here (lab use only)

COC Number: 14 -

Page 1 of 1

Report To	
Company:	ORGAWORLD
Contact:	Nick Pora
Address:	5123 Hawthorne Road Ottawa, Ontario K1G 3Y3
Phone:	613-822-2056 ext #143 613-822-2056 ext#142 (Leigh Moulton)
Invoice To	Same as Report To ☑ Yes ☐ No
	Copy of Invoice with Report ☑ Yes ☐ No
Company:	ORGAWORLD
Contact:	Leigh Moulton

Report Format / Distribution	
Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Quality Control (QC) Report with Report	☐ Yes ☐ No
☑ Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAI ☐ MAIL ☐ FAX
Email 1 or Fax	npora@orgaworld.ca
Email 2	lmoulton@orgaworld.ca

Invoice Distribution	
Select Invoice Distribution:	☑ EMAI ☐ MAIL ☐ FAX
Email 1 or Fax	npora@orgaworld.ca
Email 2	lmoulton@orgaworld.ca

Project Information	
ALS Quote #:	
Job #:	Storm Water Pond
PO / AFE:	
LSD:	

Oil and Gas Required Fields (client use)	
Approver ID:	Cost Center:
GL Account:	Routing Code:
Activity Code:	
Location:	

ALS Lab Work Order # (lab use only)

ALS Contact: Alison **Sampler:** Jessica Black

Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)

- R ☑ Regular (Standard TAT if received by 3 pm - business days)
- P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
- E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
- E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O & G AVM	METALS As,Bo,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBOD5	Temperature	E Coli	Number of Containers
	Storm Water Pond	13-Jul-16	9:00am	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System?
☐ Yes ☑ No

Are samples for human drinking water use?
☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Temp: 26°C

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☐	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☐				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Luis Moulton	July 13/16			July 16/13	2:00			

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

003633

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1798122-1 STORM WATER POND Sampled By: JESSICA BLACK on 13-JUL-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	26.0		-50	Deg. C		14-JUL-16	R3503390
Physical Tests							
Conductivity	1080		3.0	umhos/cm		14-JUL-16	R3503854
Oxygen, Dissolved	8.21	PEHR	0.050	mg/L		14-JUL-16	R3504964
pH	8.31		0.10	pH units		14-JUL-16	R3503850
Total Suspended Solids	15.5		2.0	mg/L	16-JUL-16	18-JUL-16	R3506633
Anions and Nutrients							
Unionized ammonia	<0.0020		0.0020	mg/L		15-JUL-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		15-JUL-16	R3504058
Nitrate and Nitrite as N	<0.11		0.11	mg/L		18-JUL-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		15-JUL-16	R3505952
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		15-JUL-16	R3505952
Total Kjeldahl Nitrogen	1.72		0.15	mg/L	15-JUL-16	15-JUL-16	R3504230
Phosphorus, Total	0.101		0.0030	mg/L	18-JUL-16	19-JUL-16	R3506234
Organic / Inorganic Carbon							
Dissolved Organic Carbon	14.5		1.0	mg/L		17-JUL-16	R3505321
acteriological Tests							
E. Coli	50	DLM	10	CFU/100mL		15-JUL-16	R3504721
Total Metals							
Arsenic (As)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	14-JUL-16	15-JUL-16	R3504278
Cadmium (Cd)-Total	<0.00010	DLHC	0.00010	mg/L	14-JUL-16	15-JUL-16	R3504278
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	14-JUL-16	15-JUL-16	R3504278
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	14-JUL-16	15-JUL-16	R3504278
Lead (Pb)-Total	<0.0010	DLHC	0.0010	mg/L	14-JUL-16	15-JUL-16	R3504278
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		15-JUL-16	R3504096
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	14-JUL-16	15-JUL-16	R3504278
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	14-JUL-16	15-JUL-16	R3504278
Aggregate Organics							
BOD	6.3		2.0	mg/L	14-JUL-16	19-JUL-16	R3506743
BOD Carbonaceous	6.1		2.0	mg/L	14-JUL-16	19-JUL-16	R3506732
COD	69		10	mg/L		17-JUL-16	R3505340
Oil and Grease, Total	<2.0		2.0	mg/L	16-JUL-16	16-JUL-16	R3508313
Phenols (4AAP)	0.0022		0.0010	mg/L		18-JUL-16	R3506855

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS Environmental

Report To	Nick Pora, ORGAWORLD CANADA LTD. 5123 Hawthorne Road Ottawa, ON K1G 3Y3	**Date Received** **Report Date** **Report Revision** **Version**	
Client Phone	613-822-2056		

Certificate of Analysis

Lab Work Order #	L1811895
Project P.O. #	
Job Reference	STORM WATER POND
Legal Site Description	
C of C Numbers	

Case Narrative/Comments

Work Order Qualifiers:

Temperature - 13.4 °

P. Stastny

Peter Stastny

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

10-Aug-2016 13:30
18-Aug-2016 07:24
1
FINAL

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 10-AUG-16
Report Date: 18-AUG-16 07:24 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1811895
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

P. Shetty

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

4

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1811895-1 STORM WATER POND Sampled By: JESSICA BLACK on 10-AUG-16 @ 09:00 Matrix: WATER							
Field Tests							
Temperature, Client	13.4		-50	Deg. C		16-AUG-16	R3526578
Physical Tests							
Conductivity	1190		3.0	umhos/cm		12-AUG-16	R3524239
Oxygen, Dissolved	7.97	PEHR	0.050	mg/L		11-AUG-16	R3524727
pH	8.01		0.10	pH units		12-AUG-16	R3524237
Total Suspended Solids	42.5	DLHC	4.0	mg/L	13-AUG-16	14-AUG-16	R3525415
Anions and Nutrients							
Unionized ammonia	<0.00050		0.00050	mg/L		12-AUG-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		12-AUG-16	R3524604
Nitrate and Nitrite as N	<0.11		0.11	mg/L		15-AUG-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		15-AUG-16	R3526141
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		15-AUG-16	R3526141
Total Kjeldahl Nitrogen	2.56		0.15	mg/L	12-AUG-16	12-AUG-16	R3524760
Phosphorus, Total	0.193		0.0030	mg/L	12-AUG-16	15-AUG-16	R3525572
Organic / Inorganic Carbon							
Dissolved Organic Carbon	17.6		1.0	mg/L		11-AUG-16	R3525567
teriological Tests							
E. Coli	60	DLM	10	CFU/100mL		12-AUG-16	R3524873
Total Metals							
Arsenic (As)-Total	0.00132		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Boron (B)-Total	0.046		0.010	mg/L	12-AUG-16	12-AUG-16	R3524544
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	12-AUG-16	12-AUG-16	R3524544
Chromium (Cr)-Total	0.00153		0.00050	mg/L	12-AUG-16	12-AUG-16	R3524544
Cobalt (Co)-Total	0.00044		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Copper (Cu)-Total	<0.0010		0.0010	mg/L	12-AUG-16	12-AUG-16	R3524544
Lead (Pb)-Total	0.00056		0.00010	mg/L	12-AUG-16	12-AUG-16	R3524544
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		12-AUG-16	R3524455
Nickel (Ni)-Total	0.00196		0.00050	mg/L	12-AUG-16	12-AUG-16	R3524544
Zinc (Zn)-Total	0.0044		0.0030	mg/L	12-AUG-16	12-AUG-16	R3524544
Aggregate Organics							
BOD	5.5		2.0	mg/L	11-AUG-16	16-AUG-16	R3526913
BOD Carbonaceous	5.4		2.0	mg/L	11-AUG-16	16-AUG-16	R3526916
COD	82		10	mg/L		14-AUG-16	R3525570
Oil and Grease, Total	<2.0		2.0	mg/L	12-AUG-16	12-AUG-16	R3526587
Phenols (4AAP)	0.0016		0.0010	mg/L		16-AUG-16	R3527297

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Arsenic (As)-Total	DLHC	L1811895-1
Duplicate	Boron (B)-Total	DLHC	L1811895-1
Duplicate	Cadmium (Cd)-Total	DLHC	L1811895-1
Duplicate	Chromium (Cr)-Total	DLHC	L1811895-1
Duplicate	Cobalt (Co)-Total	DLHC	L1811895-1
Duplicate	Copper (Cu)-Total	DLHC	L1811895-1
Duplicate	Lead (Pb)-Total	DLHC	L1811895-1
Duplicate	Nickel (Ni)-Total	DLHC	L1811895-1
Duplicate	Zinc (Zn)-Total	DLHC	L1811895-1
Duplicate	Phosphorus, Total	DLHC	L1811895-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1811895-1
Matrix Spike	Phosphorus, Total	MS-B	L1811895-1
Matrix Spike	Nitrate (as N)	MS-B	L1811895-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Reference Information

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

, automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 .C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.*

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
- The reporting limit.
- Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
:OD-C-WT	Water							
Batch R3526916								
WG2365815-6 DUP		**L1811221-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	16-AUG-16
WG2365815-7 LCS								
BOD Carbonaceous			92.4		%		85-115	16-AUG-16
WG2365815-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	16-AUG-16
:OD-WT	Water							
Batch R3526913								
WG2365806-12 DUP		**L1810882-2**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	16-AUG-16
WG2365806-10 LCS								
BOD			108.1		%		85-115	16-AUG-16
:2365806-9 MB								
BOD			<2.0		mg/L		2	16-AUG-16
:-DIS-ORG-WT	Water							
Batch R3525567								
WG2366176-3 DUP		**L1807074-1**						
Dissolved Organic Carbon		<1.0	<1.0	RPD-NA	mg/L	N/A	20	11-AUG-16
WG2366176-2 LCS								
Dissolved Organic Carbon			97.0		%		80-120	11-AUG-16
WG2366176-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	11-AUG-16
WG2366176-4 MS		**L1807074-1**						
Dissolved Organic Carbon			96.4		%		70-130	11-AUG-16
:OD-T-WT	Water							
Batch R3525570								
WG2367527-3 DUP		**L1810877-1**						
COD		15	19	J	mg/L	4	20	14-AUG-16
WG2367527-2 LCS								
COD			97.1		%		85-115	14-AUG-16
WG2367527-1 MB								
COD			<10		mg/L		10	14-AUG-16
WG2367527-4 MS		**L1810877-1**						
COD			93.4		%		75-125	14-AUG-16
:F-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-MF-WT	Water							
Batch R3524873								
WG2365813-5 DUP		**WG2365813-6**						
E. Coli		0	0		CFU/100mL	0.0	65	12-AUG-16
WG2365813-1 MB								
E. Coli			0		CFU/100mL		1	12-AUG-16
WG2365813-2 MB								
E. Coli			0		CFU/100mL		1	12-AUG-16
C-WT	Water							
Batch R3524239								
WG2365857-4 DUP		**WG2365857-3**						
Conductivity		790	790		umhos/cm	0.0	10	12-AUG-16
WG2365857-2 LCS								
Conductivity			100.1		%		90-110	12-AUG-16
[illegible]2365857-1 MB								
[illegible]onductivity			<3.0		umhos/cm		3	12-AUG-16
IG-T-CVAA-WT	Water							
Batch R3524455								
WG2366403-3 DUP		**L1811958-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	12-AUG-16
WG2366403-2 LCS								
Mercury (Hg)-Total			100.0		%		80-120	12-AUG-16
WG2366403-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	12-AUG-16
WG2366403-4 MS		**L1811987-1**						
Mercury (Hg)-Total			93.4		%		70-130	12-AUG-16
IET-T-CCMS-WT	Water							
Batch R3524544								
WG2366207-4 DUP		**WG2366207-3**						
Arsenic (As)-Total		0.0011	0.0011		mg/L	4.6	20	12-AUG-16
Boron (B)-Total		<0.10	<0.10	RPD-NA	mg/L	N/A	20	12-AUG-16
Cadmium (Cd)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	12-AUG-16
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	12-AUG-16
Cobalt (Co)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-AUG-16
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	12-AUG-16
Lead (Pb)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	12-AUG-16
[illegible]ckel (Ni)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	12-AUG-16
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	12-AUG-16

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IET-T-CCMS-WT	Water							
Batch R3524544								
WG2366207-2 LCS								
Arsenic (As)-Total			101.0		%		80-120	12-AUG-16
Boron (B)-Total			94.8		%		80-120	12-AUG-16
Cadmium (Cd)-Total			99.3		%		80-120	12-AUG-16
Chromium (Cr)-Total			101.5		%		80-120	12-AUG-16
Cobalt (Co)-Total			102.1		%		80-120	12-AUG-16
Copper (Cu)-Total			98.0		%		80-120	12-AUG-16
Lead (Pb)-Total			99.6		%		80-120	12-AUG-16
Nickel (Ni)-Total			99.0		%		80-120	12-AUG-16
Zinc (Zn)-Total			94.3		%		80-120	12-AUG-16
WG2366207-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Boron (B)-Total			<0.010		mg/L		0.01	12-AUG-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	12-AUG-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	12-AUG-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	12-AUG-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	12-AUG-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	12-AUG-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	12-AUG-16
WG2366207-5 MS		**WG2366207-3**						
Arsenic (As)-Total			107.4		%		70-130	12-AUG-16
Cadmium (Cd)-Total			108.1		%		70-130	12-AUG-16
Chromium (Cr)-Total			105.7		%		70-130	12-AUG-16
Cobalt (Co)-Total			109.1		%		70-130	12-AUG-16
Copper (Cu)-Total			119.0		%		70-130	12-AUG-16
Lead (Pb)-Total			108.2		%		70-130	12-AUG-16
Nickel (Ni)-Total			119.4		%		70-130	12-AUG-16
NH3-WT	Water							
Batch R3524604								
WG2366390-3 DUP		**L1812140-1**						
Ammonia, Total (as N)		1.29	1.33		mg/L	3.0	20	12-AUG-16
WG2366390-2 LCS								
Ammonia, Total (as N)			102.0		%		85-115	12-AUG-16
WG2366390-1 MB								

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IH3-WT	Water							
Batch R3524604								
WG2366390-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	12-AUG-16
WG2366390-4 MS		L1812140-1						
Ammonia, Total (as N)			N/A	MS-B	%		-	12-AUG-16
IO2-IC-WT	Water							
Batch R3526141								
WG2366425-9 DUP		WG2366425-10						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	15-AUG-16
WG2366425-7 LCS								
Nitrite (as N)			102.9		%		70-130	15-AUG-16
WG2366425-6 MB								
Nitrite (as N)			<0.010		mg/L		0.01	15-AUG-16
[illegible]2366425-8 MS		WG2366425-10						
[illegible]itrite (as N)			86.7		%		70-130	15-AUG-16
IO3-IC-WT	Water							
Batch R3526141								
WG2366425-9 DUP		WG2366425-10						
Nitrate (as N)		1.08	1.08		mg/L	0.1	25	15-AUG-16
WG2366425-7 LCS								
Nitrate (as N)			100.9		%		70-130	15-AUG-16
WG2366425-6 MB								
Nitrate (as N)			<0.020		mg/L		0.02	15-AUG-16
WG2366425-8 MS		WG2366425-10						
Nitrate (as N)			93.3		%		70-130	15-AUG-16
)2-DIS-WT	Water							
Batch R3524727								
WG2365870-1 DUP		L1810662-1						
Oxygen, Dissolved		9.30	9.15		mg/L	1.6	25	11-AUG-16
)GG-TOT-WT	Water							
Batch R3526587								
WG2366598-2 LCS								
Oil and Grease, Total			85.5		%		70-130	12-AUG-16
WG2366598-3 LCSD		WG2366598-2						
Oil and Grease, Total		85.5	81.5		%	4.9	40	12-AUG-16
[illegible]2366598-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	12-AUG-16

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
-T-COL-WT	Water							
Batch R3525572								
WG2366426-3 DUP		**L1810916-1**						
Phosphorus, Total		48.5	52.4		mg/L	7.7	20	15-AUG-16
WG2366426-2 LCS								
Phosphorus, Total			101.1		%		80-120	15-AUG-16
WG2366426-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	15-AUG-16
WG2366426-4 MS		**L1810916-1**						
Phosphorus, Total			N/A	MS-B	%		-	15-AUG-16
H-WT	Water							
Batch R3524237								
WG2365816-6 DUP		**WG2365816-5**						
pH		7.92	7.93	J	pH units	0.00	0.2	12-AUG-16
2365816-4 LCS								
pH			7.01		pH units		6.9-7.1	12-AUG-16
HENOLS-4AAP-WT	Water							
Batch R3527297								
WG2368864-3 DUP		**L1810883-1**						
Phenols (4AAP)		0.0026	0.0027		mg/L	4.6	20	16-AUG-16
WG2368864-2 LCS								
Phenols (4AAP)			97.8		%		85-115	16-AUG-16
WG2368864-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	16-AUG-16
WG2368864-4 MS		**L1810883-1**						
Phenols (4AAP)			90.5		%		75-125	16-AUG-16
OLIDS-TSS-WT	Water							
Batch R3525415								
WG2367221-3 DUP		**L1811895-1**						
Total Suspended Solids		42.5	42.0		mg/L	1.2	20	14-AUG-16
WG2367221-2 LCS								
Total Suspended Solids			101.4		%		85-115	14-AUG-16
WG2367221-1 MB								
Total Suspended Solids			<2.0		mg/L		2	14-AUG-16
KN-WT	Water							
Batch R3524760								
G2366265-3 DUP		**L1811895-1**						
otal Kjeldahl Nitrogen		2.56	2.35		mg/L	8.2	20	12-AUG-16
WG2366265-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1811895 Report Date: 18-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
KN-WT	Water							
Batch R3524760								
WG2366265-2 LCS								
Total Kjeldahl Nitrogen			102.7		%		75-125	12-AUG-16
WG2366265-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	12-AUG-16
WG2366265-4 MS		**L1811895-1**						
Total Kjeldahl Nitrogen			99.6		%		70-130	12-AUG-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
'act: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen	1	10-AUG-16 09:00	11-AUG-16 14:00	0.25	29	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1811895 were received on 10-AUG-16 13:30.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

Report To	Nick Pora, ORGAWORLD CANADA LTD. 5123 Hawthorne Road Ottawa, ON K1G 3Y3	**Date Received** **Report Date** **Report Revision** **Version**	
Client Phone	613-822-2056		

Certificate of Analysis

Lab Work Order #	L1851386
Project P.O. #	
Job Reference	STORM WATER POND
Legal Site Description	
C of C Numbers	

Case Narrative/Comments

Work Order Qualifiers:

Temperature - 11.9 °

P. Stastny

Peter Stastny

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 31-OCT-16
Report Date: 07-NOV-16 12:31 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1851386
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

P. Stathy

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1851386-1 STORM WATER POND Sampled By: JESSICA BLACK on 31-OCT-16 @ 13:00 Matrix: WATER							
Field Tests							
Temperature, Client	28.0		-50	Deg. C		02-NOV-16	R3586100
Physical Tests							
Conductivity	713		3.0	umhos/cm		02-NOV-16	R3586842
Oxygen, Dissolved	9.88	PEHR	0.050	mg/L		01-NOV-16	R3585121
pH	7.79		0.10	pH units		02-NOV-16	R3585879
Total Suspended Solids	96.7	DLHC	4.0	mg/L	04-NOV-16	05-NOV-16	R3588620
Anions and Nutrients							
Unionized ammonia	0.0219		0.00080	mg/L		02-NOV-16	
Ammonia, Total (as N)	0.434		0.020	mg/L		02-NOV-16	R3586069
Nitrate and Nitrite as N	<0.11		0.11	mg/L		04-NOV-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		03-NOV-16	R3588151
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		03-NOV-16	R3588151
Total Kjeldahl Nitrogen	4.76		0.15	mg/L	02-NOV-16	02-NOV-16	R3586481
Phosphorus, Total	0.421		0.0030	mg/L	03-NOV-16	04-NOV-16	R3588538
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.7		1.0	mg/L		01-NOV-16	R3585676
Microbiological Tests							
E. Coli	360	DLM	10	CFU/100mL		02-NOV-16	R3586277
Total Metals							
Arsenic (As)-Total	0.00096		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Boron (B)-Total	0.029		0.010	mg/L	02-NOV-16	02-NOV-16	R3586208
Cadmium (Cd)-Total	0.000014		0.000010	mg/L	02-NOV-16	02-NOV-16	R3586208
Chromium (Cr)-Total	0.00791		0.00050	mg/L	02-NOV-16	02-NOV-16	R3586208
Cobalt (Co)-Total	0.00185		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Copper (Cu)-Total	0.0044		0.0010	mg/L	02-NOV-16	02-NOV-16	R3586208
Lead (Pb)-Total	0.00120		0.00010	mg/L	02-NOV-16	02-NOV-16	R3586208
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		02-NOV-16	R3585921
Nickel (Ni)-Total	0.00570		0.00050	mg/L	02-NOV-16	02-NOV-16	R3586208
Zinc (Zn)-Total	0.0140		0.0030	mg/L	02-NOV-16	02-NOV-16	R3586208
Aggregate Organics							
BOD	19.9		2.0	mg/L	01-NOV-16	06-NOV-16	R3589424
BOD Carbonaceous	20.5		2.0	mg/L	01-NOV-16	06-NOV-16	R3589427
COD	86		10	mg/L		02-NOV-16	R3585977
Oil and Grease, Total	<2.0		2.0	mg/L	01-NOV-16	01-NOV-16	R3585960
Phenols (4AAP)	0.0012		0.0010	mg/L		02-NOV-16	R3586834

Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1851386-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1851386-1
Matrix Spike	Nitrate (as N)	MS-B	L1851386-1
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1851386-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 □C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

O2 DIS-WT	Water	Dissolved oxygen	APHA 4500-O
OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PH-WT	Water	pH	MOEE E3137A-R511

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1□C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
N-T-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.*

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3589427								
WG2423828-2 DUP		**L1850598-1**						
BOD Carbonaceous		31.1	30.2		mg/L	2.9	20	06-NOV-16
WG2423828-3 LCS								
BOD Carbonaceous			96.0		%		85-115	06-NOV-16
WG2423828-1 MB								
BOD Carbonaceous			<2.0		mg/L		2	06-NOV-16
BOD-WT	Water							
Batch R3589424								
WG2423827-2 DUP		**L1851398-1**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	06-NOV-16
WG2423827-3 LCS								
BOD			96.0		%		85-115	06-NOV-16
WG2423827-1 MB								
BOD			<2.0		mg/L		2	06-NOV-16
C-DIS-ORG-WT	Water							
Batch R3585676								
WG2424229-8 DUP		**L1851333-1**						
Dissolved Organic Carbon		10.2	11.6		mg/L	13	20	01-NOV-16
WG2424229-6 LCS								
Dissolved Organic Carbon			98.5		%		80-120	01-NOV-16
WG2424229-5 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	01-NOV-16
WG2424229-7 MS		**L1851333-1**						
Dissolved Organic Carbon			97.0		%		70-130	01-NOV-16
COD-T-WT	Water							
Batch R3585977								
WG2424291-3 DUP		**L1851386-1**						
COD		86	91		mg/L	5.4	20	02-NOV-16
WG2424291-2 LCS								
COD			107.0		%		85-115	02-NOV-16
WG2424291-1 MB								
COD			<10		mg/L		10	02-NOV-16
WG2424291-4 MS		**L1851386-1**						
COD			90.9		%		75-125	02-NOV-16
CN-WAD-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
C-MF-WT	Water							
Batch R3586277								
WG2423366-2 DUP		**WG2423366-4**						
E. Coli		0	0		CFU/100mL	0.0	65	02-NOV-16
WG2423366-1 MB								
E. Coli			0		CFU/100mL		1	02-NOV-16
C-WT	Water							
Batch R3586842								
WG2424538-4 DUP		**WG2424538-3**						
Conductivity		713	714		umhos/cm	0.1	10	02-NOV-16
WG2424538-2 LCS								
Conductivity			99.2		%		90-110	02-NOV-16
WG2424538-1 MB								
Conductivity			<3.0		umhos/cm		3	02-NOV-16
:VAA-WT	Water							
Batch R3585921								
WG2424373-3 DUP		**L1851483-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	02-NOV-16
WG2424373-2 LCS								
Mercury (Hg)-Total			101.0		%		80-120	02-NOV-16
WG2424373-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	02-NOV-16
WG2424373-4 MS		**L1851483-2**						
Mercury (Hg)-Total			101.0		%		70-130	02-NOV-16
ET-T-CCMS-WT	Water							
Batch R3586208								
WG2424180-4 DUP		**WG2424180-3**						
Arsenic (As)-Total		0.0022	0.0021		mg/L	4.9	20	02-NOV-16
Boron (B)-Total		0.14	0.14		mg/L	2.0	20	02-NOV-16
Cadmium (Cd)-Total		0.00036	0.00034		mg/L	4.6	20	02-NOV-16
Chromium (Cr)-Total		<0.0050	<0.0050	RPD-NA	mg/L	N/A	20	02-NOV-16
Cobalt (Co)-Total		0.0034	0.0033		mg/L	1.5	20	02-NOV-16
Copper (Cu)-Total		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-NOV-16
Lead (Pb)-Total		0.0011	0.0011		mg/L	2.9	20	02-NOV-16
Nickel (Ni)-Total		0.0150	0.0159		mg/L	6.2	20	02-NOV-16
Zinc (Zn)-Total		<0.030	<0.030	RPD-NA	mg/L	N/A	20	02-NOV-16
2424180-2 LCS								
Arsenic (As)-Total			99.1		%		80-120	02-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IET-T-CCMS-WT	Water							
Batch R3586208								
WG2424180-2 LCS								
Boron (B)-Total			93.6		%		80-120	02-NOV-16
Cadmium (Cd)-Total			99.1		%		80-120	02-NOV-16
Chromium (Cr)-Total			98.2		%		80-120	02-NOV-16
Cobalt (Co)-Total			98.4		%		80-120	02-NOV-16
Copper (Cu)-Total			98.8		%		80-120	02-NOV-16
Lead (Pb)-Total			100.6		%		80-120	02-NOV-16
Nickel (Ni)-Total			98.7		%		80-120	02-NOV-16
Zinc (Zn)-Total			93.9		%		80-120	02-NOV-16
WG2424180-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	02-NOV-16
dmium (Cd)-Total			<0.000010		mg/L		0.00001	02-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	02-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	02-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-NOV-16
WG2424180-5 MS		**WG2424180-3**						
Arsenic (As)-Total			102.2		%		70-130	02-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	02-NOV-16
Cadmium (Cd)-Total			103.7		%		70-130	02-NOV-16
Chromium (Cr)-Total			101.2		%		70-130	02-NOV-16
Cobalt (Co)-Total			97.0		%		70-130	02-NOV-16
Lead (Pb)-Total			99.3		%		70-130	02-NOV-16
Nickel (Ni)-Total			92.5		%		70-130	02-NOV-16
IH3-WT	Water							
Batch R3586069								
WG2424383-7 DUP		**L1851986-1**						
Ammonia, Total (as N)		1.34	1.34		mg/L	0.0	20	02-NOV-16
WG2424383-6 LCS								
Ammonia, Total (as N)			99.7		%		85-115	02-NOV-16
2424383-5 MB								
monia, Total (as N)			<0.020		mg/L		0.02	02-NOV-16
WG2424383-8 MS		**L1851986-1**						

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
IH3-WT	Water							
Batch R3586069								
WG2424383-8 MS		**L1851986-1**						
Ammonia, Total (as N)			N/A	MS-B	%		-	02-NOV-16
IO2-IC-WT	Water							
Batch R3588151								
WG2425387-4 DUP		**WG2425387-3**						
Nitrite (as N)		0.017	0.016		mg/L	1.2	25	03-NOV-16
WG2425387-2 LCS								
Nitrite (as N)			103.1		%		70-130	03-NOV-16
WG2425387-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	03-NOV-16
WG2425387-5 MS		**WG2425387-3**						
Nitrite (as N)			101.6		%		70-130	03-NOV-16
IO3-IC-WT	Water							
Batch R3588151								
WG2425387-4 DUP		**WG2425387-3**						
Nitrate (as N)		5.23	5.23		mg/L	0.0	25	03-NOV-16
WG2425387-2 LCS								
Nitrate (as N)			99.8		%		70-130	03-NOV-16
WG2425387-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	03-NOV-16
WG2425387-5 MS		**WG2425387-3**						
Nitrate (as N)			N/A	MS-B	%		-	03-NOV-16
O2-DIS-WT	Water							
Batch R3585121								
WG2423841-5 DUP		**L1851147-1**						
Oxygen, Dissolved		9.87	9.83		mg/L	0.4	25	01-NOV-16
OGG-TOT-WT	Water							
Batch R3585960								
WG2423704-2 LCS								
Oil and Grease, Total			91.6		%		70-130	01-NOV-16
WG2423704-3 LCSD		**WG2423704-2**						
Oil and Grease, Total		91.6	88.9		%	3.0	40	01-NOV-16
WG2423704-1 MB								
and Grease, Total			<2.0		mg/L		2	01-NOV-16
T-COL-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
-T-COL-WT	Water							
Batch R3588538								
WG2425147-3 DUP		**L1851221-1**						
Phosphorus, Total		0.0195	0.0174		mg/L	11	20	04-NOV-16
WG2425147-2 LCS								
Phosphorus, Total			118.5		%		80-120	04-NOV-16
WG2425147-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	04-NOV-16
WG2425147-4 MS		**L1851221-1**						
Phosphorus, Total			78.3		%		70-130	04-NOV-16
H-WT	Water							
Batch R3585879								
WG2424242-3 DUP		**WG2424242-2**						
pH		7.43	7.45	J	pH units	0.02	0.2	02-NOV-16
2424242-1 LCS								
			7.05		pH units		6.9-7.1	02-NOV-16
HENOLS-4AAP-WT	Water							
Batch R3586834								
WG2424467-7 DUP		**L1850190-1**						
Phenols (4AAP)		0.0026	0.0027		mg/L	2.8	20	02-NOV-16
WG2424467-6 LCS								
Phenols (4AAP)			107.7		%		85-115	02-NOV-16
WG2424467-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	02-NOV-16
WG2424467-8 MS		**L1850190-1**						
Phenols (4AAP)			114.8		%		75-125	02-NOV-16
OLIDS-TSS-WT	Water							
Batch R3588620								
WG2426119-3 DUP		**L1851130-2**						
Total Suspended Solids		65.3	62.0		mg/L	5.2	20	05-NOV-16
WG2426119-2 LCS								
Total Suspended Solids			99.0		%		85-115	05-NOV-16
WG2426119-1 MB								
Total Suspended Solids			<2.0		mg/L		2	05-NOV-16
KN-WT	Water							
Batch R3586481								
WG2424297-3 DUP		**L1850691-1**						
l Kjeldahl Nitrogen		8.81	9.10		mg/L	3.3	20	02-NOV-16
WG2424297-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1851386 Report Date: 07-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
KN-WT	Water							
Batch R3586481								
WG2424297-2 LCS								
Total Kjeldahl Nitrogen			111.9		%		75-125	02-NOV-16
WG2424297-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	02-NOV-16
WG2424297-4 MS		**L1850691-1**						
Total Kjeldahl Nitrogen			N/A	MS-B	%		-	02-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen	1	31-OCT-16 13:00	01-NOV-16 18:00	0.25	29	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1851386 were received on 31-OCT-16 14:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

An ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L1851386-COFC

14

Report To		Report Format / Distribution		Select Service Level Below (Rus
Company:	ORGAWORLD	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received
Contact:	Nick Pora	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received b
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if receiv
	Ottawa, Ontario K1G 3Y3	Select Distribution:	☑ EMAI ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency
Phone:	613-822-2056 ext #143	Email 1 or Fax	npora@orgaworld.ca	Specify Date Required for E2,E or P
	613-822-2056 ext#142 (Greg Jurchuk)	Email 2	gjurchuk@orgaworld.ca	
Invoice To	Same as Report To ☑ Yes ☐ No	**Invoice Distribution**		Indicate Filtered (F), Preserved (F
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAI ☐ MAIL ☐ FAX	
Company:	ORGAWORLD	Email 1 or Fax	npora@orgaworld.ca	
Contact:	Greg Jurchuk	Email 2	gjurchuk@orgaworld.ca	

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:		Approver ID:	Cost Center:
Job #:	Storm Water Pond	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only): L1851386

ALS Contact: Alison **Sampler:** Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O&G AVM
	Storm Water Pond	31-Oct-16	1:00pm	Water	R	R	R	R	R	R

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)	SAMPLE CONDI
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temp 28 deg C	Frozen ☐
Are samples for human drinking water use? ☐ Yes ☑ No		Ice packs Yes ☑ No ☐
		Cooling Initiated ☑
		INITIAL COOLER TEMPERATURES °C
		11.9

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPM
Released by:	Date: 31 OCT 16	Time: 1:30PM	Received by:	Date: 31/Oct/16	Time: 22:20	Received by:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report co

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 15-NOV-16
Report Date: 21-NOV-16 14:24 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1858237

Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers: 14-11201601
Legal Site Desc:

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1858237-1 STORM WATER POND Sampled By: JESSICA BLACK on 14-NOV-16 @ 10:00 Matrix: WATER							
Field Tests							
Temperature, Client	10.0		-50	Deg. C		14-NOV-16	R3597879
Physical Tests							
Conductivity	811		3.0	umhos/cm		19-NOV-16	R3599094
Oxygen, Dissolved	9.48	PEHR	0.050	mg/L		16-NOV-16	R3596487
pH	7.78		0.10	pH units		17-NOV-16	R3596954
Total Suspended Solids	27.9		2.0	mg/L	18-NOV-16	21-NOV-16	R3599510
Anions and Nutrients							
Unionized ammonia	0.0179		0.00040	mg/L		17-NOV-16	
Ammonia, Total (as N)	1.33	DLHC	0.040	mg/L		17-NOV-16	R3597203
Nitrate and Nitrite as N	<0.11		0.11	mg/L		21-NOV-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		18-NOV-16	R3599717
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		18-NOV-16	R3599717
Total Kjeldahl Nitrogen	4.49		0.15	mg/L	17-NOV-16	17-NOV-16	R3597465
Phosphorus, Total	0.239		0.0030	mg/L	17-NOV-16	18-NOV-16	R3597491
Organic / Inorganic Carbon							
Dissolved Organic Carbon	13.8		1.0	mg/L		16-NOV-16	R3597475
acteriological Tests							
E. Coli	40		10	CFU/100mL		17-NOV-16	R3597315
Total Metals							
Arsenic (As)-Total	0.00070		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Boron (B)-Total	0.032		0.010	mg/L	17-NOV-16	17-NOV-16	R3597519
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	17-NOV-16	17-NOV-16	R3597519
Chromium (Cr)-Total	0.00216		0.00050	mg/L	17-NOV-16	17-NOV-16	R3597519
Cobalt (Co)-Total	0.00062		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Copper (Cu)-Total	0.0017		0.0010	mg/L	17-NOV-16	17-NOV-16	R3597519
Lead (Pb)-Total	0.00043		0.00010	mg/L	17-NOV-16	17-NOV-16	R3597519
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		17-NOV-16	R3597021
Nickel (Ni)-Total	0.00233		0.00050	mg/L	17-NOV-16	17-NOV-16	R3597519
Zinc (Zn)-Total	0.0049		0.0030	mg/L	17-NOV-16	17-NOV-16	R3597519
Aggregate Organics							
BOD	8.8		2.0	mg/L	16-NOV-16	21-NOV-16	R3599576
BOD Carbonaceous	9.4		2.0	mg/L	16-NOV-16	21-NOV-16	R3599579
COD	69		10	mg/L		20-NOV-16	R3599056
Oil and Grease, Total	<2.0		2.0	mg/L	16-NOV-16	16-NOV-16	R3596577
Phenols (4AAP)	0.0037		0.0010	mg/L		17-NOV-16	R3597693

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Boron (B)-Total	MS-B	L1858237-1
Matrix Spike	Zinc (Zn)-Total	MS-B	L1858237-1
Matrix Spike	Ammonia, Total (as N)	MS-B	L1858237-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 °C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

O2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

Reference Information

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1□C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

14-11201601

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3599579								
WG2433904-6 DUP		**L1857961-1**						
BOD Carbonaceous		<2.0	<2.0	RPD-NA	mg/L	N/A	20	21-NOV-16
WG2433904-7 LCS								
BOD Carbonaceous			102.0		%		85-115	21-NOV-16
WG2433904-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	21-NOV-16
BOD-WT	Water							
Batch R3599576								
WG2433902-2 DUP		**L1857529-4**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	21-NOV-16
WG2433902-3 LCS								
BOD			93.9		%		85-115	21-NOV-16
.G2433902-1 MB								
BOD			<2.0		mg/L		2	21-NOV-16
C-DIS-ORG-WT	Water							
Batch R3597475								
WG2434305-3 DUP		**L1857475-5**						
Dissolved Organic Carbon		6.2	6.5		mg/L	3.7	20	16-NOV-16
WG2434305-2 LCS								
Dissolved Organic Carbon			97.9		%		80-120	16-NOV-16
WG2434305-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	16-NOV-16
WG2434305-4 MS		**L1857475-5**						
Dissolved Organic Carbon			91.1		%		70-130	16-NOV-16
COD-T-WT	Water							
Batch R3599056								
WG2436599-3 DUP		**L1859400-6**						
COD		18	23	J	mg/L	4	20	20-NOV-16
WG2436599-2 LCS								
COD			105.2		%		85-115	20-NOV-16
WG2436599-1 MB								
COD			<10		mg/L		10	20-NOV-16
WG2436599-4 MS		**L1859400-6**						
COD			87.5		%		75-125	20-NOV-16
EC-MF-WT	Water							

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3597315								
WG2433785-2 DUP		**WG2433785-4**						
E. Coli		0	0		CFU/100mL	0.0	65	17-NOV-16
WG2433785-1 MB								
E. Coli			0		CFU/100mL		1	17-NOV-16
EC-WT	Water							
Batch R3599094								
WG2435533-4 DUP		**WG2435533-3**						
Conductivity		1330	1330		umhos/cm	0.1	10	19-NOV-16
WG2435533-2 LCS								
Conductivity			101.9		%		90-110	19-NOV-16
WG2435533-1 MB								
Conductivity			<3.0		umhos/cm		3	19-NOV-16
T-CVAA-WT	Water							
Batch R3597021								
WG2434521-3 DUP		**L1858464-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	17-NOV-16
WG2434521-2 LCS								
Mercury (Hg)-Total			98.6		%		80-120	17-NOV-16
WG2434521-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	17-NOV-16
WG2434521-4 MS		**L1858476-1**						
Mercury (Hg)-Total			99.2		%		70-130	17-NOV-16
MET-T-CCMS-WT	Water							
Batch R3597519								
WG2434327-4 DUP		**WG2434327-3**						
Arsenic (As)-Total		0.00030	0.00031		mg/L	3.0	20	17-NOV-16
Boron (B)-Total		0.210	0.215		mg/L	2.2	20	17-NOV-16
Cadmium (Cd)-Total		0.000084	0.000088		mg/L	4.2	20	17-NOV-16
Chromium (Cr)-Total		0.00096	0.00097		mg/L	1.2	20	17-NOV-16
Cobalt (Co)-Total		0.00017	0.00017		mg/L	0.7	20	17-NOV-16
Copper (Cu)-Total		0.0013	0.0013		mg/L	1.6	20	17-NOV-16
Lead (Pb)-Total		0.00017	0.00017		mg/L	0.7	20	17-NOV-16
Nickel (Ni)-Total		0.00110	0.00109		mg/L	1.4	20	17-NOV-16
Zinc (Zn)-Total		0.0455	0.0461		mg/L	1.2	20	17-NOV-16
WG2434327-2 LCS								
Arsenic (As)-Total			96.9		%		80-120	17-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3597519								
WG2434327-2 LCS								
Boron (B)-Total			103.0		%		80-120	17-NOV-16
Cadmium (Cd)-Total			94.8		%		80-120	17-NOV-16
Chromium (Cr)-Total			93.5		%		80-120	17-NOV-16
Cobalt (Co)-Total			94.6		%		80-120	17-NOV-16
Copper (Cu)-Total			92.3		%		80-120	17-NOV-16
Lead (Pb)-Total			99.5		%		80-120	17-NOV-16
Nickel (Ni)-Total			94.3		%		80-120	17-NOV-16
Zinc (Zn)-Total			90.5		%		80-120	17-NOV-16
WG2434327-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Boron (B)-Total			<0.010		mg/L		0.01	17-NOV-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	17-NOV-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	17-NOV-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	17-NOV-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	17-NOV-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	17-NOV-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	17-NOV-16
WG2434327-5 MS		**WG2434327-3**						
Arsenic (As)-Total			92.4		%		70-130	17-NOV-16
Boron (B)-Total			N/A	MS-B	%		-	17-NOV-16
Cadmium (Cd)-Total			88.1		%		70-130	17-NOV-16
Chromium (Cr)-Total			89.7		%		70-130	17-NOV-16
Cobalt (Co)-Total			86.1		%		70-130	17-NOV-16
Copper (Cu)-Total			81.9		%		70-130	17-NOV-16
Lead (Pb)-Total			85.3		%		70-130	17-NOV-16
Nickel (Ni)-Total			83.6		%		70-130	17-NOV-16
Zinc (Zn)-Total			N/A	MS-B	%		-	17-NOV-16
NH3-WT	Water							
Batch R3597203								
WG2434644-3 DUP		**L1858244-2**						
Ammonia, Total (as N)		133	132		mg/L	0.3	20	17-NOV-16
VG2434644-2 LCS								
Ammonia, Total (as N)			98.8		%		85-115	17-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3597203								
WG2434644-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	17-NOV-16
WG2434644-4 MS		**L1858244-2**						
Ammonia, Total (as N)			N/A	MS-B	%		-	17-NOV-16
NO2-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrite (as N)			102.4		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	18-NOV-16
/G2435860-5 MS		**WG2435860-3**						
Nitrite (as N)			102.5		%		70-130	18-NOV-16
NO3-IC-WT	Water							
Batch R3599717								
WG2435860-4 DUP		**WG2435860-3**						
Nitrate (as N)		<0.020	<0.020	RPD-NA	mg/L	N/A	25	18-NOV-16
WG2435860-2 LCS								
Nitrate (as N)			100.1		%		70-130	18-NOV-16
WG2435860-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	18-NOV-16
WG2435860-5 MS		**WG2435860-3**						
Nitrate (as N)			102.5		%		70-130	18-NOV-16
O2-DIS-WT	Water							
Batch R3596487								
WG2434123-1 DUP		**L1858237-1**						
Oxygen, Dissolved		9.48	9.56		mg/L	0.8	25	16-NOV-16
OGG-TOT-WT	Water							
Batch R3596577								
WG2433872-2 LCS								
Oil and Grease, Total			93.3		%		70-130	16-NOV-16
WG2433872-3 LCSD		**WG2433872-2**						
Oil and Grease, Total		93.3	89.8		%	3.8	40	16-NOV-16
VG2433872-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	16-NOV-16

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3597491								
WG2434352-3 DUP		**L1857606-1**						
Phosphorus, Total		0.0917	0.0951		mg/L	3.7	20	17-NOV-16
WG2434352-2 LCS								
Phosphorus, Total			104.1		%		80-120	18-NOV-16
WG2434352-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	18-NOV-16
WG2434352-4 MS		**L1857606-1**						
Phosphorus, Total			91.3		%		70-130	17-NOV-16
PH-WT	Water							
Batch R3596954								
WG2434422-6 DUP		**WG2434422-5**						
pH		6.96	6.97	J	pH units	0.01	0.2	17-NOV-16
/G2434422-4 LCS								
pH			7.02		pH units		6.9-7.1	17-NOV-16
PHENOLS-4AAP-WT	Water							
Batch R3597693								
WG2434828-7 DUP		**L1857251-20**						
Phenols (4AAP)		0.0018	0.0019		mg/L	8.7	20	17-NOV-16
WG2434828-6 LCS								
Phenols (4AAP)			92.0		%		85-115	17-NOV-16
WG2434828-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	17-NOV-16
WG2434828-8 MS		**L1857251-20**						
Phenols (4AAP)			89.9		%		75-125	17-NOV-16
SOLIDS-TSS-WT	Water							
Batch R3599510								
WG2435300-3 DUP		**L1858237-1**						
Total Suspended Solids		27.9	30.1		mg/L	7.6	20	21-NOV-16
WG2435300-2 LCS								
Total Suspended Solids			98.0		%		85-115	21-NOV-16
WG2435300-1 MB								
Total Suspended Solids			<2.0		mg/L		2	21-NOV-16
TKN-WT	Water							
Batch R3597465								
WG2434411-3 DUP		**L1857896-1**						
Total Kjeldahl Nitrogen		0.70	0.81		mg/L	14	20	17-NOV-16
WG2434411-2 LCS								

ALS Environmental

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3597465								
WG2434411-2 LCS								
Total Kjeldahl Nitrogen			100.6		%		75-125	17-NOV-16
WG2434411-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	17-NOV-16
WG2434411-4 MS		**L1857896-1**						
Total Kjeldahl Nitrogen			114.1		%		70-130	17-NOV-16

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1858237 Report Date: 21-NOV-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen							
	1	14-NOV-16 10:00	16-NOV-16 17:00	0.25	55	hours	EHTR-FM
Bacteriological Tests							
E. coli							
	1	14-NOV-16 10:00	16-NOV-16 16:45	48	55	hours	EHTL

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1858237 were received on 15-NOV-16 15:00.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the JS EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1858237-COFC

COC Number: 14 - 11201601

Page 1 of 1

6E

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD	Select Report Format: ☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)		R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Nick Pora	Quality Control (QC) Report with Report ☐ Yes ☐ No		P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution: ☑ EMAI ☐ MAIL ☐ FAX		E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 ext #143	Email 1 or Fax npora@orgaworld.ca		Specify Date Required for E2,E or P:
	613-822-2056 ext#142 (Greg Jurchuk)	Email 2 gjurchuk@orgaworld.ca		**Analysis Request**
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution: ☑ EMAI ☐ MAIL ☐ FAX		
Company:	ORGAWORLD	Email 1 or Fax npora@orgaworld.ca		
Contact:	Greg Jurchuk	Email 2 gjurchuk@orgaworld.ca		
Project Information		Oil and Gas Required Fields (client use)		
ALS Quote #:		Approver ID:	Cost Center:	
Job #:	Storm Water Pond	GL Account:	Routing Code:	
PO / AFE:		Activity Code:		
LSD:		Location:		
ALS Lab Work Order # (lab use only)	L1858237 16B	ALS Contact: Andrew	Sampler: Jessica Black	

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mm-m-yy)	Time (hh:mm)	Sample Type	EC BOD COD	T-AMM UN-AMM TKN TP	PHENOL	NO2 NO3	PH CONDUCTIVITY TSS	O&G AVM	METALS As,Ba,Cd,Cr,Co,Cu,Pb,Hg,Ni,Zn,Hg	Total phosphorus	DOC	DO	CBODS	Temperature	E.Coli	Number of Containers
	Storm Water Pond	14-Nov-16	1000hrs	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	Temp 28 deg C
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐	SIF Observations	Yes ☐	No ☐	
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☑				

INITIAL COOLER TEMPERATURES °C			FINAL COOLER TEMPERATURES °C		
8.9			6.0		

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: 14Nov16	Time: 1000hrs	Received by: Tammy Andrews	Date: Nov15/16	Time: 3:00	Received by: SN	Date: 16-Nov-16	Time: 9:00

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

ORGAWORLD CANADA LTD.
ATTN: Nick Pora
5123 Hawthorne Road
Ottawa ON K1G 3Y3

Date Received: 06-SEP-16
Report Date: 12-SEP-16 15:06 (MT)
Version: FINAL

Client Phone: 613-822-2056

Certificate of Analysis

Lab Work Order #: L1824380
Project P.O. #: NOT SUBMITTED
Job Reference: STORM WATER POND
C of C Numbers:
Legal Site Desc:

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1824380-1 STORM WATER POND Sampled By: JESSICA BLACK on 06-SEP-16 @ 12:45 Matrix: WATER							
Field Tests							
Temperature, Client	16.3		-50	Deg. C		07-SEP-16	R3542622
Physical Tests							
Conductivity	920		3.0	umhos/cm		09-SEP-16	R3544128
Oxygen, Dissolved	7.70	PEHR	0.050	mg/L		07-SEP-16	R3542950
pH	7.82		0.10	pH units		09-SEP-16	R3544127
Total Suspended Solids	21.0	DLHC	4.0	mg/L	09-SEP-16	11-SEP-16	R3545535
Anions and Nutrients							
Unionized ammonia	<0.00040		0.00040	mg/L		09-SEP-16	
Ammonia, Total (as N)	<0.020		0.020	mg/L		08-SEP-16	R3543691
Nitrate and Nitrite as N	<0.11		0.11	mg/L		09-SEP-16	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		08-SEP-16	R3544653
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		08-SEP-16	R3544653
Total Kjeldahl Nitrogen	1.95		0.15	mg/L	08-SEP-16	08-SEP-16	R3544545
Phosphorus, Total	0.174		0.0030	mg/L	08-SEP-16	08-SEP-16	R3543227
Organic / Inorganic Carbon							
Dissolved Organic Carbon	15.4		1.0	mg/L		07-SEP-16	R3544074
Bacteriological Tests							
E. Coli	50	DLM	10	CFU/100mL		08-SEP-16	R3543866
Total Metals							
Arsenic (As)-Total	0.00113		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Boron (B)-Total	0.039		0.010	mg/L	07-SEP-16	08-SEP-16	R3543156
Cadmium (Cd)-Total	<0.000010		0.000010	mg/L	07-SEP-16	08-SEP-16	R3543156
Chromium (Cr)-Total	0.00093		0.00050	mg/L	07-SEP-16	08-SEP-16	R3543156
Cobalt (Co)-Total	0.00039		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Copper (Cu)-Total	<0.0010		0.0010	mg/L	07-SEP-16	08-SEP-16	R3543156
Lead (Pb)-Total	0.00019		0.00010	mg/L	07-SEP-16	08-SEP-16	R3543156
Mercury (Hg)-Total	<0.000010		0.000010	mg/L		08-SEP-16	R3543598
Nickel (Ni)-Total	0.00152		0.00050	mg/L	07-SEP-16	08-SEP-16	R3543156
Zinc (Zn)-Total	0.0030		0.0030	mg/L	07-SEP-16	08-SEP-16	R3543156
Aggregate Organics							
BOD	15.9		2.0	mg/L	07-SEP-16	12-SEP-16	R3546202
BOD Carbonaceous	17.6		2.0	mg/L	07-SEP-16	12-SEP-16	R3546209
COD	68		10	mg/L		08-SEP-16	R3544112
Oil and Grease, Total	<2.0		2.0	mg/L	07-SEP-16	07-SEP-16	R3543231
Phenols (4AAP)	0.0031		0.0010	mg/L		08-SEP-16	R3543610

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Nitrate (as N)	MS-B	L1824380-1
Matrix Spike	Phenols (4AAP)	MS-B	L1824380-1

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD-C-WT	Water	BOD Carbonaceous	APHA 5210 B (CBOD)

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD-WT	Water	BOD	APHA 5210 B

This analysis is carried out using procedures adapted from APHA Method 5210B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

C-DIS-ORG-WT	Water	Dissolved Organic Carbon	APHA 5310 B-INSTRUMENTAL

Sample is filtered through a 0.45um filter, sample is then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

COD-T-WT	Water	Chemical Oxygen Demand	APHA 5220 D

This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.

EC-MF-WT	Water	E. coli	SM 9222D

A 100 mL volume of sample is filtered through a membrane, the membrane is placed on mFC-BCIG agar and incubated at 44.5 –0 .2 C for 24 – 2 h.
Method ID: WT-TM-1200

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

ETL-N2N3-WT	Water	Calculate from NO2 + NO3	APHA 4110 B
ETL-NH3-UNION-WT	Water	Un-ionized ammonia	CALCULATION
HG-T-CVAA-WT	Water	Total Mercury in Water by CVAAS	EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS.

MET-T-CCMS-WT	Water	Total Metals by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-WT	Water	Ammonia, Total as N	EPA 350.1

Sample is measured colorimetrically. When sample is turbid a distillation step is required, sample is distilled into a solution of boric acid and measured colorimetrically.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

O2-DIS-WT	Water	Dissolved oxygen	APHA 4500-O

Reference Information

OGG-TOT-WT	Water	Oil and Grease, Total	APHA 5520 B

The procedure involves an extraction of the entire water sample with hexane. This extract is then evaporated to dryness, and the residue weighed to determine Oil and Grease.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SOLIDS-TSS-WT	Water	Suspended solids	APHA 2540 D-Gravimetric

A well-mixed sample is filtered through a weighed standard glass fibre filter and the residue retained is dried in an oven at 104–1 C for a minimum of four hours or until a constant weight is achieved.

TEMP-CLIENT-WT	Water	Temperature	Result supplied by Client
TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-N

Sample is digested to convert the TKN to ammonium sulphate. The ammonia ions are heated to produce a colour complex. The absorbance measured by the instrument is proportional to the concentration of ammonium sulphate in the sample and is reported as TKN.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Environmental

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
BOD-C-WT	Water							
Batch R3546209								
WG2383527-6 DUP		**L1824176-1**						
BOD Carbonaceous		16.7	16.4		mg/L	1.8	20	12-SEP-16
WG2383527-7 LCS								
BOD Carbonaceous			98.0		%		85-115	12-SEP-16
WG2383527-5 MB								
BOD Carbonaceous			<2.0		mg/L		2	12-SEP-16
BOD-WT	Water							
Batch R3546202								
WG2383523-2 DUP		**L1824344-2**						
BOD		<2.0	<2.0	RPD-NA	mg/L	N/A	20	12-SEP-16
WG2383523-3 LCS								
BOD			99.0		%		85-115	12-SEP-16
WG2383523-1 MB								
BOD			<2.0		mg/L		2	12-SEP-16
C-DIS-ORG-WT	Water							
Batch R3544074								
WG2383870-3 DUP		**L1824954-1**						
Dissolved Organic Carbon		2.9	2.6		mg/L	11	20	07-SEP-16
WG2383870-2 LCS								
Dissolved Organic Carbon			93.4		%		80-120	07-SEP-16
WG2383870-1 MB								
Dissolved Organic Carbon			<1.0		mg/L		1	07-SEP-16
WG2383870-4 MS		**L1824954-1**						
Dissolved Organic Carbon			96.0		%		70-130	07-SEP-16
COD-T-WT	Water							
Batch R3544112								
WG2384805-3 DUP		**L1824307-2**						
COD		21	21		mg/L	0.5	20	08-SEP-16
WG2384805-2 LCS								
COD			100.1		%		85-115	08-SEP-16
WG2384805-1 MB								
COD			<10		mg/L		10	08-SEP-16
WG2384805-4 MS		**L1824307-2**						
COD			105.9		%		75-125	08-SEP-16
EC-MF-WT	Water							

Quality Control Report

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-MF-WT	Water							
Batch R3543866								
WG2383171-2 DUP		**WG2383171-4**						
E. Coli		0	0		CFU/100mL	0.0	65	08-SEP-16
WG2383171-1 MB								
E. Coli			0		CFU/100mL		1	08-SEP-16
EC-WT	Water							
Batch R3544128								
WG2383959-4 DUP		**WG2383959-3**						
Conductivity		141	141		umhos/cm	0.2	10	09-SEP-16
WG2383959-2 LCS								
Conductivity			101.4		%		90-110	09-SEP-16
WG2383959-1 MB								
Conductivity			<3.0		umhos/cm		3	09-SEP-16
HG-T-CVAA-WT	Water							
Batch R3543598								
WG2384064-3 DUP		**L1824572-1**						
Mercury (Hg)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	08-SEP-16
WG2384064-2 LCS								
Mercury (Hg)-Total			99.4		%		80-120	08-SEP-16
WG2384064-1 MB								
Mercury (Hg)-Total			<0.000010		mg/L		0.00001	08-SEP-16
WG2384064-4 MS		**L1824572-3**						
Mercury (Hg)-Total			97.4		%		70-130	08-SEP-16
MET-T-CCMS-WT	Water							
Batch R3543156								
WG2383521-4 DUP		**WG2383521-3**						
Arsenic (As)-Total		0.00038	0.00037		mg/L	3.1	20	07-SEP-16
Boron (B)-Total		0.017	0.015		mg/L	8.3	20	07-SEP-16
Cadmium (Cd)-Total		<0.000010	<0.000010	RPD-NA	mg/L	N/A	20	07-SEP-16
Chromium (Cr)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-16
Cobalt (Co)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-16
Copper (Cu)-Total		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	07-SEP-16
Lead (Pb)-Total		<0.00010	<0.00010	RPD-NA	mg/L	N/A	20	07-SEP-16
Nickel (Ni)-Total		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	07-SEP-16
Zinc (Zn)-Total		0.0032	<0.0030	RPD-NA	mg/L	N/A	20	07-SEP-16
WG2383521-2 LCS								
Arsenic (As)-Total			98.8		%		80-120	07-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R3543156								
WG2383521-2 LCS								
Boron (B)-Total			89.0		%		80-120	07-SEP-16
Cadmium (Cd)-Total			100.2		%		80-120	07-SEP-16
Chromium (Cr)-Total			96.9		%		80-120	07-SEP-16
Cobalt (Co)-Total			99.2		%		80-120	07-SEP-16
Copper (Cu)-Total			96.8		%		80-120	07-SEP-16
Lead (Pb)-Total			98.9		%		80-120	07-SEP-16
Nickel (Ni)-Total			96.6		%		80-120	07-SEP-16
Zinc (Zn)-Total			92.0		%		80-120	07-SEP-16
WG2383521-1 MB								
Arsenic (As)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Boron (B)-Total			<0.010		mg/L		0.01	07-SEP-16
Cadmium (Cd)-Total			<0.000010		mg/L		0.00001	07-SEP-16
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	07-SEP-16
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Copper (Cu)-Total			<0.0010		mg/L		0.001	07-SEP-16
Lead (Pb)-Total			<0.00010		mg/L		0.0001	07-SEP-16
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	07-SEP-16
Zinc (Zn)-Total			<0.0030		mg/L		0.003	07-SEP-16
WG2383521-5 MS		**WG2383521-3**						
Arsenic (As)-Total			92.8		%		70-130	07-SEP-16
Boron (B)-Total			83.9		%		70-130	07-SEP-16
Cadmium (Cd)-Total			95.2		%		70-130	07-SEP-16
Chromium (Cr)-Total			92.7		%		70-130	07-SEP-16
Cobalt (Co)-Total			93.3		%		70-130	07-SEP-16
Copper (Cu)-Total			93.8		%		70-130	07-SEP-16
Lead (Pb)-Total			93.5		%		70-130	07-SEP-16
Nickel (Ni)-Total			90.5		%		70-130	07-SEP-16
Zinc (Zn)-Total			88.7		%		70-130	07-SEP-16
NH3-WT	Water							
Batch R3543691								
WG2384091-3 DUP		**L1824541-1**						
Ammonia, Total (as N)		0.049	0.049		mg/L	1.1	20	08-SEP-16
WG2384091-2 LCS								
Ammonia, Total (as N)			96.5		%		85-115	08-SEP-16

Quality Control Report

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-WT	Water							
Batch R3543691								
WG2384091-1 MB								
Ammonia, Total (as N)			<0.020		mg/L		0.02	08-SEP-16
WG2384091-4 MS		**L1824541-1**						
Ammonia, Total (as N)			92.1		%		75-125	08-SEP-16
NO2-IC-WT	Water							
Batch R3544653								
WG2383997-14 DUP		**WG2383997-13**						
Nitrite (as N)		0.287	0.282		mg/L	1.9	25	08-SEP-16
WG2383997-12 LCS								
Nitrite (as N)			100.5		%		70-130	08-SEP-16
WG2383997-11 MB								
Nitrite (as N)			<0.010		mg/L		0.01	08-SEP-16
WG2383997-15 MS		**WG2383997-13**						
Nitrite (as N)			91.5		%		70-130	08-SEP-16
NO3-IC-WT	Water							
Batch R3544653								
WG2383997-14 DUP		**WG2383997-13**						
Nitrate (as N)		7.76	7.81		mg/L	0.6	25	08-SEP-16
WG2383997-12 LCS								
Nitrate (as N)			100.9		%		70-130	08-SEP-16
WG2383997-11 MB								
Nitrate (as N)			<0.020		mg/L		0.02	08-SEP-16
WG2383997-15 MS		**WG2383997-13**						
Nitrate (as N)			N/A	MS-B	%		-	08-SEP-16
O2-DIS-WT	Water							
Batch R3542950								
WG2383584-1 DUP		**L1824380-1**						
Oxygen, Dissolved		7.70	7.65		mg/L	0.7	25	07-SEP-16
OGG-TOT-WT	Water							
Batch R3543231								
WG2383430-2 LCS								
Oil and Grease, Total			96.6		%		70-130	07-SEP-16
WG2383430-3 LCSD		**WG2383430-2**						
Oil and Grease, Total		96.6	93.3		%	3.5	40	07-SEP-16
WG2383430-1 MB								
Oil and Grease, Total			<2.0		mg/L		2	07-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
P-T-COL-WT	Water							
Batch R3543227								
WG2383906-3 DUP		**L1824553-2**						
Phosphorus, Total		0.0084	0.0099		mg/L	16	20	08-SEP-16
WG2383906-2 LCS								
Phosphorus, Total			103.5		%		80-120	08-SEP-16
WG2383906-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	08-SEP-16
WG2383906-4 MS		**L1824553-2**						
Phosphorus, Total			82.8		%		70-130	08-SEP-16
PH-WT	Water							
Batch R3544127								
WG2383956-3 DUP		**WG2383956-2**						
pH		7.59	7.60	J	pH units	0.01	0.2	09-SEP-16
WG2383956-1 LCS								
pH			6.99		pH units		6.9-7.1	09-SEP-16
PHENOLS-4AAP-WT	Water							
Batch R3543610								
WG2384168-3 DUP		**L1824857-1**						
Phenols (4AAP)		0.0218	0.0217		mg/L	0.1	20	08-SEP-16
WG2384168-2 LCS								
Phenols (4AAP)			107.5		%		85-115	08-SEP-16
WG2384168-1 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	08-SEP-16
WG2384168-4 MS		**L1824857-1**						
Phenols (4AAP)			N/A	MS-B	%		-	08-SEP-16
SOLIDS-TSS-WT	Water							
Batch R3545535								
WG2384910-3 DUP		**L1824254-7**						
Total Suspended Solids		2.8	3.2		mg/L	13	20	11-SEP-16
WG2384910-2 LCS								
Total Suspended Solids			97.8		%		85-115	11-SEP-16
WG2384910-1 MB								
Total Suspended Solids			<2.0		mg/L		2	11-SEP-16
TKN-WT	Water							
Batch R3544545								
WG2384122-3 DUP		**L1824380-1**						
Total Kjeldahl Nitrogen		1.95	1.94		mg/L	0.1	20	08-SEP-16
WG2384122-2 LCS								

Quality Control Report

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TKN-WT	Water							
Batch R3544545								
WG2384122-2 LCS								
Total Kjeldahl Nitrogen			100.4		%		75-125	08-SEP-16
WG2384122-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	08-SEP-16
WG2384122-4 MS		**L1824380-1**						
Total Kjeldahl Nitrogen			102.2		%		70-130	08-SEP-16

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1824380 Report Date: 12-SEP-16

Client: ORGAWORLD CANADA LTD.
5123 Hawthorne Road
Ottawa ON K1G 3Y3
Contact: Nick Pora

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Physical Tests							
Dissolved oxygen							
	1	06-SEP-16 12:45	07-SEP-16 16:00	0.25	27	hours	EHTR-FM

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1824380 were received on 06-SEP-16 13:40.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1824380-COFC

COC Number: 14 -

Page 1 of 1

Report To		Report Format / Distribution		Select Service Level Below (Rush Turnaround Time (TAT) is not available for all tests)
Company:	ORGAWORLD (#23523)	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)	R ☑ Regular (Standard TAT if received by 3 pm - business days)
Contact:	Greg Jurchuk	Quality Control (QC) Report with Report	☐ Yes ☐ No	P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
Address:	5123 Hawthorne Road	☑ Criteria on Report - provide details below if box checked		E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
	Ottawa, Ontario K1G 3Y3	Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge
Phone:	613-822-2056 x143 - Nick Pora	Email 1 or Fax	n pora@orgaworld.ca	Specify Date Required for E2, E or P:
	613-822-2056 x142 - Greg Jurchuk	Email 2	g jurchuk@orgaworld.ca	
Invoice To	Same as Report To ☑ Yes ☐ No	Invoice Distribution		Analysis Request
	Copy of Invoice with Report ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☐ MAIL ☐ FAX	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below
Company:	ORGAWORLD	Email 1 or Fax	n pora@orgaworld.ca	
Contact:	Greg Jurchuk	Email 2	g jurchuk@orgaworld.ca	
Project Information		Oil and Gas Required Fields (client use)		
ALS Quote #:		Approver ID:	Cost Center:	
Job #:	Storm Water Pond	GL Account:	Routing Code:	
PO / AFE:		Activity Code:		
LSD:		Location:		

ALS Lab Work Order # (lab use only): L1824380 | ALS Contact: Andrew | Sampler: Jessica Black

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	BOD, CBOD	PH, CONDUCTIVITY, TSS, NO2, NO3	TKN-TP, PHENOL, NH3-UN-ION-LAB, COD	METALS & HG	As, Ba, Cd, Cr, Co, Cu, Pb, Ni, Zn	TOTAL O&G	DOC	DISSOLVED OXYGEN	E.COLI					Number of Containers
1	Storm Water Pond 07A	06-SEP-16	18:45	Water	R	R	R	R	R	R	R	R	R					10

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report (client Use)
Are samples taken from a Regulated DW System? ☐ Yes ☑ No	
Are samples for human drinking water use? ☐ Yes ☑ No	

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ | SIF Observations Yes ☐ No ☐

Ice packs Yes ☐ No ☐ | Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C	
10.9					16.3

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
Greg Jurchuk	Sept. 6/16			sept/6/16	1840		SEP 7/16	930

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

003688

Appendix E
2010 – 2015 Analytical Data

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MS-003	GW-45804-011410-MS-004	GW-45804-052710-MW0-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MS-006	GW-45804-052312-MS-001	GW-45804-111212-MS-003
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012
			Original	Duplicate	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP*[1]**								
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	-	0.0056	0.0061	0.0052	-	0.0054
Boron (dissolved)	mg/L	-	-	-	-	-	-	ND(0.050)	-	ND(0.050)
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	0.00146	-	0.00229
Copper (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Iron (dissolved)	mg/L	46.3	16.6	17.2	3.56	1.60	0.897	1.62	-	5.78
Lead (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium (dissolved)	mg/L	-	82.9	79.6	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	11.0	10.9	1.14	0.649	0.539	0.966	-	2.17
Mercury (dissolved)	mg/L	-	-	-	-	-	-	ND(0.00010)	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0124	0.0116	0.0530	0.0344	0.0096	0.0037	-	0.0053
Nickel (dissolved)	mg/L	-	-	-	-	-	-	ND(0.0020)	-	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	NO(0.00010)	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	-	ND(0.0030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	500	490	490	207	197	177	254	-	396
Ammonia-N	mg/L	4.0	0.898	0.828	0.593	0.335	0.410	1.06	-	1.66
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	-	7.5
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	51	-	55
Chloride	mg/L	-	66.1	66.6	109	47.5	37.9	99.8	-	70.7
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	220	240	69.2	151	29.5	-	107	43.1 J
Conductivity	umho/cm	-	1750	1760	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.7	9.9	6.4	7.0	6.5	9.5	-	9.2
Escherichia coli	cfu/100mL	25.6	0	0	3	9	ND(2)	-	13	6
Fecal coliform bacteria	cfu/100mL	-	0	0	11	14	2	-	6	10
Nitrate (as N)	mg/L	13	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	NO(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	-	7.86	7.59	-	-	-	7.78	-	7.78
Phenol	mg/L	-	-	-	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	7.2	0.127	0.067	1.59	5.46	3.13	2.88	-	1.57
Sulfide	mg/L	-	-	-	-	-	-	-	-	357
Total coliform bacteria	cfu/100mL	-	0	0	700	50	70	-	470	156
Total dissolved solids (TDS)	mg/L	-	1310	1320	1010	896	482	700	-	1110
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	2.28	-	2.95
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	3970	-	4620
Turbidity	NTU	-	63.0	64.0	-	-	-	-	24.0	7.50 J
Un-ionized ammonia	mg/L	-	0.000415	0.000382	0.00045	0.000111	0.00367	-	-	0.194
Field Parameters										
Conductivity, field	mS/cm	-	1.09	1.09	0.5	1.82	0.701	1.16	1.24	1.32
Dissolved oxygen (DO), field	mg/L	-	2.29	2.29	-	6.87	-	-	-	3.01
Oxidation reduction potential (ORP), field	millivolts	-	-85	-85	-	-143	-	-	-	-113
pH, field	s.u.	-	6.53	6.53	7.47	6.13	7.62	5.65	6.24	6.58
Temperature, field	DegC	-	3.7	3.7	16.5	11.1	9.5	12.96	12.73	12.3
Turbidity, field	NTU	-	207	207	-	-	-5	-	-	-5
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	880	440	930	700	-	460
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	550	440	930	700	-	460
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	2840	1520	3410	2650	-	1710
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	8300	4100	10600	9000	-	6300
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MS-003	GW-45804-011410-MS-004	GW-45804-052710-MW0-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MS-006	GW-45804-052312-MS-001	GW-45804-111212-MS-003
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012	11/12/2012
			Original	Duplicate	Original	Original	Original	Original	Original	Original
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.068
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	0.034
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	0.024
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	0.020
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	0.0180	0.0097	0.0276	0.0086	-	0.024
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.041
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.055
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	0.113
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	0.034
Fluorene	µg/L	-	-	-	-	-	-	-	-	0.040
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	-	-	0.047
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	0.056
Pyrene	µg/L	-	-	-	-	-	-	-	-	0.056

003691

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-05	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MS-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111815-TS-016
Sample Date:		5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/18/2015
		Original	Original	Original	Original	Duplicate	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	0.0048	0.0031	0.0041	0.0016	0.0015	0.0034	0.00149
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.017
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00081
Cobalt (dissolved)	mg/L	0.00077	0.00070	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	3.03	1.66	2.78	2.54	2.54	3.42	3.00
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	1.43	1.09	1.23	0.916	0.901	1.07	0.988
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0109	0.0042	0.0045	0.0026	0.0027	0.0017	0.00160
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.0030)	0.0036	0.0045	ND(0.0030)	0.0058	ND(0.0030)	0.0024
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	208	186	234 J	234	236	299	322
Ammonia-N	mg/L	1.12	0.440	2.08 J	1.22	1.32	0.844	0.492
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	49	53	45 J	24	15	36	21
Chloride	mg/L	90	50.2	85.2 J	50	50	75.5	52.2
Color (apparent)	color unit	-	-	146 J	145	136	-	-
Color (apparent)	TCU	27.0	34.9	-	-	-	49.5	100
Conductivity	umho/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.2	7.6	8.4 J	7.4	7.3	10.7	7.6
Escherichia coli	cfu/100mL	20	11	0 J	0	2	1	0
Fecal coliform bacteria	cfu/100mL	40	15	0 J	0 J	4 J	1	0
Nitrate (as N)	mg/L	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.74	7.31	7.77 J	7.90	7.88	7.74	7.72
Phenol	mg/L	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)	0.0101	0.0022
Phosphorus	mg/L	3.27	3.32	0.174 J	0.206	0.209	1.67	0.162
Sulfide	mg/L	337	231	194 J	141	127	88.7	80.5
Total coliform bacteria	cfu/100mL	20	905	5 J	290	220	892	150
Total dissolved solids (TDS)	mg/L	612	537	644 J	513	511	468	441
Total kjeldahl nitrogen (TKN)	mg/L	2.53	1.37	2.88 J	1.44	1.54	1.95	0.99
Total suspended solids (TSS)	mg/L	2690	3220	5.6 J	7.6	6.4	2800	23.1
Turbidity	NTU	58.0	46.8	15.7 J	29.4	28.2	40.0	46.4
Un-ionized ammonia	mg/L	0.000445	0.000151	0.0173 J	0.00896	0.00753	0.00483	0.0287
Field Parameters								
Conductivity, field	mS/cm	1.3	0.857	1.17	0.307	0.307	0.697	0.594
Dissolved oxygen (DO), field	mg/L	4.46	7.02	0	3.32	3.32	8.32	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-175	-53	-53	-92	-119
pH, field	s.u.	6.05	6.18	7.38	7.47	7.47	7.24	8.39
Temperature, field	Deg C	15.9	10.0	15.65	8.11	8.11	14.87	11.3
Turbidity, field	NTU	-5	867	3.1	-	-	0	33.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	530	790	ND(250) J	ND(250)	ND(250)	530	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	530	790	ND(250) J	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1920	3160	ND(250) J	ND(250)	ND(250)	2470	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	10000	20000	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	3000	ND(350)

003692

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-05	MW1-08	MW1-08	MW1-02	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-052014-MS-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052015-TS-003	GW-45804-111015-TS-016
Sample Date:		5/22/2013	11/14/2013	5/20/2014	11/25/2014	11/25/2014	5/20/2015	11/10/2015
		Original	Original	Original	Original	Duplicate	Original	Original
Semi-Volatiles								
1-Methylnaphthalene	µg/L	0.040	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	0.028	-	-	-	-	-	-
Acenaphthene	µg/L	ND(0.020)	-	-	-	-	-	-
Acenaphthylene	µg/L	ND(0.020)	-	-	-	-	-	-
Acridine	µg/L	ND(4.0)	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.033	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	ND(0.040)	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.027	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	ND(0.020)	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	ND(0.050)	-	-	-	-	-	-
Chrysene	µg/L	0.070	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	ND(0.020)	-	-	-	-	-	-
Fluoranthene	µg/L	0.092	-	-	-	-	-	-
Fluorene	µg/L	ND(0.39)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	-	-	-	-	-	-
Naphthalene	µg/L	0.049	-	-	-	-	-	-
Phenanthrene	µg/L	0.061	-	-	-	-	-	-
Pyrene	µg/L	0.040	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-05	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-101310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MW2-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007	GW-45804-111212-MB-009
Sample Date:			1/13/2015	5/19/2015	11/2/2015	5/18/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Metals										
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)	ND(0.050)
Caomium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	0.00012	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	0.00122	0.00059
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	0.0039	0.0036
Iron (dissolved)	mg/L	46.8	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	26.5	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	0.0070	0.0091	0.0077	0.0110	-	0.177	0.0352	0.0074
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0064	0.0120	0.0077	0.0104	-	0.0122	0.0098	0.0095
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0052	0.0050
Zinc (dissolved)	mg/L	-	0.103	0.0253	0.0127	0.0414	-	0.0126	0.0090	0.0100
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	633	209	261	314	281	294	-	273	329
Ammonia-N	mg/L	4.0	ND(0.050)	0.071	0.090	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	ND(10)	19
Chloride	mg/L	-	ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	-	ND(2.0)	2.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	32.7	66.3	15.1	25.2	9.9	-	11.5	-
Conductivity	umhos/cm	-	465	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	38.6	3.5	1.5	2.2	4.8	10.0	-	3.9	5.0
Escherichia coli	cfu/100mL	25.6	0	0	0	0	NO(2)	-	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	NO(2)	-	ND(2)	ND(2)
Nitrate (as N)	mg/L	1.3	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	0.31
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	8.00	-	-	-	-	-	8.00	7.83
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	7.2	0.110	0.039	0.033	0.033	0.038	-	ND(0.030)	0.054
Sulfate	mg/L	-	-	-	-	-	-	-	-	216
Total coliform bacteria	cfu/100mL	-	1	2	30	210	2	-	ND(2)	10
Total dissolved solids (TDS)	mg/L	-	258	456	576	515	554	-	515	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.43	0.43
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	24.4	-
Turbidity	NTU	-	6.10	-	-	-	-	-	4.80	-
Un-ionized ammonia	mg/L	-	ND(0.000057)	0.00045	0.0095	ND(0.000078)	ND(0.00058)	-	-	ND(0.000040)

003694

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-05	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MD-007	GW-45804-110210-TS-006	GW-45804-051911-MWD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MD-007	GW-45804-111212-MD-009
Sample Date:			1/13/2015	5/19/2015	11/2/2015	5/19/2011	11/9/2011	11/10/2011	5/15/2012	11/12/2012
			Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TEF[1]***								
Field Parameters										
Conductivity, field	mS/cm	-	0.801	0.678	0.971	0.95	0.77	-	-	1.21
Dissolved oxygen (DO), field	mg/L	-	-	5.69	4.3	9.19	-	-	-	6.66
Oxidation reduction potential (ORP), field	millivolts	-	-	14	-77	213	-	-	-	248
pH, field	s.u.	-	6.78	7.38	8.68	6.96	7.68	-	-	6.50
Temperature, field	Deg C	-	7.8	12.12	10.9	6.14	10.8	-	-	11.8
Turbidity, field	NTU	-	255	-	-	3.5	94.4	-	-	953
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus PAH-derived Aromatic Hydrocarbons	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	330	ND(250)	ND(250)	ND(250)	-	-	ND(250)	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Anthracene	µg/L	-	-	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	0.027
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Chrysene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	-	-	ND(0.020)

003695

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MS-009	GW-45804-052013-TS-001	GW-45804-111413-TS-006	GW-45804-052014-MS-011	GW-45804-052014-MS-011	GW-45804-112514-TS-010	GW-45804-111915-TS-010
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/19/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	0.018
Cadmium (dissolved)	mg/L	-	0.00022	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	0.000035
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.00102
Cobalt (dissolved)	mg/L	-	0.00295	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	ND(0.000010)
Copper (dissolved)	mg/L	-	0.0031	0.0038	0.0039	-	0.0027	0.00376
Iron (dissolved)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	--
Manganese (dissolved)	mg/L	-	0.0381	0.0035	0.0019	-	0.0047	0.00972
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0173	0.0057	0.0123	-	0.0061	0.00905
Nickel (dissolved)	mg/L	-	0.0064	0.0048	0.0048	-	0.0038	0.00453
Zinc (dissolved)	mg/L	-	0.0153	0.0071	0.0105	-	0.0047	0.0094
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	253	310	262	-	325	324
Ammonia-N	mg/L	-	ND(0.050)	0.105	ND(0.050)	-	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	34	10	-	13	ND(10)
Chloride	mg/L	-	2.7	ND(2.0)	ND(2.0)	-	ND(10)	ND(2.5)
Color (apparent)	color unit	-	-	-	9.9	-	7.0	-
Color (apparent)	TCU	17.1	24.3 J	14.5	-	-	-	58.5
Conductivity	umhos/cm	-	-	-	-	-	-	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	-	ND(3.0)	5.9	2.2	-	5.6	5.2
Escherichia coli	cfu/100mL	-	ND(2)	0	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	ND(2)	0	0	-	0	0
Nitrate (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.50)	ND(0.050)
pH, lab	su	-	7.98	7.79	7.71	-	7.90	7.79
Phenol	mg/L	-	ND(0.0010)	0.0019	0.0016	-	ND(0.0010)	0.0027
Phosphorus	mg/L	-	0.073	ND(0.030)	0.052	-	0.031	0.041
Sulfate	mg/L	-	147	115	109	-	196	228
Total coliform bacteria	cfu/100mL	-	ND(100)	1	5	-	270	30
Total dissolved solids (TDS)	mg/L	588	448	445	402	-	457	588
Total kjeldahl nitrogen (TKN)	mg/L	-	0.18	0.41	ND(0.45)	-	0.20	0.53
Total suspended solids (TSS)	mg/L	59.2	194	65.2	17.2	-	ND(2.0)	74.2
Turbidity	NTU	19.1	8.88	0.58	2.22	-	0.62	31.9
Un-ionized ammonia	mg/L	-	ND(0.0000026)	0.000034	ND(0.00046)	-	-	ND(0.0070)

003696

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111312-MS-009	GW-45804-052913-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MS-011	GW-45804-052914-MS-011	GW-45804-112514-TS-010	GW-45804-111915-TS-010
Sample Date:		11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/19/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Field Parameters								
Conductivity, field	mS/cm	-	1.96	0.832	0.686	0.686	0.681	0.673
Dissolved oxygen (DO), field	mg/L	-	6.41	8.16	6.91	6.91	6.02	3.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	94	94	87	55
pH, field	s.u.	-	5.30	6.16	7.53	7.53	7.51	6.74
Temperature, field	Deg C	-	13.0	10.1	13.12	13.12	9.16	13.08
Turbidity, field	NTU	-	325	230	35.6	35.6	-	44.1
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250) J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	-	ND(250) J	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	-	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
Acenaphthene	µg/L	-	-	-	-	-	-	--
Acenaphthylene	µg/L	-	-	-	-	-	-	--
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	--
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	--
Chrysene	µg/L	-	-	-	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	--
Fluoranthene	µg/L	-	-	-	-	-	-	--
Fluorene	µg/L	-	-	-	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	--
Naphthalene	µg/L	-	-	-	-	-	-	--
Phenanthrene	µg/L	-	-	-	-	-	-	--
Pyrene	µg/L	-	-	-	-	-	-	--

003697

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-02	MW3-05	MW3-08	MW3-05	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MW3-008	GW-45804-110911-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0048	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.050)
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Magnesium (dissolved)	mg/L	62.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0053	0.0071	0.0016	0.0036	0.0066
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135	0.0147	0.0132	0.0152	0.0328
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	0.0021
Zinc (dissolved)	mg/L	0.0199	0.0482	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0147	ND(0.0050)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300	279	276	316	322	278	276	256
Ammonia-N	mg/L	0.123	0.077	0.078	0.073	0.058	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	15
Chloride	mg/L	25.1	28.4	31.6	27.5	27.4	21.8	55.7	43.9
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	10.2	16.9	19.7	38.3	42.8	34.4	15.2	52.4
Conductivity	umhos/cm	1080	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.8	1.7	3.5	3.0	3.1	2.5	ND(5.0)
Escherichia coli	ctu/100mL	0	0	0	0	0	0	2	0
Fecal coliform bacteria	ctu/100mL	0	0	0	1	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	7.97	-	-	-	-	-	-	7.96
Phenol	mg/L	-	-	-	-	-	-	-	ND(0.0010)
Phosphorus	mg/L	0.378	0.105	0.090	0.093	0.079	0.075	ND(0.030)	0.240
Sulfate	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	ctu/100mL	3	1	10	120	430	1	60	0
Total dissolved solids (TDS)	mg/L	736	618	690	766	778	462	1040	790
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	0.20
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	303
Turbidity	NTU	2.70	-	-	-	-	-	-	149
Un-ionized ammonia	mg/L	0.0000030	0.00118	0.00119	0.000095	0.000076	ND(0.00012)	ND(0.000049)	-
Field Parameters									
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	4.42	-	-	1.47	1.47	-	1.47	2.87
Oxidation reduction potential (ORP), field	millivolts	-	38	38	394	394	-	120	51
pH, field	s.u.	5.05	7.75	7.75	6.82	6.82	7.09	6.68	6.67
Temperature, field	Deg C	9.6	12.5	12.5	9.4	9.4	8.51	87	9.81
Turbidity, field	NTU	424	-	-	-	-	150	99	504

003698

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MD-010	GW-45804-051910-MD-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MW-003	GW-45804-110911-TS-001	GW-45804-051512-MD-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
		Original	Original	Duplicate	Original	Duplicate	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(150)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

003699

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-95	MW3-08	MW3-95	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-018	GW-45804-112614-TS-014	GW-45804-052015-TS-015	GW-45804-111815-TS-016
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/18/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.024
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00085
Cobalt (dissolved)	mg/L	0.00067	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00046
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.000290
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.0273	0.0014	0.0042	0.0055	ND(0.0010)	0.0012	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0203	0.0148	0.0165	0.0459	0.0390	0.121	0.0152
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)	0.0028	0.0043	0.00223
Zinc (dissolved)	mg/L	ND(0.0050)	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0013
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	308	275	295	262	283	256	279
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.051	ND(0.113)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	31	30	32	ND(10)	ND(10)	ND(10)
Chloride	mg/L	55.4	46	43.1	46.8	52.5	59.8	44.1
Color (apparent)	color unit	-	-	-	10.4	13.3	-	-
Color (apparent)	TCU	45.5	34.0	50.7	-	-	11.2	17.2
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	2.2	2.9	2.7	1.5	1.7	3.4
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	1	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0	1	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.76	7.57	7.62	7.62	7.52	7.81	7.62
Phenol	mg/L	ND(0.0010)	0.0030	0.0012	0.0045	ND(0.0010)	0.0017	0.00019
Phosphorus	mg/L	0.301	0.038	0.166	0.074	ND(0.030)	0.042	0.035
Sulfate	mg/L	495	292	445	222	456	474	413
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5	50	32	170
Total dissolved solids (TDS)	mg/L	1130	714	1020	613	954	862	884
Total Kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.18	1.54	ND(0.52)	0.18	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L	642	99.0	209	108	72.8	116	42.0
Turbidity	NTU	11.8	13.5	6.82	4.84	44.8	6.42	36.7
Un-ionized ammonia	mg/L	ND(0.00042)	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00039	0.00103	ND(0.0017)
Field Parameters								
Conductivity, field	mS/cm	1.20	1.16	1.46	0.946	434	0.934	1.03
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73	8.64	8.98	0
Oxidation reduction potential (ORP), field	millivolts	16	-	-	105	80	175	-40
pH, field	s.u.	7.58	5.09	6.16	7.24	7.48	7.52	8.31
Temperature, field	Deg C	9.8	11.2	10.4	8.09	8.44	12.5	12.08
Turbidity, field	NTU	473	393	25	184	-	211	0.3

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-95	MW3-08	MW3-95	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-013	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-018	GW-45804-112614-TS-014	GW-45804-052015-TS-015	GW-45804-111015-TS-016
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/20/2015	11/10/2015
		Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	-	--	-	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	--	-	--	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	-	--	-	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(292)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	0.094	--	-	-	--	--
2-Methylnaphthalene	µg/L	-	0.212	-	-	-	--	--
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	--	--
Acenaphthylene	µg/L	-	ND(0.020)	-	--	-	--	--
Acridine	µg/L	-	ND(4.0)	-	--	-	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	ND(0.020)	-	--	-	--	--
Benzo(a)pyrene	µg/L	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	--	-
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	-	-	-	--	-
Benzo(g,h,i)perylene	µg/L	-	ND(0.020)	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	ND(0.020)	--	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	ND(0.060)	--	-	-	--	--
Chrysene	µg/L	-	ND(0.020)	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	ND(0.020)	-	-	-	--	--
Fluoranthene	µg/L	-	ND(0.020)	-	--	-	--	--
Fluorene	µg/L	-	ND(0.020)	-	--	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	--	-	--	--
Naphthalene	µg/L	-	0.113	-	--	-	--	--
Phenanthrene	µg/L	-	ND(0.020)	-	-	-	--	--
Pyrene	µg/L	-	ND(0.020)	-	-	-	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		BW4-06	BW4-06	BW4-08	BW4-08	BW4-08	BW4-08	BW4-06	BW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MW0-006	GW-45804-110911-YS-003	GW-45804-051412-MB-001	GW-45804-052012-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/13/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	0.052	-	0.072	0.056	0.058
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	-	ND(0.00010)	0.00020	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	0.00122	-	0.00073	0.00056	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0014	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	-	0.320	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	-	0.320	0.416	0.220
Mercury (dissolved)	mg/L	-	-	-	ND(0.000010)	-	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0289	0.0180	0.0235	0.0192	-	0.0461	0.0204	0.0195
Nickel (dissolved)	mg/L	-	-	-	0.0110	-	0.0053	0.0083	0.0053
Zinc (dissolved)	mg/L	0.0891	0.0131	0.0090	ND(0.0030)	-	0.0053	0.0105	0.0041
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	367	416	378	388	-	387	405	372
Ammonia-N	mg/L	0.089	ND(0.050)	ND(0.050)	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	ND(10)	-	23	13	21
Chloride	mg/L	84.6	73.6	70.4	81.3	-	72.3	78	69.2
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	20.3	36.5	77.5	-	91.7	39.4 J	39.7	61.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	8.7	2.0	-	1.7	1.6	2.0
Escherichia coli	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(10)	0
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	-	0	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	0.13
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)	ND(0.10)
pH, lab	S.U.	-	-	-	7.54	-	7.67	7.60	7.68
Phenol	mg/L	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.166	0.098	0.479	0.100	-	0.228	0.088	0.109
Sulfate	mg/L	-	-	-	-	-	697	731	691
Total coliform bacteria	cfu/100mL	0	40	2	-	16	2	ND(100)	ND(10)
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530	-	1540	1450	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.21	-	ND(0.15)	ND(0.15)	0.18
Total suspended solids (TSS)	mg/L	-	-	-	24.6	-	1370	100	381
Turbidity	NTU	-	-	-	-	22.0	4.60 J	10.3	6.56
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	-	-	ND(0.00049)	ND(0.0000023)	ND(0.000019)
Field Parameters									
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03	1.75	1.99	0.96
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	4.39	6.26	7.73
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	18	47	-
pH, field	S.U.	7.44	5.95	7.00	6.43	8.27	7.57	5.20	6.20
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.51	12.0	13.4	10.4
Turbidity, field	NTU	-	455	399	-	-	355	594	56

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		BW4-05	BW4-06	BW4-08	BW4-08	BW4-08	BW4-08	BW4-05	BW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-MW0-006	GW-45804-110911-YS-003	GW-45804-051412-MB-001	GW-45804-052012-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007	GW-45804-111413-TS-012
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/13/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	340	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.030)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.030)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.030)	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.010)	ND(0.0050)	0.0061
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(c)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.030)	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.030)	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.030)	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-06	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052914-MB-006	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-012
Sample Date		5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original
Parameters:	***Units***				
Metals					
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.052	0.052	0.060	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00092)	ND(0.00050)	ND(0.00050)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.270	0.0881	0.157	0.154
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010)
Molybdenum (dissolved)	mg/L	0.0201	0.0203	0.0199	0.0242
Nickel (dissolved)	mg/L	0.0061	0.0051	0.0055	0.0052
Zinc (dissolved)	mg/L	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	360	338	343	349
Ammonia-N	mg/L	ND(0.057)	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	68.1	69	77.6	82.6
Color (apparent)	color unit	17.3	10.9	-	-
Color (apparent)	TCU	-	-	2.4	1.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	ND(1.0)	1.1	1.5	2.3
Escherichia coli	cfu/100mL	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.32	0.18
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.40	7.66	7.77	7.63
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0058	0.0029
Phosphorus	mg/L	ND(0.030)	0.032	ND(0.030)	ND(0.030)
Sulfide	mg/L	521	665	665	755
Total coliform bacteria	cfu/100mL	0	0	9	1
Total dissolved solids (TDS)	mg/L	1370	1390	1300	1380
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.21)	ND(0.15)	ND(0.15)	0.56
Total suspended solids (TSS)	mg/L	7.2	10.0	8.5	2.4
Turbidity	NTU	0.22	4.22	ND(0.44)	0.69
Un-ionized ammonia	mg/L	0.00024	ND(0.00012)	ND(0.00015)	ND(0.0016)
Field Parameters					
Conductivity, field	mS/cm	2.04	-	1.42	1.4
Dissolved oxygen (DO), field	mg/L	0.58	-	2.21	0
Oxidation reduction potential (ORP), field	millivolts	99	-	186	-7
pH, field	s.u.	7.11	7.07	8.93	8.15
Temperature, field	Deg C	12.62	8.5	15.83	10.14
Turbidity, field	NTU	57	-	0	0.6

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-06	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-052014-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-012
Sample Date		5/29/2014	11/25/2014	5/28/2015	11/10/2015
		Original	Original	Original	Original
Parameters:	***Units***				
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gell (GHH)	µg/L	-	-		
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F 2 less naphthalene	µg/L	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(390)	ND(380)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	--	--
Acenaphthene	µg/L	-	-	--	--
Acenaphthylene	µg/L	-	-	--	--
Acridine	µg/L	-	-	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	--	--
Benzo(c)pyridine (Quinoline)	µg/L	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--
Chrysene	µg/L	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	--	--
Fluoranthene	µg/L	-	-	--	--
Fluorene	µg/L	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	--	--
Naphthalene	µg/L	-	-	--	--
Phenanthrene	µg/L	-	-	--	--
Pyrene	µg/L	-	-	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	RW4-05
Sample ID:		GW-45804-051910-MS-009	GW-45804-110210-TS-011	GW-45804-051711-MSD-007	GW-45804-110911-TS-012	GW-45804-051412-MS-012	GW-45804-052312-MS-005	GW-45804-111212-MS-008	GW-45804-052213-TS-009
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.0035	0.0021	0.0012	0.0012	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	-	-	-	0.058	-	0.059	0.065
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00010	-	0.00011	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	0.00231	-	0.00195	0.00287
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.400	0.467	0.301	0.781	0.099	-	ND(0.097)	0.247
Lead (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.252	0.372	-	0.422	0.317
Mercury (dissolved)	mg/L	-	-	-	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0386	0.0317	-	0.0226	0.0462
Nickel (dissolved)	mg/L	-	-	-	-	0.0054	-	0.0110	0.0056
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0050)	-	0.0073	0.0054
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	456	427	376	387	351	-	396	393
Ammonia-N	mg/L	0.117	0.084	0.081	0.052	ND(0.050)	-	ND(0.050)	0.066
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	ND(10)	-	15	21
Chloride	mg/L	81.4	203	87.3	83.4	78.0	-	80.4	66
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	25.4	93.5	139	88.4	-	27	11.2 J	33.5
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.8	1.0	2.7	3.1	1.7	-	1.8	1.6
Escherichia coli	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	-	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	0.13	-	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	-	ND(0.10)	ND(0.50)
pH, lab	su	-	-	-	-	7.67	-	7.74	7.73
Phenol	mg/L	-	-	-	-	ND(0.0010)	-	ND(0.0010)	0.0040
Phosphorus	mg/L	0.974	1.05	1.25	1.49	0.672	-	0.293	0.906
Sulfate	mg/L	-	-	-	-	-	-	718	798
Total coliform bacteria	cfu/100mL	0	4	3	2	-	0	10	ND(10)
Total dissolved solids (TDS)	mg/L	1960	1920	1700	1730	1740	-	1600	1540
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.19	-	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	-	-	-	-	5280	-	528	1710
Turbidity	NTU	-	-	-	-	-	67.0	2.60 J	84.6
Un-ionized ammonia	mg/L	0.00085	0.000021	0.00030	0.00014	-	-	ND(0.0005)	0.00000073

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-05
Sample ID:		GW-45804-051910-MS-009	GW-45804-110210-TS-011	GW-45804-051711-MSD-007	GW-45804-110911-TS-012	GW-45804-051412-MS-012	GW-45804-052312-MS-005	GW-45804-111212-MS-008	GW-45804-052213-TS-009
Sample Date:		5/19/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012	5/23/2012	11/12/2012	5/22/2013
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Field Parameters									
Conductivity, field	mS/cm	1.96	2.41	2.55	2.46	2.13	2.1	1.98	1.98
Dissolved oxygen (DO), field	mg/L	-	3.39	-	-	-	-	5.47	8.74
Oxidation reduction potential (ORP), field	millivolts	-	5	-	-	-	-	-78	-5
pH, field	s.u.	7.46	6.00	7.3	7.04	6.27	6.27	6.70	5.54
Temperature, field	Deg C	11.4	11.4	7.68	11.4	10.32	13.00	10.3	14.5
Turbidity, field	NTU	-	-	-	-5	-	-	640	-5
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1520	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (SHI)	µg/L	3900	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.030)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.038)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benz[a]anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0309	0.0159	0.0056	0.0074	0.0121	-	ND(0.010)	0.0063
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.030)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.030)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.039)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.030)	ND(0.020)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-05	MW4-05	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111915-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2013	5/28/2015	11/19/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.070	0.058	0.071	0.064	0.10
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00144	0.00061	0.00145	0.00085	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)
Iron (dissolved)	mg/L	1.66	0.221	0.382	0.280	0.13
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.218	0.182	0.234	0.169	0.137
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0351	0.0445	0.0397	0.0415	0.0532
Nickel (dissolved)	mg/L	0.0023	0.0022	ND(0.0020)	0.0022	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0095	0.0091	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	350	399	326	310	346
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.131)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	42	ND(10)	ND(10)	ND(10)	ND(10)
Chloride	mg/L	67.4	73.5	69	63.7	71.4
Color (apparent)	color unit	-	12.0	16.9	-	-
Color (apparent)	TCU	117	-	-	17.7	7.8
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.0	2.0	1.7	1.5	1.9
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	0.24	ND(0.50)	0.10	0.24
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)
pH, lab	S.U.	7.58	7.48	7.72	7.75	7.73
Phenol	mg/L	ND(0.0010)	0.0018	ND(0.0010)	0.0036	0.0036
Phosphorus	mg/L	1.75	0.070	0.097	0.045	ND(0.030)
Sulfate	mg/L	702	845	710	755	716
Total coliform bacteria	cfu/100mL	ND(10)	5	0	0	1
Total dissolved solids (TDS)	mg/L	1480	1390	1480	1380	1310
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	ND(0.15)	ND(0.15)	0.46	0.20
Total suspended solids (TSS)	mg/L	2650	110	61.2	23.3	19.4
Turbidity	NTU	19.4	22.0	9.33	13.8	5.22
Un-ionized ammonia	mg/L	ND(0.000018)	ND(0.000018)	ND(0.000018)	0.00041	ND(0.0019)

003708

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-05	MW4-05	MW4-09	MW4-09
Sample ID:		GW-45804-111413-TS-013	GW-45804-052914-MB-004	GW-45804-112514-TS-002	GW-45804-052815-TS-012	GW45804-111915-TS-015
Sample Date:		11/14/2013	5/29/2014	11/25/2013	5/28/2015	11/19/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Field Parameters						
Conductivity, field	mS/cm	2.01	2	0.059	1.69	1.69
Dissolved oxygen (DO), field	mg/L	6.45	8.95	8.44	1.62	1.62
Oxidation reduction potential (ORP), field	millivolts	-	10	19	191	191
pH, field	su	6.97	7.2	7.21	6.98	6.98
Temperature, field	Deg C	11.2	9.02	10.23	14.98	14.98
Turbidity, field	NTU	556	54.5	-	34.3	34.3
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	280	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	280	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	300	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	580	ND(380)	ND(380)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	0.038	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0064	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-

003709

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-05	MW5-08	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-011310-TS-002	GW-45804-051808-MB-001	GW-45804-110210-TS-003	GW-45804-051611-MW5-006	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MB1-003	GW-45804-021512-MB1-004	GW-45804-032112-MW5-005	GW-45804-032112-MW5-006
Sample Date:			1/13/2016	5/18/2016	11/2/2016	5/16/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***	***TLP***[1]										
Metals												
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0010	ND(0.0010)	-	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L		-	-	-	-	-	-	0.054	0.056	-	-
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	-	-
Calcium (dissolved)	mg/L		-	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L		-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00080)	ND(0.00080)	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-
Iron (dissolved)	mg/L	48.3	1.99	4.88	4.19	5.18	3.92	3.83	6.27	6.24	-	-
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0010)	ND(0.0010)	-	-
Magnesium (dissolved)	mg/L	-	116	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.65	3.25	2.99	3.59	3.42	3.47	4.73	4.79	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.00010)	ND(0.00010)	-	-
Molybdenum (dissolved)	mg/L	-	0.024	0.018	0.022	0.0095	0.0133	0.0129	0.0088	0.0088	-	-
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	ND(0.0020)	ND(0.0020)	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	0.139	ND(0.030)	ND(0.030)	0.0093	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0087	-	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-	-	-
General Chemistry												
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	350	408	487	485	541	534	527	517	477	-
Ammonia-N	mg/L	4.0	0.698	0.693	0.320	3.90	4.77	4.78	7.39	6.85	9.99	10.3
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	45	35	-	-
Chloride	mg/L	-	94.4	147	98.5	103	108	108	-	-	104	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	23.1	25.9	128	102	29.2	23.9	10.9	13.0	25.6	-
Conductivity	umhos/cm	-	2150	-	-	-	-	-	-	-	2170	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.6	5.5	6.5	10.0	10.0	10.0	11.0	9.4	8.0	-
Escherichia coli	cfu/100mL	25.6	0	0	0	0	ND(2)	ND(2)	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	ND(2)	ND(2)	0	0	0 J	0 J
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	-
Petroleum Products	mg/L	-	-	-	-	-	-	-	ND(1.0)	ND(1.0)	-	-
pH, lab	s.u.	-	7.68	-	-	-	-	-	7.56	7.53	7.08	-
Phenol	mg/L	-	-	-	-	-	-	-	0.0010	0.0010	-	-
Phosphorus	mg/L	7.2	6.11	1.20	0.750	0.187	0.482	0.519	0.638	0.631	0.706	-
Sulfate	mg/L	-	-	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	3	0	6	10	4	ND(2)	0	0	1	0
Total dissolved solids (TDS)	mg/L	-	1750	1620	1350	1740	1610	1610	1600	1760	1790	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	10.8	9.87	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	2010 J	770 J	-	-
Turbidity	NTU	-	410	-	-	-	-	-	116	156	18.6	-
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-	-
Field Parameters		-										
		-										
Conductivity, field	mS/cm	-	2.56	0.957	2.15	2.67	2.48	-	2.51	2.51	2.56	2.56
Dissolved oxygen, (DO), field	mg/L	-	-	-	4.92	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-57	-	-	-	-	-	-	-
pH, field	s.u.	-	6.54	6.93	5.72	6.52	7.15	7.15	6.57	6.57	5.23	5.23
Temperature, field	Deg C	-	9.6	11.6	14.9	8.8	13.7	13.7	7.52	7.52	8.4	8.4
Turbidity, field	NTU	-	0	-	-	266	852	-	-5	-5	-5	-5
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	12500	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	ND(2500)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	12400	ND(2500)	720	ND(250)	600	560	720 J	ND(250) J	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	36900	4400	2010	990	1770	1640	2470 J	610 J	4700	-

003710

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-05	MW5-08	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-99
Sample ID:			GW-45804-011310-TS-002	GW-45804-051808-MS-001	GW-45804-110210-TS-003	GW-45804-051611-MW5-006	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-MS-003	GW-45804-021512-MS-004	GW-45804-032112-MS-005	GW-45804-032112-MS-006
Sample Date:			1/13/2016	5/18/2016	11/2/2016	5/16/2011	11/8/2011	11/8/2011	2/15/2012	2/15/2012	3/21/2012	3/21/2012
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***	***TLP***[1]										
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	104000	13800	4500	-	4500	4100	6300	-	10300	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	49300	4400	2630	550	2370	2260	3190 J	610 J	4700	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-	-	-	-	-
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	-	-	ND(0.28)	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	0.27	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	0.24	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	0.25	0.141	0.023	0.100	0.151	0.074	0.069	-	-
Benzo(a)anthracene	µg/L	-	-	0.99	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.848	0.520	0.0435	0.244 J	0.470 J	0.234	0.218	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.54	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.55	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.88	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.64	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.51	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.79	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.41	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-08	MW5-08	MW5-08	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-051412-M8-003	GW-45804-051412-M8-004	GW-45804-052312-M8-004	GW-45804-M-08-12-M8-009	GW-45804-111212-M8-008	GW-45804-022713-TS-002	GW-45804-022713-TS-004	GW-45804-052213-TS-013	GW-45804-080213-TS-004	GW-45804-111413-TS-011
Sample Date		5/14/2012	5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013
		Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***										
Metals											
Aluminum (dissolved)	mg/L	-	-	-	ND(0.10)	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	ND(0.050)	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	0.0019	0.0012	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	0.15	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Boron (dissolved)	mg/L	0.067	0.064	-	ND(0.50)	0.072	0.057	0.055	0.064	0.074	0.060
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	282	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0010)	0.0015	-	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	ND(0.0050)	0.00033	0.00063	0.00055	0.00121	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.88	5.95	-	5.55	5.70	7.31	7.34	7.47	4.70	5.60
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	92.0	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.88	3.95	-	3.40	4.27	4.40	4.65	4.29	3.45	3.36
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0093	0.0094	-	0.014	0.0159	0.0110	0.0109	0.0163	0.0103	0.0102
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	-	ND(0.020)	0.0037	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	ND(0.50)	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	19	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	ND(0.0040)	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	10	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.0010)	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	101	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	3.31	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	ND(0.0030)	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	ND(0.010)	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	ND(0.020)	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	ND(0.10)	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	ND(0.050)	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	ND(0.050)	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.0060	ND(0.0030)	-	ND(0.030)	0.0048	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	ND(0.040)	-	-	-	-	-	-
General Chemistry											
Alkalinity, bicarbonate	mg/L	-	-	-	488	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	ND(10)	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	ND(10)	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	442	436	-	490	525	488	494	482	495	596
Ammonia-N	mg/L	10.1	10.0	-	8.95	3.35	12.1	12.8	10.3	15.3	18.4
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	30	25	-	44	54	57	57	38	30	55
Chloride	mg/L	116	116	-	176	143	149	149	320	144	149
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	-	106	57.4	52.1 J	55.0	48.4	28.0	86.5	130
Conductivity	umhos/cm	-	-	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	9.4	-	8.1	8.3	12.1	11.1	8.3	9.5	8.8
Escherichia coli	cfu/100mL	-	-	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0
Fecal coliform bacteria	cfu/100mL	-	-	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.58	7.58	-	7.75	7.57	7.54	7.66	7.58	7.41	7.51
Phenol	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.00010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0012
Phosphorus	mg/L	0.550	0.406	-	0.651	0.188	0.474	0.628	0.332	0.148	0.404
Sulfate	mg/L	-	-	-	-	424	872	872	881	773	630
Total coliform bacteria	cfu/100mL	-	-	ND(10)	0	2	ND(2)	2	100	10	ND(10)
Total dissolved solids (TDS)	mg/L	1720	1710	-	1740	1430	2060	2020	1510	1820	1760
Total kjeldahl nitrogen (TKN)	mg/L	11.8	12.2	-	10.8	3.98	13.5	14.1	10.8	16.8	20.3
Total suspended solids (TSS)	mg/L	380	246	-	304	88.0	700 J	1400 J	650	16.4	390
Turbidity	NTU	-	-	26.0	29.0	6.90 J	39.0 J	20.7 J	19.2	29.0	50.0
Un-ionized ammonia	mg/L	-	-	-	-	-	-	-	-	-	-
Field Parameters											
Conductivity, field	mS/cm	2.45	-	3.06	2.21	1.94	2.85	-	2.84	2.54	2.55
Dissolved oxygen (DO), field	mg/L	-	-	-	5.69	3.04	5.71	-	5.71	5.68	7.15
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-87	-	-	-87	-101	-
pH, field	s.u.	8.26	-	8.17	7.87	8.37	7.31	7.31	5.75	8.55	5.24
Temperature, field	Deg C	10.23	-	10.17	16.54	14.8	7.8	7.8	11.5	17.4	13.3
Turbidity, field	NTU	-	-	-	463	199	939	-	618	2.2	243
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	-	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	-	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270
Petroleum hydrocarbons F4 (C34-C50)	µg/L	660	640	-	1600	510	ND(420)	ND(250)	730	ND(250)	1010

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08
Sample ID:		GW-45804-051412-M8-003	GW-45804-051412-M8-004	GW-45804-052312-M8-004	GW-45804-08-08-12-M8-005	GW-45804-111212-M8-005	GW-45804-022713-TS-002	GW-45804-022713-TS-004	GW-45804-052213-TS-003	GW-45804-080213-TS-004	GW-45804-111413-TS-011
Sample Date		5/14/2012	5/14/2012	5/23/2012	8/8/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013
		Original	Duplicate	Original	Original	Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***										
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	ND(2500)	2700	-	4400	ND(2500)	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	690	840	-	2140	510	ND(420)	ND(250)	990	ND(250)	1280
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	-
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.027)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	ND(0.28)	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	ND(0.20)	ND(0.020)	-	-	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	-	0.26	0.056	-	-	0.142	-	-
Acenaphthylene	µg/L	-	-	-	0.23	0.053	-	-	0.162	-	-
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)	-	-
Anthracene	µg/L	ND(0.020)	0.023	-	ND(0.20)	0.050	ND(0.20)	ND(0.20)	0.049	ND(0.020)	0.028
Benzo(a)anthracene	µg/L	-	-	-	0.31	0.220	-	-	0.181	-	-
Benzo(a)pyrene	µg/L	0.0225 J	0.0282 J	-	0.28	0.197	0.11 J	0.31 J	0.159	ND(0.0050)	0.0634
Benzo(b)fluoranthene	µg/L	-	-	-	0.33	0.184	-	-	0.188	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)	-	-
Benzo(ghi)perylene	µg/L	-	-	-	0.23	0.117	-	-	0.113	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	0.20	0.162	-	-	0.167	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	0.257	-	-
Chrysene	µg/L	-	-	-	0.35	0.226	-	-	0.196	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	ND(0.20)	0.038	-	-	0.029	-	-
Fluoranthene	µg/L	-	-	-	1.02	0.548	-	-	0.525	-	-
Fluorene	µg/L	-	-	-	ND(0.20)	0.064	-	-	ND(0.13)	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	ND(0.20)	0.120	-	-	0.117	-	-
Naphthalene	µg/L	-	-	-	ND(0.20)	ND(0.020)	-	-	0.024 J	-	-
Phenanthrene	µg/L	-	-	-	0.28	0.153	-	-	0.132	-	-
Pyrene	µg/L	-	-	-	0.85	0.489	-	-	0.458	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-99	MW5-99	MW5-09	MW5-99	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-042114-TS-006	GW-45804-052914-MB-012	GW-45804-053014-MB-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		4/21/2014	5/29/2014	5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Antimony (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027	ND(0.0010)
Barium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Beryllium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Bismuth (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Boron (dissolved)	mg/L	ND(0.050)	0.065	-	0.096	0.066	ND(0.10)	ND(0.10)	0.10	0.12
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.000060)	ND(0.000010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	-	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	6.73	6.53	-	4.68	7.82	14.5	7.65	10.9	4.86
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Manganese (dissolved)	mg/L	3.08	3.26	-	2.50	2.45	5.33	3.60	3.86	2.94
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0061	0.0066	-	0.0144	0.0339	0.0156	0.0073	0.0204	0.00850
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	-	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Potassium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Selenium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Silicon (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Silver (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Sodium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Strontium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Thallium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Tin (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Titanium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Tungsten (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Uranium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Vanadium (dissolved)	mg/L	-	-	-	-	-	--	-	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)
Zirconium (dissolved)	mg/L	-	-	-	-	-	--	--	-	--
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	--	-	-	--
Alkalinity, carbonate	mg/L	-	-	-	-	-	--	-	-	--
Alkalinity, hydroxide	mg/L	-	-	-	-	-	--	-	-	--
Alkalinity, total (as CaCO3)	mg/L	880	-	742 J	573 J	445	446	517	596	504
Ammonia-N	mg/L	36.4	30.4	-	26.6 J	9.91	3.11	22.1	34.2	25.5
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	--	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	ND(43)	41	-	34 J	33	65	34	45	32
Chloride	mg/L	209	-	231 J	207 J	244	1160	174	693	185
Color (apparent)	color unit	163 J	-	269 J	102 J	101	-	-	-	-
Color (apparent)	TCU	-	-	-	-	-	74.4	34.2	181	151
Conductivity	umho/cm	-	-	-	-	-	--	-	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	7.5	7.1	-	8.4 J	9.2	5.4	7.7	8.5	7.8
Escherichia coli	cfu/100mL	0	0	-	0 J	0	ND(0)	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	-	1 J	0	ND(0)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	-	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.050)
Petroleum Products	mg/L	-	-	-	-	-	--	-	-	--
pH, lab	s.u.	7.31	-	7.52 J	7.45 J	7.46	7.37	7.75	7.51	7.62
Phenol	mg/L	0.0076	0.0011	-	0.0011 J	0.0010	ND(0.0015)	0.0035	ND(0.00022)	0.00016
Phosphorus	mg/L	0.183	0.198	-	0.161 J	0.105	0.912	0.355	0.131	0.133
Sulfate	mg/L	297	-	421 J	411 J	172	227	980	505	675
Total coliform bacteria	cfu/100mL	0	0	-	2 J	0	96	ND(100)	100	0
Total dissolved solids (TDS)	mg/L	1480	-	1640 J	1420 J	1130	3470	1580	2300	1710
Total kjeldahl nitrogen (TKN)	mg/L	26.9	26.0	-	25.9 J	9.21	9.19	37.8	26.3	26.3
Total suspended solids (TSS)	mg/L	21.5	-	17.6 J	9.6 J	20.8	1020	530	25.3	10.6
Turbidity	NTU	87.0	51.0	-	48.7 J	11.6	43.0	47.0	130	63.3
Un-ionized ammonia	mg/L	-	-	-	-	-	0.0307	0.203	0.292	0.923
Field Parameters										
Conductivity, field	mS/cm	2.57	2.86	2.86	2.57	1.107	2.879	2.49	2.84	2.54
Dissolved oxygen (DO), field	mg/L	4.86	0	0	1.06	3.93	--	-	5.44	0.1
Oxidation reduction potential (ORP), field	millivolts	-132	-168	-140	-139	-53	--	-	-125	-144
pH, field	s.u.	7.15 D 7.15	7.31	7.4	8.53	6.92	7.36	7.39	7.35	8.06
Temperature, field	Deg C	9.9 D 9.86	9.44	9.5	19.38	10.56	3.89	11.54	22.72	15.28
Turbidity, field	NTU	22.9	5.7	52.2	44	-	--	294	173	4.3
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	ug/L	120	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	ND(100)	ND(100)	-	ND(100) J	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	510	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	500	-	--	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)	ND(250)	-	ND(250) J	ND(250)	1500	530	ND(250)	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-09	MW5-99	MW5-99	MW5-09	MW5-99	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:		GW-45804-042114-TS-006	GW-45804-052914-MB-012	GW-45804-053014-MB-012	GW-45804-082114-TS-006	GW-45804-112614-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TS-004	GW-45804-081215-TS-006	GW-45804-111015-TS-007
Sample Date:		4/21/2014	5/29/2014	5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015
		Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	ug/L	-	-	-	-	-	--	--	-	--
Total Petroleum Hydrocarbons (C10-C16)	ug/L	-	-	-	-	-	--	--	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L	-	-	-	-	-	--	--	-	--
Total Petroleum Hydrocarbons (C6-C50)	ug/L	ND(380)	ND(380)	-	ND(350) J	ND(360)	2010	530	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	ug/L	-	-	-	-	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	ug/L	-	-	-	-	-	--	--	--	ND(250)
Semi-Volatiles										
1+2-Methylnaphthalene	ug/L	-	-	-	-	-	--	--	--	--
1-Methylnaphthalene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
1-Methylnaphthalene/2-Methylnaphthalene	ug/L	-	-	-	-	-	--	--	-	--
2-Methylnaphthalene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Acenaphthene	ug/L	0.184	--	-	-	--	--	--	-	--
Acenaphthylene	ug/L	ND(0.197)	--	-	-	--	--	--	-	--
Acridine	ug/L	ND(4.0)	-	-	-	-	--	--	-	--
Anthracene	ug/L	ND(0.020)	ND(0.020)	-	ND(0.020) J	ND(0.020)	ND(0.20)	0.047	ND(0.020)	ND(0.020)
Benzo(a)anthracene	ug/L	ND(0.020)	-	-	--	-	--	--	--	--
Benzo(a)pyrene	ug/L	ND(0.0050)	ND(0.0050)	-	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	ug/L	ND(0.020)	-	-	--	-	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	ug/L	-	-	-	--	-	--	--	--	--
Benzo(b)quinoline (Quinoline)	ug/L	ND(0.040)	-	-	-	-	--	--	-	--
Benzo(g,h,i)perylene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Benzo(k)fluoranthene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Carcinogenic potency equivalent	ug/L	ND(0.050)	--	-	-	--	--	--	-	--
Chrysene	ug/L	ND(0.020)	--	-	-	--	--	--	-	--
Dibenz(a,h)anthracene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Fluoranthene	ug/L	0.121	-	-	-	-	--	--	-	--
Fluorene	ug/L	0.043	-	-	-	-	--	--	-	--
Indeno(1,2,3-cd)pyrene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Naphthalene	ug/L	ND(0.050)	-	-	-	-	--	--	-	--
Phenanthrene	ug/L	ND(0.020)	-	-	-	-	--	--	-	--
Pyrene	ug/L	0.079	-	-	-	-	--	--	-	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011408-MW-001	GW-45804-051016-MW-006	GW-45804-081910-MW1-003	GW-45804-110210-TS-004	GW-45804-021511-MW-004	GW-45804-051711-MWD-005	GW-45804-081611-TS-004	GW-45804-110911-TS-005
Sample Date:		1/14/2016	5/12/2016	8/19/2016	11/2/2016	2/15/2011	5/17/2011	8/16/2011	11/10/2011
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0617	0.0032	0.0098	0.0101	0.0196	ND(0.010)	0.0026
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.069	ND(0.050)	0.179	0.252	ND(0.050)	0.058	2.89	0.154
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	98.1	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	0.462	0.570	0.858	1.61	0.797	1.50	1.66	1.11
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	0.0033	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	0.190	0.0074	0.0256	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	175	631	442	510	499	563	452	477
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	19.5	22.2	99.1	15.8	23.0
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	6.5	40.6	2.5	12.6
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-
Chloride	mg/L	29.7	38.8	93.4	166	63.7	82.1	67.6	74.1
Color (apparent)	TCU	61	161	53.2	187	239	102	114	17.0
Conductivity	umho/cm	1930	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	286	9.0	99.0	16.7	25.9	9.3	7.7
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2
Fecal coliform bacteria	cfu/100mL	0	50	90	5000	80	150	20	10
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-
Petroleum Products	s.u.	7.90	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570	0.127	0.134
Sulfide	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	0	80	350	18000	13700	1510	290	210
Total dissolved solids (TDS)	mg/L	1720	1990	1700	1640	1330	2290	1660	1610
Total Kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-
Turbidity	NTU	1.06	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0645	0.0623	0.0355
Field Parameters									
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	-	-	0	2.48
Oxidation reduction potential (ORP), field	millivolts	23	-341	-268	-292	-333	-	-279	-238
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.25	6.99	6.97
Temperature, field	Deg C	4.8	14.07	22.3	17.3	11.0	15.99	21.7	17.5
Turbidity, field	NTU	185	-	-	-	-	-	188	15.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011408-MW-001	GW-45804-051018-MW-006	GW-45804-081910-MW1-003	GW-45804-110210-TS-004	GW-45804-021511-MW-004	GW-45804-051711-MWD-008	GW-45804-081611-TS-004	GW-45804-110911-TS-008
Sample Date:		1/14/2016	5/18/2016	8/19/2016	11/2/2016	2/15/2011	5/17/2011	8/16/2011	11/10/2011
		Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***								
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-08	MW101-09	MW101-65	MW101-65	MW101-08	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-009	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***						
Metals							
Aluminum (dissolved)	mg/L	-	-	-	-	ND(0.10)	-
Antimony (dissolved)	mg/L	-	-	-	-	ND(0.050)	-
Arsenic (dissolved)	mg/L	0.0073	-	-	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	-	-	-	-	0.11	-
Beryllium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Bismuth (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Boron (dissolved)	mg/L	ND(0.050)	-	-	0.084	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	ND(0.00010)	-	-	ND(0.00010)	ND(0.00080)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	292	-
Chromium (dissolved)	mg/L	0.0026	-	-	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00080	-	-	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	-	-	1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	ND(0.0010)	-	-	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	-	-	-	-	88.9	-
Manganese (dissolved)	mg/L	0.535	-	-	1.21	1.12	1.17
Mercury (dissolved)	mg/L	ND(0.00010)	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0021	-	-	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	0.0041	-	-	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	-	-	-	-	ND(0.50)	-
Potassium (dissolved)	mg/L	-	-	-	-	24	-
Selenium (dissolved)	mg/L	-	-	-	-	ND(0.0040)	-
Silicon (dissolved)	mg/L	-	-	-	-	ND(10)	-
Silver (dissolved)	mg/L	-	-	-	-	ND(0.0010)	-
Sodium (dissolved)	mg/L	-	-	-	-	54.2	-
Strontium (dissolved)	mg/L	-	-	-	-	1.67	-
Thallium (dissolved)	mg/L	-	-	-	-	ND(0.0020)	-
Tin (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Titanium (dissolved)	mg/L	-	-	-	-	ND(0.020)	-
Tungsten (dissolved)	mg/L	-	-	-	-	ND(0.10)	-
Uranium (dissolved)	mg/L	-	-	-	-	ND(0.050)	-
Vanadium (dissolved)	mg/L	-	-	-	-	ND(0.010)	-
Zinc (dissolved)	mg/L	ND(0.0030)	-	-	0.0052	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	ND(0.040)	-
General Chemistry							
Alkalinity, bicarbonate	mg/L	-	-	-	-	442	-
Alkalinity, carbonate	mg/L	-	-	-	-	ND(10)	-
Alkalinity, hydroxide	mg/L	-	-	-	-	ND(10)	-
Alkalinity, total (as CaCO3)	mg/L	361	286	285	284	445	466
Ammonia-N	mg/L	98.9	10.6	10.6	7.89	106	30.4
Biochemical oxygen demand (carbonaceous)	mg/L	149	ND(2.8)	ND(2.8)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	524	-	-	11	42	114
Chloride	mg/L	-	92.9	95.9	106	87.3	157
Color (apparent)	TCU	310	61.2	48.9	60.4	34.4	169
Conductivity	umhos/cm	-	1810	1820	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	104	5.6	7.3	6.2	8.7	38.0
Escherichia coli	cfu/100mL	2870	28	41	1	30	19
Fecal coliform bacteria	cfu/100mL	150000	100 J	400 J	1	125	20
Nitrate (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	ND(2.0)	-	-	ND(0.20)	-	-
Petroleum Products	s.u.	7.95	7.37	7.74	7.37	7.75	7.82
Phenol	mg/L	0.0990	-	-	ND(0.0010)	0.0030	0.0260
Phosphorus	mg/L	1.36	0.150	0.143	0.079	0.310	0.138
Sulfide	mg/L	-	-	-	-	-	1060
Total coliform bacteria	cfu/100mL	98000	98000	98000	21	190	110
Total dissolved solids (TDS)	mg/L	1180	1560	1570	1530	1790	2240
Total kjeldahl nitrogen (TKN)	mg/L	127	-	-	9.54	110	40.6
Total suspended solids (TSS)	mg/L	10.0	-	-	6.8	7.2	17.0
Turbidity	NTU	200	7.00	6.50	13.0	2.80	53.0
Un-ionized ammonia	mg/L	-	0.000764	0.000763	-	-	0.668
Field Parameters							
Conductivity, field	mS/cm	2.52	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	-	-	-	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	-	-	-	123	-271	-546
pH, field	s.u.	6.9	6.39	6.39	6.6	8.2	7.70
Temperature, field	Deg C	11.87	13.3	13.3	15.79	24.2	16.5
Turbidity, field	NTU	50.3	169	169	52.3	4.3	9
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	49	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	110	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	110	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-55	MW101-55	MW101-09	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
		Original	Original	Duplicate	Original	Original	Original
Parameters:	***Units***						
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.029)	-
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-
Anthracene	µg/L	ND(0.020)	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	ND(0.010)	-	-	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Chrysene	µg/L	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	ND(0.053)	-
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-030520TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-WB-010
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]						
Metals								
Arsenic (dissolved)	mg/L	-	0.0045	0.0025	0.0012	0.0063	ND(0.0010)	0.0019
Boron (dissolved)	mg/L	-	0.076	0.116	0.158	0.150	0.151	0.112
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00227	0.00095	ND(0.00050)	0.00351	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0028	ND(0.0010)	0.0022	ND(0.0010)
Iron (dissolved)	mg/L	48.5	34.5	4.66	ND(0.050)	12.8	ND(0.050)	0.208
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	2.24	1.21	0.179	0.711	0.0299	0.530
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0543	0.0196	0.0177	0.0270	0.0150	0.0239
Nickel (dissolved)	mg/L	-	0.0030	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030
Zinc (dissolved)	mg/L	-	0.0095	0.0146	0.0074	0.0063	ND(0.0030)	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	633	362	484	409	667	476	480
Ammonia-N	mg/L	4.0	6.98	11.8	9.32	13.7	22.1	34.9
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2
Chemical oxygen demand (COD)	mg/L	-	74	27	30	55	ND(41)	14
Chloride	mg/L	-	157	141	135	164	194	140
Color (apparent)	color unit	-	-	-	-	-	16.8 J	15.9
Color (apparent)	TCU	-	75.5	29.9 J	8.2	121	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	14.8	ND(7.8)	5.8	13.0	5.4	3.6
Escherichia coli	cfu/100mL	25.6	ND(2)	ND(2)	ND(2)	ND(2)	50	0
Fecal coliform bacteria	cfu/100mL	-	ND(2) J	ND(2)	2	ND(2)	50	0
Nitrate (as N)	mg/L	1.5	0.21	5.82	2.15	0.18	0.84	0.84
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	-	7.38	7.82	7.20	7.37	7.23	7.42
Phenol	mg/L	-	ND(0.0010)	ND(0.0080)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)
Phosphorus	mg/L	7.2	0.097	0.218	ND(0.030)	1.13	ND(0.030)	0.032
Sulfate	mg/L	-	1060	797	867	886	887	834
Total coliform bacteria	cfu/100mL	-	2	30	300	200	4200	50
Total dissolved solids (TDS)	mg/L	-	2160	1860	1860	1910	2040	1840
Total Kjeldahl nitrogen (TKN)	mg/L	-	11.4	13.5	9.62	14.3	23.0	31.9
Total suspended solids (TSS)	mg/L	-	153	386	10.0	226	5.8	3.6
Turbidity	NTU	-	356	22.0	0.71	65.3	13.8	0.95
Un-ionized ammonia	mg/L	-	0.00228	0.00241	0.00211	0.00858	0.0436	0.152
Field Parameters								
Conductivity, field	mS/cm	-	2.89	2.62	2.37	2.67	3.09	2.82
Dissolved oxygen (DO), field	mg/L	-	3.22	2.93	3.73	8.15	3.7	0.61
Oxidation reduction potential (ORP), field	millivolts	-	-73	-	38	-	59	-62
pH, field	s.u.	-	6.32	5.74	5.60	6.26	7.0 7.00	7.06
Temperature, field	Deg C	-	5.4	18.5	22.32 D 22.3	15.5	8.31 D 8.3	17.67
Turbidity, field	NTU	-	329	97.5	24	73.9	38.5	37.5
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	360	ND(250)	2130	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	350	ND(250)	2110	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	920	ND(250)	7090	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	51400	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	1280	ND(250)	9210	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C15)	µg/L	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-030513-TS-006	GW-45804-052313-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052914-WS-010
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014
			Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]						
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Aniline	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	0.048	0.59	ND(0.020)	0.67	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	-	0.097	1.26	0.0179	1.74	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.045)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW105-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-061315-TS-008	GW-45804-110815-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	6/13/2015	11/8/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***							
Metals								
Arsenic (dissolved)	mg/L	0.0136	0.0146	0.0067	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	0.161	0.157	0.079	ND(0.10)	0.13	0.17	0.12
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00186	0.00174	0.00095	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	4.76	4.85	10.7	11.2	ND(0.50)	1.23	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	1.18	1.23	1.62	2.02	0.888	1.41	0.0538
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000014	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0263	0.0281	0.0161	0.0090	0.0071	0.0135	0.0148
Nickel (dissolved)	mg/L	0.0045	0.0050	ND(0.0020)	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.0030)	0.0052	0.0111	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	507 J	519 J	485	434	307	451	367
Ammonia-N	mg/L	25.9 J	25.7 J	19.5	19.2	ND(0.450)	24.3	1.38
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	33 J	32 J	26	41	18	25	15
Chloride	mg/L	114 J	115 J	111	133	137	185	136
Color (apparent)	color unit	39.4 J	35.6 J	101	--	--	--	--
Color (apparent)	TCU	--	--	--	127	9.4	76.7	8.8
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.8 J	5.8 J	6.7	5.1	4.3	6.3	5.0
Escherichia coli	ctu/100mL	0 J	0 J	0	ND(2)	0	0	0
Fecal coliform bacteria	ctu/100mL	0 J	0 J	0	ND(2)	0	0	0
Nitrate (as N)	mg/L	0.31 J	0.34 J	ND(0.50)	2.01	11.6	0.17	5.58
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.50)	0.111	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.15 J	7.15 J	7.88	7.64	7.47	7.77	7.28
Phenol	mg/L	ND(0.0010) J	ND(0.0010) J	ND(0.0010)	ND(0.0034)	ND(0.0027	0.0017	ND(0.0010)
Phosphorous	mg/L	0.066 J	0.062 J	0.151	1.47	ND(0.032)	0.046	ND(0.030)
Sulfate	mg/L	592 J	586 J	695	1000	1010	769	705
Total coliform bacteria	ctu/100mL	0 J	0 J	1	4	20	20	15
Total dissolved solids (TDS)	mg/L	1430 J	1410 J	1560	1960	1920	1630	1520
Total kjeldahl nitrogen (TKN)	mg/L	28.1 J	26.9 J	21.7	17.2	0.39	5.49	1.88
Total suspended solids (TSS)	mg/L	15.2 J	10.4 J	230	2630	5.8	26.3	6.4
Turbidity	NTU	21.7 J	16.3 J	43.0	40.1	ND(1.34)	3.88	4.34
Un-ionized ammonia	mg/L	1.50 J	1.49 J	0.0884	0.0681	0.00109	0.164	0.0147
Field Parameters								
Conductivity, field	mS/cm	2.46	2.46	1.4	1.661	2.51	2.65	2.03
Dissolved oxygen (DO), field	mg/L	0.36	0.36	4.14	--	2.12	1.35	0
Oxidation reduction potential (ORP), field	millivolts	-96	-96	-75	--	247	-90	14
pH, field	s.u.	8.02	8.02	7.07	7.46	6.83	7.55	7.59
Temperature, field	Deg C	22.61	22.61	13.19	5.94	16.38	19.45	15.25
Turbidity, field	NTU	16.2	16.2	-	--	0	16.4	4.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100) J	ND(100) J	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250) J	ND(250) J	ND(250)	1330	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250) J	ND(250) J	ND(250)	1310	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(250) J	290	4490	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380) J	ND(380) J	ND(380)	5920	ND(399)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	ND(100)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004	GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-008	GW-45804-110915-TS-011
Sample Date:		8/21/2014	8/21/2014	11/25/2014	4/8/2015	5/28/2015	8/13/2015	11/9/2015
		Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***							
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	--	ND(250)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--	--
Acridine	µg/L	-	-	-	--	--	--	--
Anthracene	µg/L	ND(0.020) J	ND(0.020) J	0.026	0.83	ND(0.020)	0.020	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050) J	ND(0.0050) J	0.0063	2.26	0.0072	0.0264	0.0117
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	-	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	-	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--	--
Chrysene	µg/L	-	-	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--	--
Fluorene	µg/L	-	-	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--	--
Pyrene	µg/L	-	-	-	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-051310-TS-003	GW-45804-051810-WS-002	GW-45804-081910-MW0-004	GW-45804-110216-TS-005	GW-45804-021511-MW-001	GW-45804-021511-MW-002	GW-45804-051611-MW0-001	GW-45804-051611-MW0-002
Sample Date:			5/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	***Units***	***TLP***[1]								
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	48.3	10.0	6.20	17.3	15.9	24.0	24.7	10.5	10.4
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Magnesium (dissolved)	mg/L	-	77.4	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	2.41	1.95	2.06	2.14	3.30	3.30	4.01	4.02
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	0.037	0.059	0.058	0.055	0.026	0.024	0.0249	0.0252
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	633	530	230	444	428	696	710	277	261
Ammonia-N	mg/L	4.0	0.952	1.12	1.82	0.823	0.931	0.832	0.935	1.06
Biochemical oxygen demand (carbonaceous)	mg/L	-	3.0	NO(2.0)	NO(2.0)	ND(2.0)	2.5	ND(2.0)	NO(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	58.1	106	58.1	71.8	78.7	78.5	107	105
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	36.8	51.3	31.2	36.2	87.4	88.5	39.3	39.1
Conductivity	umhos/cm	-	1800	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.4	7.7	13.0	10.8	14.9	15.2	10.5	10.6
Escherichia coli	cfu/100mL	25.5	0	0	0	ND(2)	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	1	0	0	ND(2)	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	7.77	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	1.36	4.30	1.94	2.81	0.628	0.701	1.09	0.400
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	2	0	30	10	0	0	1	1
Total dissolved solids (TDS)	mg/L	-	1340	1260	1350	1260	1190	1200	1820	1890
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	4.90	-	-	-	-	-	-	-
Un-ionized Ammonia	mg/L	-	0.000325	0.00324	0.00102	0.000267	0.000218	0.000195	0.0000310	0.000103
Field Parameters										
Conductivity, field	mS/cm	-	2.3	1.87	1.54	2.07	2.35	2.35	2.79	2.79
Dissolved oxygen (DO), field	mg/L	-	-	-	-	3	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-125	-130	-130	-	-
pH, field	s.u.	-	6.22	7.11	6.09	5.89	6.20	6.20	5.73	5.73
Temperature, field	Deg C	-	8.8	9.9	19.3	15.0	4.7	4.7	7.21	7.21
Turbidity, field	NTU	-	>5	-	-	-	-	-	427	427
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	3300	2900	750	480	ND(250)	470	ND(2500)	ND(2500)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	14300	13900	3120	1860	630	1800	4200	ND(2500)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-WS-002	GW-45804-081910-MW0-004	GW-45804-110216-TS-005	GW-45804-021611-MB-001	GW-45804-021611-MB-002	GW-45804-051611-MW0-001	GW-45804-051611-MW0-002
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010	2/16/2011	2/16/2011	5/16/2011	5/16/2011
			Original	Original	Original	Original	Original	Duplicate	Original	Duplicate
Parameters:	***Units***	***TLP***[1]								
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	46900	52900	8800	5900	-	5800	12300	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(1000)	ND(1000)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	17600	16800	3670	2340	630	2270	4200	ND(2500)
Total Petroleum Hydrocarbons (C18-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	ND(0.26)	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	ND(0.20)	ND(0.20)	0.098	0.031	0.069	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	0.44	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	0.509	0.082	0.252	0.113	0.232	0.0141	0.0021
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	0.39	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	0.48	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	0.42	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	0.59	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	1.41	-	-	-	-	-	-
Fluorene	µg/L	-	-	ND(0.20)	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	0.36	-	-	-	-	-	-
Naphthalene	µg/L	-	-	0.22	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	0.91	-	-	-	-	-	-
Pyrene	µg/L	-	-	1.32	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-022512-MB-001	GW-45804-032412-MB-004	GW-45804-032412-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	***Units***								
Metals									
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	-	-
Antimony (dissolved)	mg/L	-	-	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	0.0067	0.0042	-	-	0.0047	-	-
Barium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	-	-
Boron (dissolved)	mg/L	-	-	ND(0.050)	-	-	0.056	-	-
Cadmium (dissolved)	mg/L	ND(0.0010)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00010)	-	-
Calcium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Chromium (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Cobalt (dissolved)	mg/L	-	-	ND(0.00050)	-	-	ND(0.00050)	-	-
Copper (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Iron (dissolved)	mg/L	8.84	7.95	10.3	-	-	9.57	-	-
Lead (dissolved)	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	3.37	2.58	3.73	-	-	3.47	-	-
Mercury (dissolved)	mg/L	-	-	ND(0.00010)	-	-	ND(0.00010)	-	-
Molybdenum (dissolved)	mg/L	0.051	0.0259	0.0119	-	-	0.0188	-	-
Nickel (dissolved)	mg/L	-	-	ND(0.0020)	-	-	ND(0.0020)	-	-
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	-	-
Potassium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Selenium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silicon (dissolved)	mg/L	-	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	-	-	-	-	-
Sodium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Strontium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Thallium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tin (dissolved)	mg/L	-	-	-	-	-	-	-	-
Titanium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	-	-
Uranium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.0030)	ND(0.0030)	-	-	ND(0.0030)	-	-
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	380	465	511	426	-	364	-	-
Ammonia-N	mg/L	3.17	3.16	4.05	2.58	2.74	3.74	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	5.5	5.2	ND(3.0)	-	3.3	-	-
Chemical oxygen demand (COD)	mg/L	-	-	48	-	-	36	-	-
Chloride	mg/L	141	112	-	173	-	152	-	-
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	44.4	30.2	43.2	23.3	-	-	158	112
Conductivity	umhos/cm	-	-	-	1950	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	18.5	13.1	11.3	-	11.0	-	-
Escherichia coli	cfu/100mL	0	ND(2)	0	0	0	-	0	0
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0 J	0 J	-	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.5)	-	ND(0.10)	-	-
Petroleum Products	mg/L	-	-	ND(1.0)	-	-	-	-	-
pH, lab	s.u.	-	-	7.60	7.08	-	7.59	-	-
Phenol	mg/L	-	-	ND(0.0010)	-	-	ND(0.0010)	-	-
Phosphorus	mg/L	0.511	0.710	0.475	0.592	-	0.321	-	-
Sulfide	mg/L	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	1	2	2	0	0	-	2	4
Total dissolved solids (TDS)	mg/L	1580	1580	1580	1510	-	1620	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	5.55	-	-	5.33	-	-
Total suspended solids (TSS)	mg/L	-	-	465	-	-	567	-	-
Turbidity	NTU	-	-	162	27.0	-	-	58.0 J	23.0 J
Un-ionized Ammonia	mg/L	0.0329	0.0184	-	0.0000556	0.0000580	-	-	-
Field Parameters									
Conductivity, field	mS/cm	2.26	2.39	2.36	2.46	2.45	2.34	2.3	-
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	-	-	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-	-
pH, field	s.u.	7.34	7.29	5.9	5.09	5.09	6.46	6.29	-
Temperature, field	Deg C	19.9	13.7	4.65	6.8	8.8	10.77	11.08	-
Turbidity, field	NTU	-	661	-5	-5	-5	-	-	-
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(25)	ND(100)	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	290	ND(250)	ND(250)	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	290	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	520	1130	450	690	-	ND(250)	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-081611-TS-003	GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-002	GW-45804-052312-MB-003
Sample Date:		8/16/2011	11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012
		Original	Original	Original	Original	Original	Original	Original	Duplicate
Parameters:	***Units***								
Petroleum Hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	3400	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	520	1420	450	880	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-
Anthracene	µg/L	0.033	0.021	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.135	0.0923	0.014	-	-	0.0299	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-
Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-08-08-12-MW-002	GW-45804-08-08-12-MW-003	GW-45804-111212-MW-004	GW-45804-111212-MW-005	GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-005
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***								
Metals									
Aluminum (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Antimony (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	0.00aa	0.0044	0.0020	0.0035	0.0034	0.0071
Barium (dissolved)	mg/L	0.13	0.13	-	-	-	-	-	-
Beryllium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Bismuth (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Boron (dissolved)	mg/L	ND(0.50)	ND(0.50)	0.068	0.065	ND(0.050)	0.059	0.067	0.076
Cadmium (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Calcium (dissolved)	mg/L	282	273	-	-	-	-	-	-
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.00087	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	8.33	8.05	5.48	4.85	9.39	8.87	8.75	5.33
Lead (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	70.1	68.8	-	-	-	-	-	-
Manganese (dissolved)	mg/L	2.83	2.75	1.99	2.10	4.08	4.27	4.50	3.20
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.024	0.024	0.0115	0.0127	0.0085	0.0130	0.0130	0.0191
Nickel (dissolved)	mg/L	ND(0.020)	ND(0.020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	ND(0.50)	ND(0.50)	-	-	-	-	-	-
Potassium (dissolved)	mg/L	24	23	-	-	-	-	-	-
Selenium (dissolved)	mg/L	ND(0.0040)	ND(0.0040)	-	-	-	-	-	-
Silicon (dissolved)	mg/L	15	15	-	-	-	-	-	-
Silver (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	-	-	-	-	-	-
Sodium (dissolved)	mg/L	79.1	78.5	-	-	-	-	-	-
Strontium (dissolved)	mg/L	2.74	2.69	-	-	-	-	-	-
Thallium (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	-	-	-	-	-	-
Tin (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Titanium (dissolved)	mg/L	ND(0.020)	ND(0.020)	-	-	-	-	-	-
Tungsten (dissolved)	mg/L	ND(0.10)	ND(0.10)	-	-	-	-	-	-
Uranium (dissolved)	mg/L	ND(0.050)	ND(0.050)	-	-	-	-	-	-
vanadium (dissolved)	mg/L	ND(0.010)	ND(0.010)	-	-	-	-	-	-
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	0.0044	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	ND(0.040)	ND(0.040)	-	-	-	-	-	-
General Chemistry									
Alkalinity, bicarbonate	mg/L	562	555	-	-	-	-	-	-
Alkalinity, carbonate	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, hydroxide	mg/L	ND(10)	ND(10)	-	-	-	-	-	-
Alkalinity, total (as CaCO3)	mg/L	567	560	535	528	476	398	401	447
Ammonia-N	mg/L	4.82	5.22	4.95	4.77	3.68	4.49	4.35	7.02
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	3.9 J	8.6 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	53	51	42 J	55 J	63	48	44	38 J
Chloride	mg/L	119	119	120	115	184	180	196	148
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	184	66.6	65.6 J	79.5 J	236	94.0	33.7	126
Conductivity	umho/cm	-	-	-	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	10.2	11.7	12.0	17.6	15.8	16.5	13.9
Escherichia coli	ctu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Fecal coliform bacteria	ctu/100mL	0	0	ND(2)	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)
Petroleum Products	mg/L	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.96	8.00	7.83	7.63	7.61	7.70	7.67	7.49
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0030	0.0030	ND(0.0010)
Phosphorus	mg/L	0.756	0.527	0.954	0.716	0.862	0.726	0.703	0.093
Sulfate	mg/L	-	-	435	430	587	682	689	662
Total coliform bacteria	ctu/100mL	0	0	20 J	ND(2) J	ND(2)	ND(100)	ND(100)	10
Total dissolved solids (TDS)	mg/L	1430	1410	1370	1360	1680	1660	1640	1760
Total kjeldahl nitrogen (TKN)	mg/L	6.61	6.74	6.21	5.74	5.26	5.52	5.98	6.98
Total suspended solids (TSS)	mg/L	484	594	466	773	2680	646	748	25.8
Turbidity	NTU	54.9	30.6	9.30 J	5.79 J	32.0	20.5 J	40.0 J	34.0
Un-ionized Ammonia	mg/L	-	-	0.0917	0.0883	0.0888	0.00156	0.00151	0.0151
Field Parameters									
Conductivity, field	mS/cm	1.82	-	2.29	-	2.47	-	2.38	2.32
Dissolved oxygen (DO), field	mg/L	8.1	-	8.24	-	8.86	-	5.54	5.45
Oxidation reduction potential (ORP), field	millivolts	-	-	-132	-	-	-	-131	-119
pH, field	s.u.	7.7	-	7.75	7.75	7.76	6.11	6.01	6.53
Temperature, field	Deg C	18.2a	-	15.1	15.1	8.8	12.3	12.3	20.7
Turbidity, field	NTU	8.92	-	840	-	-5	-	-5	0
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(25)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	480	520	630 J	ND(250) J	ND(630)	490	420	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-08-08-12-MW-002	GW-45804-08-08-12-MW-003	GW-45804-111212-MW-004	GW-45804-111212-MW-005	GW-45804-022713-TS-001	GW-45804-052213-TS-014	GW-45804-052213-TS-015	GW-45804-080713-TS-006
Sample Date:		8/8/2012	8/8/2012	11/12/2012	11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013
		Original	Duplicate	Original	Duplicate	Original	Duplicate	Original	Original
Parameters:	***Units***								
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	2500	ND(2500)	3000	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-	-
Total Petroleum Hydrocarbons (C9-C50)	µg/L	460	520	630 J	ND(250) J	ND(630)	460	420	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-
1-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.26)	ND(0.28)	ND(0.028)	ND(0.028)	-	-	-	-
2-Methylnaphthalene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acenaphthylene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	ND(4.0)	-
Anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.20)	ND(0.20)	0.036	0.037	-	0.033	0.022	-
Benzo(a)pyrene	µg/L	ND(0.10)	ND(0.10)	0.049	0.042	ND(0.10)	0.0342	0.0252	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.049	0.046	-	0.047	0.035	-
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	-	-
Benzo(h)quinoline (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	ND(0.20)	ND(0.20)	0.051	0.071	-	0.054	0.044	-
Benzo(k)fluoranthene	µg/L	ND(0.20)	ND(0.20)	0.033	0.034	-	0.026	0.024	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	ND(0.060)	-
Chrysene	µg/L	ND(0.20)	ND(0.20)	0.046	0.053	-	0.041	0.031	-
Dibenz(a,h)anthracene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	-
Fluoranthene	µg/L	ND(0.20)	0.34	0.129	0.145	-	0.104 J	0.080 J	-
Fluorene	µg/L	ND(0.20)	ND(0.20)	ND(0.020)	0.021	-	ND(0.13)	ND(0.097)	-
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.20)	ND(0.20)	0.025	0.032	-	0.029	0.024	-
Naphthalene	µg/L	ND(0.20)	ND(0.20)	0.034	0.034	-	0.036 J	0.033 J	-
Phenanthrene	µg/L	ND(0.20)	ND(0.20)	0.072 J	0.094 J	-	0.062	0.056	-
Pyrene	µg/L	ND(0.20)	0.36	0.154	0.178	-	0.131	0.101	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-99	MW102-99	MW102-99	MW102-99	MW102-99	MW102-99	MW102-99	MW102-99	MW102-99
Sample ID:		GW-45804-080713-TS-005	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040215-TS-004	GW-45804-052815-TS-006	GW-45804-080215-TS-004
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2013	11/25/2014	4/8/2015	5/28/2015	8/02/2015
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Metals										
Aluminum (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Antimony (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Arsenic (dissolved)	mg/L	0.0068	0.0029	0.0012	0.0024	0.0040	0.0017	VD(0.0010)	0.0018	ND(0.00010)
Barium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Beryllium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Bismuth (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Boron (dissolved)	mg/L	0.075	0.067	ND(0.050)	0.075	0.092	0.066	VD(0.050)	0.079	ND(0.010)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	VD(0.00010)	ND(0.00010)	ND(0.000010)
Calcium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Chromium (dissolved)	mg/L	0.0017	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	VD(0.0010)	ND(0.0010)	ND(0.00050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	VD(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	VD(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	5.90	6.07	5.19	5.82	5.81	5.12	10.7	9.11	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	VD(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Manganese (dissolved)	mg/L	3.20	3.74	4.90	5.02	3.17	3.31	3.97	4.47	ND(0.00050)
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	VD(0.00010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0199	0.0107	0.0049	0.0084	0.0151	0.0083	0.0022	0.0056	ND(0.000050)
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	VD(0.0020)	ND(0.0020)	ND(0.00050)
Phosphorus (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Potassium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Selenium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Silicon (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Silver (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Sodium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Strontium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Thallium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Tin (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Titanium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Tungsten (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Uranium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Vanadium (dissolved)	mg/L	-	-	-	-	-	-	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)	0.0070	VD(0.0030)	ND(0.0030)	0.0019
Zirconium (dissolved)	mg/L	-	-	-	-	-	-	--	--	-
General Chemistry										
Alkalinity, bicarbonate	mg/L	-	-	-	-	-	-	--	--	--
Alkalinity, carbonate	mg/L	-	-	-	-	-	-	--	--	--
Alkalinity, hydroxide	mg/L	-	-	-	-	-	-	--	--	--
Alkalinity, total (as CaCO3)	mg/L	446	511	474	475 J	534 J	545	522	489	ND(10)
Ammonia-N	mg/L	6.93	7.12	5.37	7.80 J	10.4 J	8.37	5.57	8.5	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	2.8	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	148 J	51	ND(58)	163 J	48 J	39	45	41	ND(10)
Chloride	mg/L	147	143	178	160 J	160 J	125	149	355	ND(0.50)
Color (apparent)	color unit	-	-	151 J	230 J	82.2 J	159	--	--	--
Color (apparent)	TCU	80.0	176	-	-	-	-	54.2	75.0	ND(1.0)
Conductivity	umho/cm	-	-	-	-	-	-	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	14.7	11.6	9.6	8.2 J	7.7 J	10.9	7.8	10.7	ND(1.0)
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	ND(2) J	0 J	0	ND(2)	0	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	VD(0.10)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	VD(0.050)	ND(0.050)	ND(0.010)
Petroleum Products	mg/L	-	-	-	-	-	-	--	--	--
pH, lab	s.u.	7.50	7.81	7.30	7.68 J	7.51 J	7.84	7.71	7.69	7.18
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0033	0.0019 J	0.0019 J	ND(0.0010)	VD(0.0029)	0.0027	0.0021
Phosphorus	mg/L	0.116	0.599	0.046	0.127 J	0.079 J	0.088	0.938	0.073	ND(0.030)
Sulfate	mg/L	575	546	477	564 J	457 J	425	405	579	ND(0.50)
Total coliform bacteria	cfu/100mL	10	ND(2)	0	ND(2) J	0 J	0	12	10	1
Total dissolved solids (TDS)	mg/L	1770	1560	1450	1510 J	1490 J	1360	1410	1600	ND(10)
Total kjeldahl nitrogen (TKN)	mg/L	7.01	7.89	6.21	7.43 J	9.80 J	9.06	6.99	11.6	ND(0.15)
Total suspended solids (TSS)	mg/L	23.6	905	24.5	39.0 J	12.0 J	16.4	1480	21.4	ND(2.0)
Turbidity	NTU	32.0	53.9	11.7	99.0 J	52.6 J	52.6	27.4	99.0	ND(0.10)
Un-ionized Ammonia	mg/L	0.0149	0.00316	0.0215	0.0364 J	1.00 J	0.0257	0.0261	0.0477	-
Field Parameters										
Conductivity, field	mS/cm	-	2.24	2.36	2.39	2.34	0.576	1.245	2.47	0.681
Dissolved oxygen (DO), field	mg/L	-	9.06	5.89	0	2.02	3.03	---	1.04	0.91
Oxidation reduction potential (ORP), field	millivolts	-	-	-146	-176	-154	-103	---	-66	-252
pH, field	s.u.	6.63	6.21	7.34 D 7.34	7.52	6.64	7.14	7.44	7.18	7.59
Temperature, field	Deg C	20.7	12.5	7.2 D 7.17	10.58	20.39	11.26	4.4	13.32	19.3
Turbidity, field	NTU	-	64	33.8	30.1	46.1	-	---	0	252
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	280	ND(250)	ND(250) J	ND(250) J	ND(250)	260	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	280	ND(250)	ND(250) J	ND(250) J	ND(250)	260	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1240	ND(250)	ND(250) J	ND(250) J	ND(250)	1290	ND(250)	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-080713-TS-006	GW-45804-111413-TS-010	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	GW-45804-112514-TS-009	GW-45804-040215-TS-004	GW-45804-052815-TS-006	GW-45804-080215-TS-004
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2013	11/25/2014	4/8/2015	5/28/2015	8/12/2015
		Duplicate	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***									
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1530	ND(380)	ND(380) J	ND(380) J	ND(380)	1540	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--	--	--
Semi-Volatiles										
1+2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	-
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acenaphthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acenaphthylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Acridine	µg/L	-	-	ND(4.0)	-	-	-	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.058	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	-	-	-	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	ND(0.050)	-	-	-	--	--	-
Chrysene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Fluorene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Naphthalene	µg/L	-	-	ND(0.050)	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**
Sample ID:		**GW-45804-111015-TS-017**
Sample Date:		**11/10/2015**
		Original
Parameters:	***Units***	
Metals		
Aluminum (dissolved)	mg/L	--
Antimony (dissolved)	mg/L	--
Arsenic (dissolved)	mg/L	0.0015
Barium (dissolved)	mg/L	--
Beryllium (dissolved)	mg/L	--
Bismuth (dissolved)	mg/L	--
Boron (dissolved)	mg/L	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)
Calcium (dissolved)	mg/L	--
Chromium (dissolved)	mg/L	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0020)
Iron (dissolved)	mg/L	5.82
Lead (dissolved)	mg/L	ND(0.00050)
Magnesium (dissolved)	mg/L	--
Manganese (dissolved)	mg/L	4.17
Mercury (dissolved)	mg/L	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00540
Nickel (dissolved)	mg/L	ND(0.0050)
Phosphorus (dissolved)	mg/L	--
Potassium (dissolved)	mg/L	--
Selenium (dissolved)	mg/L	--
Silicon (dissolved)	mg/L	--
Silver (dissolved)	mg/L	--
Sodium (dissolved)	mg/L	--
Strontium (dissolved)	mg/L	--
Thallium (dissolved)	mg/L	--
Tin (dissolved)	mg/L	--
Titanium (dissolved)	mg/L	--
Tungsten (dissolved)	mg/L	--
Uranium (dissolved)	mg/L	--
Vanadium (dissolved)	mg/L	--
Zinc (dissolved)	mg/L	ND(0.010)
Zirconium (dissolved)	mg/L	--
General Chemistry		
Alkalinity, bicarbonate	mg/L	--
Alkalinity, carbonate	mg/L	--
Alkalinity, hydroxide	mg/L	--
Alkalinity, total (as CaCO3)	mg/L	459
Ammonia-N	mg/L	3.35
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36
Chloride	mg/L	199
Color (apparent)	color unit	--
Color (apparent)	TCU	222
Conductivity	umhos/cm	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.5
Escherichia coli	cfu/100mL	0
Fecal coliform bacteria	cfu/100mL	0
Nitrate (as N)	mg/L	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)
Petroleum Products	mg/L	--
pH, lab	s.u.	7.70
Phenol	mg/L	0.0029
Phosphorus	mg/L	0.101
Sulfate	mg/L	680
Total coliform bacteria	cfu/100mL	0
Total dissolved solids (TDS)	mg/L	1690
Total kjeldahl nitrogen (TKN)	mg/L	6.47
Total suspended solids (TSS)	mg/L	16.2
Turbidity	NTU	86.2
Un-ionized Ammonia	mg/L	0.285
Field Parameters		
Conductivity, field	mS/cm	2.29
Dissolved oxygen (DO), field	mg/L	0.57
Oxidation reduction potential (ORP), field	millivolts	-167
pH, field	s.u.	8.11
Temperature, field	Deg C	13.66
Turbidity, field	NTU	2.3
Petroleum Products		
Petroleum hydrocarbons F1 (C6-C10)	ug/L	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	ug/L	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	ug/L	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	ug/L	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L	ND(250)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		**MW102-09**
Sample ID:		**GW-16004-111015-TS-017**
Sample Date:		**11/10/2015**
		Original
Parameters:	***Units***	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(350)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	ND(250)
Semi-Volatiles		
1+2-Methylnaphthalene	ug/L	--
1-Methylnaphthalene	µg/L	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--
2-Methylnaphthalene	µg/L	--
Acenaphthene	µg/L	--
Acenaphthylene	µg/L	--
Acridine	µg/L	--
Anthracene	µg/L	ND(0.020)
Benzo(a)anthracene	µg/L	--
Benzo(a)pyrene	ug/L	ND(0.0050)
Benzo(b)fluoranthene	ug/L	--
Benzo(b,j)fluoranthene/Benzo(j)fluoranthene	ug/L	--
Benzo(c)pyridine (Quinoline)	ug/L	--
Benzo(g,h,i)perylene	µg/L	--
Benzo(k)fluoranthene	µg/L	--
Carcinogenic potency equivalent	µg/L	--
Chrysene	µg/L	--
Dibenz(a,h)anthracene	µg/L	--
Fluoranthene	µg/L	--
Fluorene	µg/L	--
Indeno(1,2,3-cd)pyrene	µg/L	--
Naphthalene	ug/L	--
Phenanthrene	ug/L	--
Pyrene	ug/L	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-99	MW103-99	MW103-09
Sample ID:			GW-45804-051810-MBI-004	GW-45804-051810-MB-005	GW-45804-081910-MWBI-001	GW-45804-081910-MWBI-002	GW-45804-110210-TS-009	GW-45804-021611-MB-003	GW-45804-051611-MWD-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/16/2011	5/16/2011	8/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Metals										
Arsenic (dissolved)	mg/L	-	0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cadmium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	46.8	22.9	23.8	10.8	11.1	7.64	7.87	6.33	6.79
Lead (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Manganese (dissolved)	mg/L	17.1	8.78	7.90	7.77	7.70	5.83	8.44	4.06	4.36
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0062	ND(0.010)
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	-	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
		-								
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	533	264	266	186	192	152	189	202	190
Ammonia-N	mg/L	4.6	2.35	2.25	1.50	1.21	0.855	0.906	0.552	0.856
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-	-	-
Chloride	mg/L	-	107	106	78.7	78.4	40.1	44.3	58.9	90.8
Color (apparent)	color unit	-	-	-	-	-	-	-	-	-
Color (apparent)	TCU	-	83.8	97.8	520	498	367	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.0	8.9	8.7	10.2	8.6	10.9	9.0	11.2
Escherichia coli	cfu/100mL	25.6	0	0	0	0	0	0	0	1
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0	0	0	0	10
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	-	-	-	-	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-	-	-
Phosphorus	mg/L	7.2	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	0	0	0	0	1	0	10	20
Total dissolved solids (TDS)	mg/L	-	970	990	926	892	576	880	778	558
Total Kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-	-	-
Turbidity	NTU	-	-	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	-	0.00799	0.00789	0.00108	0.000871	0.000398	0.000132	0.000262	0.00404
Field Parameters										
Conductivity, field	mS/cm	-	1.423	1.423	0.99	0.96	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L	-	1.89	1.89	0	0	0	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-123	-123	-152	-152	-143	-128	-	-165
pH, field	s.u.	-	7.05	7.05	6.20	6.20	6.17	6.17	6.43	7.17
Temperature, field	Deg.C	-	13.82	13.82	19.2	19.2	14.3	4.7	6.86	18.1
Turbidity, field	NTU	-	-	-	-	-	-	-	14.5	89.1

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-99	MW103-99	MW103-99
Sample ID:			GW-45804-051810-MB1-004	GW-45804-051810-MB-005	GW-45804-081910-MW1-001	GW-45804-081910-MW1-002	GW-45804-110210-TS-009	GW-45804-021611-MB-003	GW-45804-051611-MW0-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/16/2011	5/16/2011	8/16/2011
			Original	Duplicate	Original	Duplicate	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-	-	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-MW311-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051612-MB-008	GW-45804-111212-MB-011	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/15/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
		Duplicate	Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***								
Metals									
Arsenic (dissolved)	mg/L	0.011	0.0092	-	0.0071	0.0087	0.0087	0.0074	0.0091
Boron (dissolved)	mg/L	-	-	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Caomium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.41	5.39	-	7.69	7.12	8.77	11.6	7.17
Lead (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.31	4.37	-	5.45	4.72	7.35	8.51	4.03
Mercury (dissolved)	mg/L	-	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0079	-	0.0049	0.0041	0.0063	0.0044	0.0090
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	-	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0056
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183	212	272	209	201
Ammonia-N	mg/L	0.555	0.508	0.517	0.642	0.814	0.939	1.08	1.11
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	26	30	45	44	36
Chloride	mg/L	51.0	38.9	37.7	-	81.5	62.4	111	92
Color (apparent)	color unit	-	-	-	-	-	-	-	-
Color (apparent)	TCU	289	103	75.3	14.2	277	322 J	75.9	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2	11.0	9.9	13.5	17.9
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite/Nitrate	mg/L	-	-	-	ND(1.0)	-	-	-	-
pH, lab	s.u.	-	-	-	7.61	7.67	7.74	7.60	7.52
Phenol	mg/L	-	-	-	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	ND(0.030)	0.046	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	-	-	-	-	-	328	278	317
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2	10
Total dissolved solids (TDS)	mg/L	564	546	546	612	748	860	900	794
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.47	1.61	1.66	2.08	1.66
Total suspended solids (TSS)	mg/L	-	-	-	13.0	7.0	15.0	32.0	14.0
Turbidity	NTU	-	-	-	77.0	81.0	8.50 J	106	59.0
Un-ionized ammonia	mg/L	0.00410	0.00166	0.00171	-	-	0.197	0.00556	0.000496
Field Parameters									
Conductivity, field	mS/cm	-	0.75	-	1.05	1.21	1	1.62	1.28
Dissolved oxygen (DO), field	mg/L	-	1.55	-	-	1.66	9.47	1.62	2.38
Oxidation reduction potential (ORP), field	millivolts	-	-153	-	-	-139	-119	-109	-
pH, field	s.u.	-	7.10	7.10	5.78	6.64	6.84	7.48	6.15
Temperature, field	Deg C	-	12.0	12.0	8	12.98	16.3	5.6	14.3
Turbidity, field	NTU	-	13.4	-	464	94.3	129	74.4	117

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MS-005	GW-45804-051612-MS-008	GW-45804-111212-MS-011	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/16/2012	11/12/2012	2/27/2013	5/22/2013
		Duplicate	Original	Duplicate	Original	Original	Original	Original	Original
Parameters:	***Units***								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-
Semi-Volatiles									
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.030
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	0.025
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	0.070
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	0.054
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-	0.022
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	ND(0.020)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052615-TS-002
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/26/2015
		Original	Original	Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	***Units***									
Metals										
Arsenic (dissolved)	mg/L	0.0102	0.0100	0.0031	0.0062	0.0101	0.0091	0.0063	0.0064	0.0067
Boron (dissolved)	mg/L	0.055	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00086	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0026	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.09	6.22	2.69	5.16	3.91	4.80	7.30	7.22	4.77
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.73	2.79	1.78	2.99	1.96	2.41	4.09	4.03	2.48
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0061	0.0052	0.0080	0.0042	0.0049	0.0047	0.0029	0.0029	0.0041
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.0038	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.0147	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	179	183	341	224 J	202 J	209	305	308	228
Ammonia-N	mg/L	1.28	0.674	0.667	1.30 J	1.49 J	1.33	0.969	1.03	1.01
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.5	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	27	62	ND(34)	54 J	30 J	30	29	25	32
Chloride	mg/L	66	61.9	71.1	67.2 J	62.7 J	52	84.7	87.7	78.5
Color (apparent)	color unit	-	-	559 J	269 J	138 J	203	-	-	-
Color (apparent)	TCU	208	60.0	-	-	-	-	132	133	225
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	9.3	7.7	5.8 J	11.3 J	9.3	7.0	7.0	11.6
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0 J	0 J	0	ND(2)	2	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0 J	1 J	0	ND(2)	ND(2)	2
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)
Nitrite/Nitrate	mg/L	-	-	-	-	-	-	-	-	-
pH, lab	s.u.	7.44	7.11	7.25	7.89 J	7.54 J	7.32	7.71	7.72	7.84
Phenol	mg/L	ND(0.0010)	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)	ND(0.0027)	ND(0.0025)	0.0034
Phosphorus	mg/L	ND(0.030)	1.54	ND(0.030)	0.043 J	ND(0.030) J	0.039	0.363	0.357	ND(0.030)
Sulfate	mg/L	195	171	272	193 J	109 J	126	174	185	90.1
Total coliform bacteria	cfu/100mL	100	7	7	0 J	7 J	300	178	128	50
Total dissolved solids (TDS)	mg/L	630	524	628	650 J	498 J	479	655	676	491
Total kjeldahl nitrogen (TKN)	mg/L	2.31	0.91	ND(1.57)	2.15 J	2.10 J	1.32	1.48	1.59	1.72
Total suspended solids (TSS)	mg/L	3.2	2750	53.5	4.0 J	ND(2.0) J	3.6	448	300	8.3
Turbidity	NTU	18.7	106	47.0	34.0 J	7.03 J	19.8	52.0	53.0	24.8
Un-ionized ammonia	mg/L	0.00423	0.000291	0.00164	0.00788 J	0.017 J	0.00646	0.0113	0.0127	0.00653
Field Parameters										
Conductivity, field	mS/cm	1.06	0.868	1.78	1.19	0.718	0.517	0.681	0.681	0.609
Dissolved oxygen (DO), field	mg/L	4.82	7.53	4.52	0	0.21	3.82	--	--	2.3
Oxidation reduction potential (ORP), field	millivolts	174	-	401	-154	-147	-96	--	--	-43
pH, field	s.u.	6.91	6.19	7.06 D 7.06	7.43	6.77	7.41	7.99	7.89	7.34
Temperature, field	Deg C	17.7	12.7	9.34 D 9.3	9.98	18.75	11.08	5.1	5.1	13.59
Turbidity, field	NTU	32.1	256	28.1	38.8	28.8	-	--	--	0

003738

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MS-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006	GW-45804-052615-TS-002
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015	5/26/2015
		Original	Original	Original	Original	Original	Original	Original	Duplicate	Original
Parameters:	***Units***									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)	960 J	370 J	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)	1260 J	ND(380) J	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--	--	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--	--	-
Semi-Volatiles										
1-Methylnaphthalene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	ND(0.020)	--	--	-	--	--	--
Acenaphthene	µg/L	-	-	0.037	--	--	-	--	--	--
Acenaphthylene	µg/L	-	-	ND(0.020)	--	--	-	--	--	--
Acridine	µg/L	-	-	ND(4.0)	--	--	-	--	--	--
Anthracene	µg/L	ND(0.020)	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.20)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.078	ND(0.050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	ND(0.040)	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	ND(0.060)	--	--	-	--	--	--
Chrysene	µg/L	-	-	ND(0.020)	--	--	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.020)	--	--	-	--	--	--
Fluoranthene	µg/L	-	-	ND(0.020)	--	--	-	--	--	--
Fluorene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	--
Naphthalene	µg/L	-	-	ND(0.050)	-	-	-	--	--	-
Phenanthrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-
Pyrene	µg/L	-	-	ND(0.020)	-	-	-	--	--	-

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09
Sample ID:		GW-45894-081315-TS-002	GW-45894-110915-TS-005
Sample Date:		8/13/2015	11/9/2015
		Original	Original
Parameters:	***Units***		
Metals			
Arsenic (dissolved)	mg/L	0.00806	0.00851
Boron (dissolved)	mg/L	0.045	0.042
Caomium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.00050)	0.00068
Cobalt (dissolved)	mg/L	0.00011	0.00013
Copper (dissolved)	mg/L	ND(0.00020)	ND(0.00020)
Iron (dissolved)	mg/L	4.92	4.74
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)
Manganese (dissolved)	mg/L	2.92	2.71
Mercury (dissolved)	mg/L	0.000013	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.00467	0.00378
Nickel (dissolved)	mg/L	0.00056	0.00052
Zinc (dissolved)	mg/L	0.0023	0.0016
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	262	254
Ammonia-N	mg/L	1.15	1.00
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	32	32
Chloride	mg/L	86.8	56.9
Color (apparent)	color unit		
Color (apparent)	TCU	247	207
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.9	10.1
Escherichia coli	cfu/100mL	12	0
Fecal coliform bacteria	cfu/100mL	40	0
Nitrate (as N)	mg/L	0.022	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.010)
Nitrite/Nitrate	mg/L	--	--
pH, lab	s.u.	7.93	7.58
Phenol	mg/L	0.0021	0.0036
Phosphorus	mg/L	ND(0.030)	0.048
Sulfate	mg/L	102	88.2
Total coliform bacteria	cfu/100mL	50	2
Total dissolved solids (TDS)	mg/L	565	374
Total Kjeldahl nitrogen (TKN)	mg/L	1.87	1.50
Total suspended solids (TSS)	mg/L	ND(2.0)	ND(2.0)
Turbidity	NTU	18.6	18.3
Un-ionized ammonia	mg/L	0.0170	0.0265
Field Parameters			
Conductivity, field	mS/cm	2.56	0.602
Dissolved oxygen (DO), field	mg/L	1.46	3.92
Oxidation reduction potential (ORP), field	millivolts	-179	-138
pH, field	s.u.	7.62	7.96
Temperature, field	Deg C	17.26	13.49
Turbidity, field	NTU	0	1.9

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09
Sample ID:		GW-45894-081315-TS-002	GW-45894-110916-TS-005
Sample Date:		8/13/2015	11/9/2015
		Original	Original
Parameters:	***Units***		
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	ND(250)
Semi-Volatiles			
1-Methylnaphthalene	µg/L	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--
2-Methylnaphthalene	µg/L	--	--
Acenaphthene	µg/L	--	--
Acenaphthylene	µg/L	--	--
Acridine	µg/L	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	--
Benzo(g,h,i)perylene	µg/L	-	--
Benzo(k)fluoranthene	µg/L	-	--
Carcinogenic potency equivalent	µg/L	--	--
Chrysene	µg/L	--	--
Dibenz(a,h)anthracene	µg/L	--	--
Fluoranthene	µg/L	--	--
Fluorene	µg/L	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	--
Naphthalene	µg/L	-	--
Phenanthrene	µg/L	-	--
Pyrene	µg/L	-	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030513-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915 TS-002	GW-45804-052815 TS-009
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015	5/28/2015
			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original
Parameters:	***Units***	***TLP***[1]										
Metals												
Arsenic (dissolved)	mg/L	-	0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	-	ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	0.068	0.100
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	0.00204	0.0026	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00129	ND(0.00050)
Copper (dissolved)	mg/L	-	0.0043	ND(0.009)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)	0.0020	0.0024
Iron (dissolved)	mg/L	46.3	0.932	19.4	23.5	4.96	4.62	12.2	15.6	2.74	0.765	0.101
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	1.82	19.4	17.5	7.70	5.35	13.3	14.6	11.5	3.45	0.548
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.186	0.0164	0.0172	0.0014	0.0232	0.0181	0.0139	0.0177	0.0136	0.0174
Nickel (dissolved)	mg/L	-	0.0073	ND(0.010)	0.0023	0.0102	0.0026	ND(0.010)	ND(0.010)	ND(0.010)	0.0027	0.0045
Zinc (dissolved)	mg/L	-	0.0043	ND(0.030)	0.0043	0.0035	0.0201	ND(0.030)	ND(0.030)	ND(0.030)	0.0040	ND(0.0030)
		-										
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	833	290	388	263	308	207	575	499 J	596	485	381
Ammonia-N	mg/L	4.0	7.45	4.65	8.87	14.3	4.80	13.2	11.2 J	7.20	7.33	1.93
Biochemical oxygen demand (carbonaceous)	mg/L	-	15.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	99	72	68	95	ND(54)	74	76 J	55	56	23
Chloride	mg/L	-	170	219	162	147	185	189	126 J	129	193	187
Color (apparent)	color unit	-	-	-	-	-	126 J	155 J	85.8 J	210	-	-
Color (apparent)	TCU	-	82.8	173 J	362	76.7	-	-	-	-	198	68.9
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	25.3	51.2	18.6	21.0	10.3	11.1	14.3 J	13.9	5.8	5.5
Escherichia coli	cfu/100mL	25.6	0	4	ND(2)	ND(2)	0	0	0 J	0	ND(2)	0
Fecal coliform bacteria	cfu/100mL	-	ND(0) J	6	10	ND(2)	0	0	0 J	0	ND(2)	0
Nitrate (as N)	mg/L	1.3	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)	0.37	2.53
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)	ND(0.10)	0.361
pH, lab	s.u.	-	7.86	7.73	7.50	7.57	7.55	7.56	7.34 J	7.52	7.48	7.71
Phenol	mg/L	-	0.0016	ND(0.0020)	ND(0.0080)	ND(0.0010)	0.0025	0.0117	ND(0.0010) J	ND(0.0010)	0.0022	0.0020
Phosphorus	mg/L	7.2	0.060	0.062	0.070	0.040	0.096	0.111	0.093 J	0.069	0.066	0.042
Sulfate	mg/L	-	995	531	800	713	452	507	335 J	512	646	583
Total coliform bacteria	cfu/100mL	-	100	1700	10400	10	1	0	ND(10) J	2	30 J	0
Total dissolved solids (TDS)	mg/L	-	1770	1800	2030	1600	1170	1580	1270 J	1470	1620	1470
Total kjeldahl nitrogen (TKN)	mg/L	-	9.95	6.55	8.80	14.8	5.67	13.6	15.0 J	9.81	8.06	2.12
Total suspended solids (TSS)	mg/L	-	72.0	78.0	106	564	32.0	202	647 J	61.0	1240	92.4
Turbidity	NTU	-	61.0	102	43.0	75.0	54.0	132	57.0 J	124	30.9	30.0
Un-ionized ammonia	mg/L	-	0.0198	0.0292	0.0214	0.0536	0.0281	0.101	0.856 J	0.0258	0.000644	0.0170
Field Parameters												
Conductivity, field	mS/cm	-	2.15	2.17	2.53	2.5	2.41	2.55	2.53	0.628	--	2.12
Dissolved oxygen (DO), field	mg/L	-	3.61	3.67	7.86	7.24	6.62	2	6.26	6.19	--	10.14
Oxidation reduction potential (ORP), field	millivolts	-	-176	-	-122	-	-118	-145	-134	-90	--	-26
pH, field	s.u.	-	7.14	7.26	6.85	7.12	7.08 D 7.40	7.3	6.13	7.15	5.58	7.38
Temperature, field	Deg C	-	9.0	17.3	21.59 D 21.6	13.1	9.32 D 10.5	17.06	22.81	11.56	7.4	18.43
Turbidity, field	NTU	-	76.4	150	150	104	148	444	684	-	--	152
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	810 J	ND(250)	300	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	420	560	ND(250)	ND(250)	800 J	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)	1110	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	-	-	-	-	-	-	-	12800 J	-	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3045 J	ND(380)	1410	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	--	--
Semi-Volatiles												
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-	-	-	--	--
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)	ND(0.20)	ND(0.020)
Benz(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Benzo(a)pyrene	µg/L	-	0.024	ND(0.0080)	0.0079	0.391	0.0212	0.0435	0.426 J	0.0183	0.011	0.0510
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	0.029	-	-	-	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-	-	-	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-	-	-	--	--
Chrysene	µg/L	-	-	-	-	-	0.023	-	-	-	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Fluoranthene	µg/L	-	-	-	-	-	0.041	-	-	-	--	--
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-	-	-	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030513-TS-007	GW-45804-052313-TS-002	GW-45804-080713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-MS-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002	GW-45804-052815-TS-009	
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015	5/28/2015	
			Original	Original	Original	Original	Original	Original	Original	Original	Original	Original	
Parameters:	***Units***	***TLP***[1]											
Naphthalene	ug/L	-	-	-	-	-	ND(0.050)	-	-	-	-	-	
Phenanthrene	ug/L	-	-	-	-	-	ND(0.020)	-	-	-	-	-	
Pyrene	ug/L	-	-	-	-	-	0.035	-	-	-	-	-	

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13
Sample ID:		GW-45804-081315-TS-007	GW-45804-111016-TS-003
Sample Date:		8/13/2015	11/10/2015
		Original	Original
Parameters:	***Units***		
Metals			
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0013
Boron (dissolved)	mg/L	0.11	0.13
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	0.0040	0.0032
Copper (dissolved)	mg/L	0.0107	ND(0.0030)
Iron (dissolved)	mg/L	9.28	7.79
Lead (dissolved)	mg/L	0.00056	ND(0.00050)
Manganese (dissolved)	mg/L	12.5	9.30
Mercury (dissolved)	mg/L	0.000023	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0172	0.0152
Nickel (dissolved)	mg/L	0.0060	ND(0.0050)
Zinc (dissolved)	mg/L	ND(0.010)	ND(0.010)
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	400	340
Ammonia-N	mg/L	[illegible]	6.36
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	47	41
Chloride	mg/L	114	66.1
Color (apparent)	color unit		
Color (apparent)	TCU	130	142
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	9.5
Escherichia coli	cfu/100mL	0	0
Fecal coliform bacteria	cfu/100mL	0	0
Nitrate (as N)	mg/L	[illegible]	0.93
Nitrite (as N)	mg/L	0.090	ND(0.050)
pH, lab	s.u.	7.90	7.78
Phenol	mg/L	0.0020	0.0032
Phosphorus	mg/L	0.041	0.066
Sulfate	mg/L	521	385
Total coliform bacteria	cfu/100mL	40	5
Total dissolved solids (TDS)	mg/L	1180	1130
Total kjeldahl nitrogen (TKN)	mg/L	10.9	5.80
Total suspended solids (TSS)	mg/L	35.0	52.0
Turbidity	NTU	0.07	68.1
Un-ionized ammonia	mg/L	0.256	0.190
Field Parameters			
Conductivity, field	mS/cm	1.46	1.82
Dissolved oxygen (DO), field	mg/L	0.17	3.54
Oxidation reduction potential (ORP), field	millivolts	-120	-136
pH, field	s.u.	7.58	8.15
Temperature, field	Deg C	17.46	10.0
Turbidity, field	NTU	280	89
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	ND(250)
Semi-Volatiles			
1-Methylnaphthalene	µg/L	--	--
2-Methylnaphthalene	µg/L	--	--
Acenaphthene	µg/L	--	--
Acenaphthylene	µg/L	--	--
Acridine	µg/L	--	--
Anthracene	µg/L	0.021	ND(0.020)
Benzo(a)anthracene	µg/L	--	--
Benzo(a)pyrene	µg/L	0.0199	0.0166
Benzo(b)fluoranthene	µg/L	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--
Benzo(g,h,i)perylene	µg/L	--	--
Benzo(k)fluoranthene	µg/L	--	--
Carcinogenic potency equivalent	µg/L	--	--
Chrysene	µg/L	--	--
Dibenz(a,h)anthracene	µg/L	--	--
Fluoranthene	µg/L	--	--
Fluorene	µg/L	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13
Sample ID:		GW-45804-081315-TS-007	GW-45804-111016-TS-003
Sample Date:		8/13/2015	11/10/2015
		Original	Original
Parameters:	***Units***		
Naphthalene	µg/L	-	--
Phenanthrene	µg/L	-	--
Pyrene	µg/L	-	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-0305201 3-TS-008	GW-45804-052513-TS-010	GW-45804-080713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-006
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	***Units***	***TLP***[1]										
Metals												
Arsenic (dissolved)	mg/L	-	0.0058	0.0142	0.0078	0.0029	0.0028	0.0092	0.0078	0.0049	0.0049	ND(0.0010)
Boron (dissolved)	mg/L	-	0.073	0.052	0.065	0.076	0.074	0.062	0.061	0.065	0.067	0.068
Cadmium (dissolved)	mg/L	-	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	46.5	2.09	6.31	4.56	2.07	2.11	0.216	0.212	0.665	0.695	0.286
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	17.1	0.487	0.850	0.630	0.512	0.518	0.443	0.413	0.443	0.532	0.568
Mercury (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	0.0090	0.0141	0.0106	0.0087	0.0086	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Nickel (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	-	ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0059	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
		-										
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	633	482	365	382	429	427	911	980	600	606	436 J
Ammonia-N	mg/L	4.0	34.3	22.3	28.2	25.5	27.2	76.0	75.5	57.8	57.8	16.3 J
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1	5.1	5.5	3.0 J
Chemical oxygen demand (COD)	mg/L	-	46	15	13	32	30	ND(54)	65	34	30	19 J
Chloride	mg/L	-	173	128	198	164	164	246	245	218	217	114 J
Color (apparent)	color unit	-	-	-	-	-	-	46.9 J	53.9 J	55.5 J	70.7 J	12.4 J
Color (apparent)	TCU	-	27.1	58.9 J	52.9	83.5	73.7	-	-	-	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	7.5	ND(5.2)	5.1	4.5	4.1	9.3	9.4	5.2	5.2	4.4 J
Escherichia coli	cfu/100mL	25.6	7	ND(2)	ND(2)	0	0	380	380	0	0	0 J
Fecal coliform bacteria	cfu/100mL	-	50 J	ND(2)	ND(2)	0	0	450	490	0	0	0 J
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.33 J	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
pH, lab	s.u.	-	7.82	7.75	7.41	7.54	7.51	7.25	7.26	7.55	7.55	7.41 J
Phenol	mg/L	-	ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0003	0.0003	0.0074	0.0056	0.0023 J
Phosphorus	mg/L	7.2	0.048	0.045	0.035	0.051	ND(0.030)	0.057	0.057	0.134	0.107	0.072 J
Sulfate	mg/L	-	970	963	1050	674	678	429	427	649	649	509 J
Total coliform bacteria	cfu/100mL	-	160	110	2	2	ND(10)	4400	4900	2	1	ND(10) J
Total dissolved solids (TDS)	mg/L	-	2100	1660	2140	1610	1600	1610	1600	1740	1730	1290 J
Total kjeldahl nitrogen (TKN)	mg/L	-	38.2	24.5	30.6	25.8	27.2	74.3	75.0	46.4	51.2	15.3 J
Total suspended solids (TSS)	mg/L	-	16.0	31.0	44.4	8.4	6.4	30.0 J	9.4 J	11.6 J	4.0 J	16.8 J
Turbidity	NTU	-	19.0	30.0	36.6	19.2	22.7	51.0	59.0	18.2	26.0	3.47 J
Un-ionized ammonia	mg/L	-	0.141	0.0793	0.0885	0.0298	0.0316	0.174	0.173	0.396	0.396	17.6 J
Field Parameters												
Conductivity, field	mS/cm	-	3.01	2.59	2.75	2.43	-	2.12	-	3.02	3.02	2.02
Dissolved oxygen (DO), field	mg/L	-	2.66	1.21	4.33	6.79	-	4.53	-	5.33	5.33	0.26
Oxidation reduction potential (ORP), field	millivolts	-	-215	-	-101	-	-	-73	-	-318	-318	-275
pH, field	s.u.	-	7.11	6.90	6.83	6.47	6.47	7.40 D 7.03	7.03	7.19	7.19	9.87
Temperature, field	Deg C	-	14.5	19.1	22.6 D 22.55	17.3	17.3	9.3 D 10.47	9.3	18.92	18.92	21.66
Turbidity, field	NTU	-	170	119	34.2	11.2	-	51.8	-	24.6	24.6	108

003746

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-030513-YS-008	GW-45804-052313-TS-010	GW-45804-080713-YS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-YS-006
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
			Original	Original	Original	Original	Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	***Units***	***TLP***[1]										
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330 J
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	550	ND(250)	560	ND(380)	ND(380)	ND(380)	ND(380)	ND(380) J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-	-	-	-	-
Semi-Volatiles												
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)	ND(4.0)	-	-	-
Anthracene	µg/L	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b,j,k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)	ND(0.040)	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)	ND(0.060)	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.050)	ND(0.050)	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)	ND(0.020)	-	-	-

003747

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-001	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Metals						
Arsenic (dissolved)	mg/L	0.0011	ND(0.0010)	ND(0.010)	0.0011	ND(0.0010)
Boron (dissolved)	mg/L	0.073	0.066	ND(0.10)	ND(0.10)	0.11
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00078	ND(0.0050)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	2.75	1.35	7.40	4.59	7.61
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.880	0.889	1.06	0.699	0.869
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0070	0.0161	0.0150	0.0146	0.0161
Nickel (dissolved)	mg/L	ND(0.0020)	0.0035	ND(0.010)	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	0.0211	ND(0.0030)	ND(0.030)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	406	270	288	323	379
Ammonia-N	mg/L	18.6	16.2	13.7	15.6	5.71
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	11	27	16	14	14
Chloride	mg/L	111	135	175	225	155
Color (apparent)	color unit	97.7				
Color (apparent)	TCU	-	21.4	40.9	133	94.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.2	2.6	3.6	4.4	4.5
Escherichia coli	cfu/100mL	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.78	7.76	7.53	7.85	7.48
Phenol	mg/L	ND(0.0001)	ND(0.0053)	0.0057	ND(0.0010)	0.0026
Phosphorus	mg/L	0.095	0.253	0.156	0.088	0.073
Sulfate	mg/L	738	1350	1360	1240	799
Total coliform bacteria	cfu/100mL	10	1730	2	100	1
Total dissolved solids (TDS)	mg/L	1480	2480	2200	2250	1530
Total kjeldahl nitrogen (TKN)	mg/L	20.7	15.5	14.9	13.8	5.81
Total suspended solids (TSS)	mg/L	21.3	402	293	16.0	15.0
Turbidity	NTU	20.9	5.71	21.0	17.0	110
Un-ionized ammonia	mg/L	0.0563	0.131	0.135	0.376	0.135
Field Parameters						
Conductivity, field	mS/cm	0.695	2.212	3.15	3.26	2.39
Dissolved oxygen (DO), field	mg/L	2.72	--	4.34	0.44	0.91
Oxidation reduction potential (ORP), field	millivolts	-71	--	-8	-142	-150
pH, field	s.u.	6.99	7.47	7.25	7.60	7.73
Temperature, field	Deg C	15.4	12.8	20.6	22.91	19.0
Turbidity, field	NTU	-	--	412	41.8	11.9

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804-040815-TS-001	GW-45804-052715-TS-010	GW-45804-081315-TS-001	GW-45804-110915-TS-006
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/13/2015	11/9/2015
		Original	Original	Original	Original	Original
Parameters:	***Units***					
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	ND(250)	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	--	ND(250)
Semi-Volatiles						
1-Methylnaphthalene	µg/L	-	--	--	--	--
2-Methylnaphthalene	µg/L	-	--	--	--	--
Acenaphthene	µg/L	-	--	--	--	--
Acenaphthylene	µg/L	-	--	--	--	--
Acridine	µg/L	-	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	--	--	--	--
Benzo(g,h,i)perylene	µg/L	-	--	--	--	--
Benzo(k)fluoranthene	µg/L	-	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	--	--	--	--
Chrysene	µg/L	-	--	--	--	--
Dibenz(a,h)anthracene	µg/L	-	--	--	--	--
Fluoranthene	µg/L	-	--	--	--	--
Fluorene	µg/L	-	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	--	--	--	--
Naphthalene	µg/L	-	--	--	--	--
Phenanthrene	µg/L	-	--	--	--	--
Pyrene	µg/L	-	--	--	--	--

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015
Sample Type:			Original	Original	Original	Duplicate
Parameters	**Units**	**TLP[1]**				
Metals						
Arsenic (dissolved)	mg/L	-	0.0011	0.00190	0.0012	0.0011
Boron (dissolved)	mg/L	-	0.095	0.165	0.18	0.18
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.00050)	0.00052	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0010)	0.00054	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	48.3	2.54	1.50	3.09	3.20
Lead (dissolved)	mg/L	-	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	2.44	1.35	1.59	1.62
Mercury (dissolved)	mg/L	-	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.0102	0.0164	0.0125	0.0127
Nickel (dissolved)	mg/L	-	ND(0.0020)	0.00205	ND(0.0050)	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.0030)	ND(0.0043)	ND(0.010)	ND(0.010)
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	423	449	461	469
Ammonia-N	mg/L	4.0	10.8	2.93	2.90	3.86
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	27	34	38	41
Chloride	mg/L	-	153	112	114	119
Color (apparent)	TCU	-	95.7	71.6	189	143
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.0	9.3	12.7	10.7
Escherichia coli	cfu/100mL	25.6	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	0	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	-	7.92	7.94	7.66	7.68
Phenol	mg/L	-	0.0060	ND(0.0017)	0.0024	0.0033
Phosphorus	mg/L	7.2	0.068	0.057	0.060	0.074
Sulfate	mg/L	-	709	423	444	479
Total coliform bacteria	cfu/100mL	-	0	ND(1)	0	0
Total dissolved solids (TDS)	mg/L	-	1370	1100	1170	1180
Total kjeldahl nitrogen (TKN)	mg/L	-	11.9	3.30	3.38	3.91
Total suspended solids (TSS)	mg/L	-	6.8	11.5	7.3	7.9
Turbidity	NTU	-	25.0	14.1	69.2	47.7
Un-ionized ammonia	mg/L	-	0.171	0.0516	0.0823	0.109

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-081215-TS-005	GW-45804-111015-TS-001	GW-45804-111015-TS-014
Sample Date:			5/28/2015	8/12/2015	11/10/2015	11/10/2015
Sample Type:			Original	Original	Original	Duplicate
Parameters	**Units**	**TLP[1]**				
Field Parameters						
Conductivity, field	mS/cm	-	2.07	3.92	1.32	1.32
Dissolved oxygen (DO), field	mg/L	-	1.98	0.51	3.12	3.12
Oxidation reduction potential (ORP), field	millivolts	-	43	-122	-134	-134
pH, field	s.u.	-	7.76	7.35	8.01	8.01
Temperature, field	Deg C	-	13.75	17.5	12.9	12.9
Turbidity, field	NTU	-	0	149	13.8	13.8
Petroleum Products						
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	540	420
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	540	420
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	540	420
Semi-Volatiles						
Anthracene	µg/L	-	ND(0.020)	0.021	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002
Sample Date:			8/13/2015	8/13/2015	11/10/2015
Sample Type:			Original	Duplicate	Original
Parameters	**Units**	**TLP[1]**			
Metals					
Arsenic (dissolved)	mg/L	-	0.0140	0.0138	ND(0.0010)
Boron (dissolved)	mg/L	-	0.23	0.24	0.11
Cadmium (dissolved)	mg/L	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	-	0.0321	0.0330	ND(0.0050)
Cobalt (dissolved)	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Iron (dissolved)	mg/L	48.3	0.45	0.40	0.19
Lead (dissolved)	mg/L	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Manganese (dissolved)	mg/L	17.1	4.52	4.57	1.04
Mercury (dissolved)	mg/L	-	0.000038 J	0.000018 J	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	0.00268	0.00206	0.00068
Nickel (dissolved)	mg/L	-	0.0075	0.0075	ND(0.0050)
Zinc (dissolved)	mg/L	-	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	1810	1820	436
Ammonia-N	mg/L	4.0	61.3	59.7	6.01
Biochemical oxygen demand (carbonaceous)	mg/L	-	1340	1380	4.3
Chemical oxygen demand (COD)	mg/L	-	2480	2840	38
Chloride	mg/L	-	483	480	162
Color (apparent)	TCU	-	1100	1110	119
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	965	1030	10.7
Escherichia coli	cfu/100mL	25.6	4000 J	4000 J	0
Fecal coliform bacteria	cfu/100mL	-	4000	4000	0
Nitrate (as N)	mg/L	1.3	ND(0.20)	ND(0.20)	ND(0.10)
Nitrite (as N)	mg/L	-	ND(0.10)	ND(0.10)	ND(0.050)
pH, lab	s.u.	-	7.11	7.15	7.52
Phenol	mg/L	-	1.07	1.07	0.0029
Phosphorus	mg/L	7.2	1.83	1.59	0.281
Sulfate	mg/L	-	399	391	848
Total coliform bacteria	cfu/100mL	-	100000	130000	40
Total dissolved solids (TDS)	mg/L	-	3800	3620	1630
Total kjeldahl nitrogen (TKN)	mg/L	-	85.7	86.1	7.98
Total suspended solids (TSS)	mg/L	-	12.3	15.6	64.1
Turbidity	NTU	-	463	418	81.3
Un-ionized ammonia	mg/L	-	0.108	--	0.292

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002
Sample Date:			8/13/2015	8/13/2015	11/10/2015
Sample Type:			Original	Duplicate	Original
Parameters	**Units**	**TLP[1]**			
Field Parameters					
Conductivity, field	mS/cm	-	5.44	5.44	2.48
Dissolved oxygen (DO), field	mg/L	-	1.37	1.37	3.33
Oxidation reduction potential (ORP), field	millivolts	-	-362	-362	-215
pH, field	s.u.	-	6.59	6.59	7.99
Temperature, field	Deg C	-	21.6	21.6	16.56
Turbidity, field	NTU	-	182	182	243
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	--	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	-	--	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)
Semi-Volatiles					
Anthracene	µg/L	-	ND(0.035)	ND(0.029)	ND(0.029)
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)

Table E.4.2

Unconfined Shallow Groundwater Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
▭ - Exceedence of the Tier I Trigger Level

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0010	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	-	0.00015	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	-	1.75	3.30	0.455
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	-	0.486	1.43	1.11
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	-	0.0438	0.0049	0.0058
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	-	0.0115	0.309	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	-	422	559	559
Ammonia-N	mg/L	-	-	0.2	-	0.245	0.252	0.219
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	-	73.6	333	164
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	-	27.2	122	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	-	4.5	8.0	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	-	ND(0.10)	ND(0.10)	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	-	ND(0.10)	ND(0.10)	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	-	0.033	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	-	808	1580	1360
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	-	0.0057	0.00152	0.00303
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.972	1.229	1.58	2.05
Dissolved oxygen (DO), field	mg/L	-	-	-	-	-	10.92	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	OG	-	6.68	8.02	7.41	7.76
Temperature, field	Deg C	15	AO	-	9.33	9.96	10.6	10.98
Turbidity, field	NTU	5	AO	-	125	-	-	16.5

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-011810-MB-001	GW-45804-051810-MB-003	GW-45804-110210-TS-008	GW-45804-051611-MMD-004
Sample Date:					1/18/2010	5/18/2010	11/2/2010	5/16/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	-	-	0.111	0.078
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	-	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	-	0.0016	0.0036
Iron (dissolved)	mg/L	0.3	AO	10.6	2.30	-	2.36	1.18
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.31	-	1.23	1.84
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0066	-	0.0030	0.0044
Nickel (dissolved)	mg/L	-	-	-	-	-	0.0036	0.0023
Zinc (dissolved)	mg/L	5	AO	-	0.0080	-	0.0285	0.0095
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	986	559	-	559	541
Ammonia-N	mg/L	-	-	0.2	**0.478**	-	**1.60**	**0.476**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	13	30
Chloride	mg/L	250	AO	-	109	-	-	140
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	7.6	-	84.6	33.2 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	6.9	-	5.0	5.3
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	-	0	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(10)	-	0	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	-	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	-	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	7.74	7.88
Phenol	mg/L	-	-	-	-	-	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	-	0.037	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	-	446
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	-	0	ND(2)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1380	-	1300	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	3.95	0.69
Total suspended solids (TSS)	mg/L	-	-	-	-	-	5.6	2.0
Turbidity	NTU	5	AO	-	-	-	16.9	5.60 J
Un-ionized ammonia	mg/L	-	-	-	0.00171	-	-	0.0217
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.26	0.931	2.02	1.8
Dissolved oxygen (DO), field	mg/L	-	-	-	9.81	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-55
pH, field	s.u.	6.5-8.5	OG	-	7.21	6.55	6.57	8.29
Temperature, field	Deg C	15	AO	-	8.7	13.8	11.48	11.2
Turbidity, field	NTU	5	AO	-	40.7	-	-	113

003757

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-110911-TS-008	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007
Sample Date:					11/9/2011	5/14/2012	5/23/2012	11/12/2012
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.028)
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	-	ND(0.0050)	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.108	0.111	0.079	0.060
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	0.0030	0.0010	0.0134	0.0091
Iron (dissolved)	mg/L	0.3	AO	10.6	1.06	0.733	1.72	ND(0.050)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.17	1.11	1.90	1.30
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0043	0.0045	0.0041	0.0048
Nickel (dissolved)	mg/L	-	-	-	0.0086	0.0031	0.0022	0.0026
Zinc (dissolved)	mg/L	5	AO	-	0.0064	0.0146	0.0044	0.0065
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30?-500	OG	386	550	584	570	563
Ammonia-N	mg/L	-	-	0.2	0.609	1.91	3.72	1.13
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	34	34	23	19
Chloride	mg/L	250	AO	-	143	164	170	186
Color (apparent)	color unit	5	AO	-	-	-	45.7	7.6
Color (apparent)	TCU	5	AO	-	30.1 J	65.4	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	ND(5.2)	8.1	4.4	7.6
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.20	0.18	ND(0.10)	0.68
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	7.82	7.43	7.48	7.37
Phenol	mg/L	-	-	-	ND(0.0030)	ND(0.0010)	0.0023	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	325	358	355	345
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1270	1380	1400	1340
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	2.04	3.52	1.18
Total suspended solids (TSS)	mg/L	-	-	-	4.9	7.2	6.4	4.8
Turbidity	NTU	5	AO	-	8.75	13.8	14.5	ND(0.58)
Un-ionized ammonia	mg/L	-	-	-	0.000186	0.000748	0.0128	0.00429
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.97	2.1	2.27	0.626
Dissolved oxygen (DO), field	mg/L	-	-	-	8.32	10.4	6.56	8.32
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-41	124
pH, field	s.u.	6.5-8.5	OG	-	7.84	8.16	7.13	7.08
Temperature, field	Deg C	15	AO	-	13.5	12.3	11.83	14.3
Turbidity, field	NTU	5	AO	-	198	1	4.3	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-052313-TS-011	GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016
Sample Date:					5/23/2013	11/14/2013	5/28/2014	11/26/2014
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	-
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	-
Acridine	µg/L	-	-	-	-	-	ND(4.0)	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(a)pyrene	µg/L	0.01	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	ND(0.040)	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	ND(0.060)	-
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	-
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	-
Naphthalene	µg/L	-	-	-	-	-	ND(0.050)	-
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	-
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008
Sample Date:					5/28/2015	5/28/2015	11/10/2015
					Original	Duplicate	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Metals							
Arsenic (dissolved)	mg/L	0.025	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	MAC	-	0.106	0.103	0.14
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.0010)
Copper (dissolved)	mg/L	-	-	-	0.0154	0.0173	0.0112
Iron (dissolved)	mg/L	0.3	AO	10.6	0.811[b]	0.555[b]	0.29
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.35[b]	1.36[b]	1.54[b]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0048	0.0051	0.00551
Nickel (dissolved)	mg/L	-	-	-	0.0033	0.0031	ND(0.0050)
Zinc (dissolved)	mg/L	5	AO	-	0.0113 J	0.0064 J	ND(0.010)
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	986	568[b]	574[b]	550[b]
Ammonia-N	mg/L	-	-	0.2	0.636[a]	0.650[a]	0.678[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	25	25	25
Chloride	mg/L	250	AO	-	264[b]	247	83.7
Color (apparent)	color unit	5	AO	-			
Color (apparent)	TCU	5	AO	-	36.6	37.9	43.1
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	5.5[b]	5.4[b]	5.4[b]
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	0.34	0.31	0.051
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.67	7.62	7.50
Phenol	mg/L	-	-	-	0.0016 J	0.0037 J	0.0027
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	313	294	62.0
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	0	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1230[b]	1300[b]	1440[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.96	0.85	0.97
Total suspended solids (TSS)	mg/L	-	-	-	3.0	ND(2.0)	4.0
Turbidity	NTU	5	AO	-	9.08[b]	8.71[b]	15.4[b]
Un-ionized ammonia	mg/L	-	-	-	0.00321	0.00328	0.0247
Field Parameters							
Conductivity, field	mS/cm	-	-	-	1.76	--	2.7
Dissolved oxygen (DO), field	mg/L	-	-	-	4.47	--	2.49
Oxidation reduction potential (ORP), field	millivolts	-	-	-	166	--	-2
pH, field	s.u.	6.5-8.5	OG	-	7.23	7.23	7.69
Temperature, field	Deg C	15	AO	-	13.56	13.6	13.44
Turbidity, field	NTU	5	AO	-	0	--	0.9

003761

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4
Sample ID:					GW-45804-052815-TS-013	GW-45804-052815-TS-014	GW-45804-111015-TS-008
Sample Date:					5/28/2015	5/28/2015	11/10/2015
					Original	Duplicate	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]			
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbo	µg/L	-	-	-	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)	ND(360)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	--	--	ND(250)
Semi-Volatiles							
Semi-Volatiles							
1-Methylnaphthalene	µg/L	-	-	-	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--	--	--
2-Methylnaphthalene	µg/L	-	-	-	--	--	--
Acenaphthene	µg/L	-	-	-	--	--	--
Acenaphthylene	µg/L	-	-	-	--	--	--
Acridine	µg/L	-	-	-	--	--	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--	--	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--	--	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--	--	--
Benzo(k)fluoranthene	µg/L	-	-	-	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	-	--	--	--
Chrysene	µg/L	-	-	-	--	--	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--	--	--
Fluoranthene	µg/L	-	-	-	--	--	--
Fluorene	µg/L	-	-	-	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--	--	--
Naphthalene	µg/L	-	-	-	--	--	--
Phenanthrene	µg/L	-	-	-	--	--	--
Pyrene	µg/L	-	-	-	--	--	--

003762

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0032	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	6.60	9.16	-	6.52
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.12	1.57	-	1.41
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0059	0.0042	-	0.0049
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	0.110	ND(0.0030)	-	0.0078
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	611	309	-	571
Ammonia-N	mg/L	-	-	0.2	0.157	0.104	-	0.117
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	2500	AO	-	64.0	63.0	-	58.1
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	16.4	127	-	109	232
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	9.4	9.9	-	11.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	0.462	-	0.031
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	4	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	692	-	1020
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.00083	0.00022	-	0.000126
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.6	1.32	1.36	1.98
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.94	0.5	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-88	-88	-
pH, field	s.u.	6.5-8.5	OG	-	7.2	6.90	8.29	6.69
Temperature, field	Deg C	15	AO	-	15.1	12.2	12	6.74
Turbidity, field	NTU	5	AO	-	-	-	-	29.7

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.01	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	7.17	6.97	7.16	7.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.42	1.37	1.71	1.52
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	0.0033	ND(0.0030)	0.0057
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	966	597	546	666	643
Ammonia-N	mg/L	-	-	0.2	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	27	34	30
Chloride	mg/L	2500	AO	-	56.7	78.7	82.1	94
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	18.4	50.1	258	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	11	12.6	9.5	15.1
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.91	7.67	7.46
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	0.0020
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	198	213
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(2)	42	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	1000	1030	1080	1090
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.63	0.60	0.50
Total suspended solids (TSS)	mg/L	-	-	-	-	15.0	16.0	42.0
Turbidity	NTU	5	AO	-	-	80.0	6.80 J	90.0
Un-ionized ammonia	mg/L	-	-	-	0.00026	-	0.00078	0.000092
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.82	1.63	2	1.87
Dissolved oxygen (DO), field	mg/L	-	-	-	2.96	1.27	0.87	1.71
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-98	-77	-156	-
pH, field	s.u.	6.5-8.5	OG	-	6.97	6.4	7.32	5.84
Temperature, field	Deg C	15	AO	-	12.8	11.55	12.6	12.9
Turbidity, field	NTU	5	AO	-	72.1	84.6	15.7	58

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111011-TS-010	GW-45804-051512-MB-009	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					11/10/2011	5/15/2012	11/12/2012	5/22/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.028)	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Fluorene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Naphthalene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	ND(0.020)	ND(0.020)

003766

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.062	11.1	1.12	6.26[5]
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0936	1.02	0.0934	0.401[5]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0042	0.0027	0.0010	ND(0.0010)
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	AO	-	ND(0.0030)	ND(0.0030)	0.0034	0.0035
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	996	74	309	84	168
Ammonia-N	mg/L	-	-	0.2	0.081	0.055	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	78	34	ND(10)	12
Chloride	mg/L	2500	AO	-	86.8	78.9	80	388[5]
Color (apparent)	color unit	5	AO	-	-	25.3	31.7	-
Color (apparent)	TCU	5	AO	16.4	33.7	-	-	29.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	6.8	3.0	3.5	2.8
Escherichia coli	cfu/100mL	ND	MAC	5	0	ND(2)	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	ND(2)	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	8.54	7.67	8.30	8.08
Phenol	mg/L	-	-	-	0.0133	0.0032	0.0015	0.0030
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	61.4	191	62	383
Total coliform bacteria	cfu/100mL	ND	MAC	-	ND(10)	10	0	ND(10)
Total dissolved solids (TDS)	mg/L	500	OAO	-	284	722	288	348
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.40	0.60	ND(0.15)	0.21
Total suspended solids (TSS)	mg/L	-	-	-	177	292	9.6	ND(2.0)
Turbidity	NTU	5	AO	-	8.90	145	8.03	6.68[5]
Un-ionized ammonia	mg/L	-	-	-	0.000039	0.00016	ND(0.0012)	0.0016
Field Parameters								
Conductivity, field	mS/cm	-	-	-	1.98	1.81	0.329	0.474
Dissolved oxygen (DO), field	mg/L	-	-	-	11.04	0.15	4.3	0.56
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-122	-154	-186
pH, field	s.u.	6.5-8.5	OG	-	6.22	6.96	7.98	7.94
Temperature, field	Deg C	15	AO	-	11.3	13.6	11.6	14.57
Turbidity, field	NTU	5	AO	-	187	44.5	-	0

003767

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052814-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	ND(0.020)	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7
Sample ID:					GW-45804-110915-TS-004
Sample Date:					11/9/2015
					Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Metals					
Arsenic (dissolved)	mg/L	0.025	IMAC	-	0.00015
Boron (dissolved)	mg/L	5	IMAC	-	0.023
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.000010)
Chromium (dissolved)	mg/L	0.05	MAC	-	0.00053
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00010)
Copper (dissolved)	mg/L	-	-	-	ND(0.00020)
Iron (dissolved)	mg/L	0.3	AO	10.6	0.133
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.000050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0470
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.00124
Nickel (dissolved)	mg/L	-	-	-	ND(0.00050)
Silver (dissolved)	mg/L	-	-	-	--
Zinc (dissolved)	mg/L	5	AO	-	0.0013
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	998	106
Ammonia-N	mg/L	-	-	0.2	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	12
Chloride	mg/L	2500	AO	-	87.0
Color (apparent)	color unit	5	AO	-	
Color (apparent)	TCU	5	AO	18.4	46.2
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.2
Escherichia coli	cfu/100mL	ND	MAC	5	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.020)
Nitrite (as N)	mg/L	1	AO	-	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	8.88[3]
Phenol	mg/L	-	-	-	0.0027
Phosphorus	mg/L	-	-	0.5	8.82[3]
Sulfate	mg/L	500	AO	-	17.4
Total coliform bacteria	cfu/100mL	ND	MAC	-	1[3]
Total dissolved solids (TDS)	mg/L	500	OAO	-	245
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	0.26
Total suspended solids (TSS)	mg/L	-	-	-	2.7
Turbidity	NTU	5	AO	-	18.8[3]
Un-ionized ammonia	mg/L	-	-	-	ND(0.045)
Field Parameters					
Conductivity, field	mS/cm	-	-	-	0.404
Dissolved oxygen (DO), field	mg/L	-	-	-	0
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-187
pH, field	s.u.	6.5-8.5	OG	-	10.05[3]
Temperature, field	Deg C	15	AO	-	14.06
Turbidity, field	NTU	5	AO	-	2

003769

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7
Sample ID:					GW-45804-110915-TS-004
Sample Date:					11/9/2015
					Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)
Semi-Volatiles					
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	--
Acenaphthene	µg/L	-	-	-	--
Acenaphthylene	µg/L	-	-	-	--
Acridine	µg/L	-	-	-	--
Anthracene	µg/L	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	--
Chrysene	µg/L	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--
Fluoranthene	µg/L	-	-	-	--
Fluorene	µg/L	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--
Naphthalene	µg/L	-	-	-	--
Phenanthrene	µg/L	-	-	-	--
Pyrene	µg/L	-	-	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	-	0.0023	-	0.0018
Boron (dissolved)	mg/L	5	IMAC	-	-	-	-	-
Cadmium (dissolved)	mg/L	0.005	MAC	-	0.00022	0.00020	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	-	-	-
Cobalt (dissolved)	mg/L	-	-	-	-	-	-	-
Copper (dissolved)	mg/L	-	-	-	-	-	-	-
Iron (dissolved)	mg/L	0.3	AO	10.6	3.59	2.85	-	5.37
Lead (dissolved)	mg/L	0.01	MAC	-	-	-	-	-
Manganese (dissolved)	mg/L	0.05	MAC	2.1	1.52	1.53	-	2.71
Mercury (dissolved)	mg/L	0.001	MAC	-	-	-	-	-
Molybdenum (dissolved)	mg/L	-	-	-	0.0695	0.0527	-	0.0168
Nickel (dissolved)	mg/L	-	-	-	-	-	-	-
Silver (dissolved)	mg/L	-	-	-	ND(0.00010)	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0743	ND(0.0030)	-	0.0123
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	986	427	480	-	519
Ammonia-N	mg/L	-	-	0.2	0.373	0.311	-	0.476
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	250	AO	-	83.5	70.6	-	106
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	143	-	90.6	209
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	16.4	8.5	9.7	-	10.3
Escherichia coli	cfu/100mL	ND	MAC	5	0	-	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	-	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	ND(0.10)	-	ND(0.30)
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	-	ND(0.30)
pH, lab	s.u.	6.5-8.5	OG	-	-	-	-	-
Phenol	mg/L	-	-	-	-	-	-	-
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	-	0.072
Sulfate	mg/L	500	AO	-	-	-	-	-
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	-	10	2
Total dissolved solids (TDS)	mg/L	500	OAO	-	1080	1060	-	1460
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	5	AO	-	-	-	-	-
Un-ionized ammonia	mg/L	-	-	-	0.000407	0.00152	-	0.0145
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.52	1.53	1.85	2.31
Dissolved oxygen (DO), field	mg/L	-	-	-	-	2.91	2.12	0.02
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-124	-31	-80
pH, field	s.u.	6.5-8.5	OG	-	6.62	7.24	6.14	6.12
Temperature, field	Deg C	15	AO	-	11.9	12.8	7.72	10.59
Turbidity, field	NTU	5	AO	-	-	-	-	4.2

003771

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-052610-MMD-015	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

003772

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	-	0.068	0.078	0.074
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	-	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	-	ND(0.00050)	0.00078	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.8	ND(0.050)	5.77	6.02	5.56
Lead (dissolved)	mg/L	0.01	MAC	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.321	**2.95**	**2.91**	**2.64**
Mercury (dissolved)	mg/L	0.001	MAC	-	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	-	-	-	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L	-	-	-	-	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	996	291	519	548	507
Ammonia-N	mg/L	-	-	0.2	ND(0.050)	**1.85**	**2.33**	**2.45**
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	23	51	36
Chloride	mg/L	250	AO	-	42.8	116	140	94.2
Color (apparent)	color unit	5	AO	-	-	-	-	-
Color (apparent)	TCU	5	AO	-	5.0	112	73.0	35.0 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	3.1	10.6	7.6	ND(5.2)
Escherichia coli	cfu/100mL	ND	MAC	5	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL	-	-	-	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	10	AO	0.5	0.44	ND(0.10)	ND(0.10)	0.25
Nitrite (as N)	mg/L	1	AO	-	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.	6.5-8.5	OG	-	-	7.96	7.60	7.82
Phenol	mg/L	-	-	-	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	500	AO	-	-	-	548	373
Total coliform bacteria	cfu/100mL	ND	MAC	-	340	2	10	140
Total dissolved solids (TDS)	mg/L	500	OAO	-	834	1550	1600	1510
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	2.18	2.43	2.86
Total suspended solids (TSS)	mg/L	-	-	-	-	12.5	14.0	38.7
Turbidity	NTU	5	AO	-	-	79.0	7.60	51.0
Un-ionized ammonia	mg/L	-	-	-	ND(0.00031)	-	0.605	0.00202
Field Parameters								
Conductivity, field	mS/cm	-	-	-	0.981	2.37	1.85	2.17
Dissolved oxygen (DO), field	mg/L	-	-	-	-	1.7	0	5.62
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-73	-104	-
pH, field	s.u.	6.5-8.5	OG	-	7.48	6.96	6.17	6.41
Temperature, field	Deg C	15	AO	-	9.0	9.92	9.8	14.5
Turbidity, field	NTU	5	AO	-	52.3	165	29.7	48

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111011-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					11/10/2011	5/15/2012	11/13/2012	5/23/2013
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	-	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	-	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	-	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	-	-	-	-	-	-	-
Fluoranthene	µg/L	-	-	-	-	-	-	-
Fluorene	µg/L	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	-	-	-	-	-	-	-
Phenanthrene	µg/L	-	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Metals								
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.081	0.099	0.204	0.188
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)
Copper (dissolved)	mg/L	-	-	-	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)
Iron (dissolved)	mg/L	0.3	AO	10.6	6.25	3.06	ND(0.050)	0.178
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	2.38	1.34	0.648	0.0878[5]
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0211	0.0133	0.0301	0.0351
Nickel (dissolved)	mg/L	-	-	-	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)
Silver (dissolved)	mg/L	-	-	-	-	-	-	-
Zinc (dissolved)	mg/L	5	-	-	0.0034	0.0075	0.0075	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	30-500	OG	988	548	486	488	305
Ammonia-N	mg/L	-	-	0.2	4.60	2.66	0.273	0.099
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	46	19	ND(10)	ND(10)
Chloride	mg/L	250	AO	-	157	103	127	48.9
Color (apparent)	color unit	5	AO	-	-	34.8J	81.9	
Color (apparent)	TCU	5	AO	-	35.7	-	-	15.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	19.5	4.2	2.5	2.4
Escherichia coli	cfu/100mL	ND	MAC	5	0	0	0	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0	0	0	0
Nitrate (as N)	mg/L	10	AO	0.5	ND(0.10)	0.15	0.40	0.826[5]
Nitrite (as N)	mg/L	1	AO	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
pH, lab	s.u.	6.5-8.5	OG	-	7.53	7.76	7.54	8.02
Phenol	mg/L	-	-	-	ND(0.0010)	0.0030	0.0015	0.0014
Phosphorus	mg/L	-	-	0.5	ND(0.030)	ND(0.030)	ND(0.030)	0.030
Sulfate	mg/L	500	AO	-	839	279	333	172
Total coliform bacteria	cfu/100mL	ND	MAC	-	0	16	0	1[5]
Total dissolved solids (TDS)	mg/L	500	OAO	-	1750	1030	1140	823[5]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	5.09	2.86	0.42	0.43
Total suspended solids (TSS)	mg/L	-	-	-	28.4	10.0	24.4	28.1
Turbidity	NTU	5	AO	-	63.6	23.5	11.4	3.44
Un-ionized ammonia	mg/L	-	-	-	0.00197	0.0104	0.00365	0.0020
Field Parameters								
Conductivity, field	mS/cm	-	-	-	2.32	1.69	0.557	0.961
Dissolved oxygen (DO), field	mg/L	-	-	-	7.89	8.74	10.48	6.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-64	24	144
pH, field	s.u.	6.5-8.5	OG	-	6.24	7.22	7.80	7.73
Temperature, field	Deg C	15	AO	-	11.1	10.44	7.2	17.05
Turbidity, field	NTU	5	AO	-	0	5.5	-	0

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015
					Original	Original	Original	Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]				
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	-	-	-	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	-	-	-	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
2-Methylnaphthalene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	--
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	--
Acridine	µg/L	-	-	-	-	ND(4.0)	-	--
Anthracene	µg/L	-	-	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	-	ND(0.040)	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	-	ND(0.020)	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	-	ND(0.060)	-	--
Chrysene	µg/L	-	-	-	-	ND(0.020)	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	--
Fluorene	µg/L	-	-	-	-	ND(0.020)	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	--
Naphthalene	µg/L	-	-	-	-	ND(0.050)	-	--
Phenanthrene	µg/L	-	-	-	-	ND(0.020)	-	--
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-110915-TS-012
Sample Date:					11/9/2015
					Original
Parameters:	**Units**	**ODWQS[1]**	**ODWQS SOURCE**	**TLP[2]**	
Metals					
Arsenic (dissolved)	mg/L	0.025	IMAC	-	ND(0.0010)
Boron (dissolved)	mg/L	5	IMAC	-	0.29
Cadmium (dissolved)	mg/L	0.005	MAC	-	ND(0.00010)
Chromium (dissolved)	mg/L	0.05	MAC	-	ND(0.0050)
Cobalt (dissolved)	mg/L	-	-	-	ND(0.0010)
Copper (dissolved)	mg/L	-	-	-	ND(0.0020)
Iron (dissolved)	mg/L	0.3	AO	10.6	ND(0.10)
Lead (dissolved)	mg/L	0.01	MAC	-	ND(0.00050)
Manganese (dissolved)	mg/L	0.05	MAC	2.1	0.0439
Mercury (dissolved)	mg/L	0.001	MAC	-	ND(0.000010)
Molybdenum (dissolved)	mg/L	-	-	-	0.0818
Nickel (dissolved)	mg/L	-	-	-	ND(0.0050)
Silver (dissolved)	mg/L	-	-	-	--
Zinc (dissolved)	mg/L	5	-	-	ND(0.010)
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	300-500	OG	998	281
Ammonia-N	mg/L	-	-	0.2	0.365[a]
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	14
Chloride	mg/L	250	AO	-	52.5
Color (apparent)	color unit	5	AO	-	
Color (apparent)	TCU	5	AO	-	59.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	5	AO	18.4	4.3
Escherichia coli	cfu/100mL	ND	MAC	5	0
Fecal coliform bacteria	cfu/100mL	-	-	-	0
Nitrate (as N)	mg/L	10	AO	0.5	0.81[a]
Nitrite (as N)	mg/L	1	AO	-	ND(0.050)
pH, lab	s.u.	6.5-8.5	OG	-	7.72
Phenol	mg/L	-	-	-	0.0019
Phosphorus	mg/L	-	-	0.5	ND(0.030)
Sulfate	mg/L	500	AO	-	256
Total coliform bacteria	cfu/100mL	ND	MAC	-	0
Total dissolved solids (TDS)	mg/L	500	OAO	-	964[b]
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	1.04
Total suspended solids (TSS)	mg/L	-	-	-	6.0
Turbidity	NTU	5	AO	-	4.96
Un-ionized ammonia	mg/L	-	-	-	0.177
Field Parameters					
Conductivity, field	mS/cm	-	-	-	0.931
Dissolved oxygen (DO), field	mg/L	-	-	-	2.36
Oxidation reduction potential (ORP), field	millivolts	-	-	-	136
pH, field	s.u.	6.5-8.5	OG	-	8.84[b]
Temperature, field	Deg C	15	AO	-	11.35
Turbidity, field	NTU	5	AO	-	2.6

003777

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2016 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8
Sample ID:					GW-45804-110915-TS-012
Sample Date:					11/9/2015
					Original
Parameters:	Units	ODWQS[1]	ODWQS SOURCE	TLP[2]	
Petroleum Products					
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	ND(380)
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	-	ND(250)
Semi-Volatiles					
1-Methylnaphthalene	µg/L	-	-	-	--
2-Methylnaphthalene	µg/L	-	-	-	--
Acenaphthene	µg/L	-	-	-	--
Acenaphthylene	µg/L	-	-	-	--
Acridine	µg/L	-	-	-	--
Anthracene	µg/L	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	-	-	-	--
Benzo(a)pyrene	µg/L	0.1	MAC	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	--
Benzo(b)pyridine (Quinoline)	µg/L	-	-	-	--
Benzo(g,h,i)perylene	µg/L	-	-	-	--
Benzo(k)fluoranthene	µg/L	-	-	-	--
Carcinogenic potency equivalent	µg/L	-	-	-	--
Chrysene	µg/L	-	-	-	--
Dibenz(a,h)anthracene	µg/L	-	-	-	--
Fluoranthene	µg/L	-	-	-	--
Fluorene	µg/L	-	-	-	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	--
Naphthalene	µg/L	-	-	-	--
Phenanthrene	µg/L	-	-	-	--
Pyrene	µg/L	-	-	-	--

Table E.4.3

Deep Bedrock Groundwater Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Notes:

1) TLP - Trigger Level Program Concentration (CRA, 2015)
2) ODWQS - Ontario Drinking Water Quality Standards, Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOECC, June 2003, revised June 2006)

J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the Tier I Trigger Level
[ ] - Exceedence of the ODWQS

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110510-TS-014	SW-45804-111110-TS-001	SW-45804-051711-MMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0031	ND(0.0010)	-	0.0018	0.0013
Boron	mg/L	0.2	-	-	-	-	-	-
Cadmium	mg/L	0.0002	0.00001	0.00116	0.00005	-	0.00161	0.00059
Chromium	mg/L	-	-	-	-	-	-	-
Cobalt	mg/L	0.0009	-	-	-	-	-	-
Copper	mg/L	0.005	-	-	-	-	-	-
Iron	mg/L	0.3	0.089	ND(0.050)	1.85	-	0.811	ND(0.050)
Lead	mg/L	0.005	-	-	-	-	-	-
Magnesium	mg/L	-	73.7	-	-	-	-	-
Manganese	mg/L	-	0.0433	0.0357	0.305	-	0.348	0.0346
Mercury	mg/L	0.0002	-	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.233	0.319	0.139	-	0.146	0.167
Nickel	mg/L	0.025	-	-	-	-	-	-
Zinc	mg/L	0.03	0.0200	0.0067	0.0330	-	0.149	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	220	201	216	-	188	286
Ammonia-N	mg/L	-	ND(0.050)	0.103	0.096	-	0.110	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	-	-
Chloride	mg/L	-	83.1	83.6	79.2	-	122	122
Color (apparent)	TCU	-	8.7	9.9	-	9.1	21.3	12.0
Conductivity	umhos/cm	-	1490	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	3.6	3.1	6.7	-	5.2	4.9
Escherichia coli	cfu/100mL	100	0	1	-	1	35	1
Fecal coliform bacteria	cfu/100mL	4800	1	10	-	1	37	2
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(1.0)	0.57	0.94	-	1.32	0.55
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.08	-	-	-	-	-
Phenol	mg/L	0.005	-	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0044	0.0079	0.0387	-	0.0167	0.0061
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	8	350	-	2100	600	140
Total dissolved solids (TDS)	mg/L	-	1100	1010	1010	-	1170	1430
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	-	-	-
Turbidity	NTU	-	0.52	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	ND(0.000014)	0.0025	0.00035	-	0.00034	ND(0.000094)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-011310-TS-001	SW-45804-051810-MB-002	SW-45804-110519-TS-014	SW-45804-111110-TS-001	SW-45804-051711-RMD-004	SW-45804-111711-TS-003
Sample Date:			1/13/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011	11/17/2011
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1850	1283	1480	1750	1840	1740
Dissolved oxygen (DO), field	mg/L	-	-	-	10.51	10.4	11.2	12.6
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	171	-
pH, field	s.u.	6.5-8.5	8.21	7.65	7.27	8.3	7.06	6.96
Temperature, field	Deg C	-	4.0	22	8.1	5.7	12.29	8.8
Turbidity, field	NTU	-	73	-	-	-	6.7	10.8
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	-	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	-	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L			-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L			-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	-	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0093	-	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0011	-	ND(0.0010)	0.0027	0.0025	ND(0.010)
Boron	mg/L	0.2	0.149	-	0.089	0.087	0.105	ND(0.10)
Cadmium	mg/L	0.0002	0.00002	-	0.00013	0.00003	0.00003	ND(0.00009)
Chromium	mg/L	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)
Cobalt	mg/L	0.0009	0.00111	-	0.00213	0.00188	0.00277	ND(0.0050)
Copper	mg/L	0.005	0.0016	-	0.0011	ND(0.0010)	ND(0.0010)	ND(0.010)
Iron	mg/L	0.3	0.231	-	0.418	0.069	0.078	ND(0.50)
Lead	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	0.0014	ND(0.0050)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0536	-	0.165	0.0636	0.0593	0.028
Mercury	mg/L	0.0002	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.273	-	0.239	0.283	0.468	0.385
Nickel	mg/L	0.025	0.0113	-	0.0157	0.0138	0.0238	0.016
Zinc	mg/L	0.03	0.0174	-	ND(0.0030)	ND(0.0030)	0.0053	ND(0.030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	268	-	232	145	179	136
Ammonia-N	mg/L	-	0.073	-	0.100	0.634	0.463	0.105
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	15	-	76	ND(10)	38	10
Chloride	mg/L	-	164	-	94.2	95.8	101	100
Color (apparent)	TCU	-	-	7.2	15.0	9.4 J	8.6	16.3
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.2	-	3.2	2.4	4.5	2.2
Escherichia coli	cfu/100mL	100	-	45	38	ND(10)	10	10
Fecal coliform bacteria	cfu/100mL	4800	-	11	150	ND(10)	3	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	1.18	-	0.34	1.28	1.30	0.33
Nitrite (as N)	mg/L	0.3	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.87	-	8.08	8.11	8.14	8.12
Phenol	mg/L	0.005	ND(0.0010)	-	ND(0.0010)	0.0050	ND(0.0010)	0.0035
Phosphorus	mg/L	0.01	0.0130	-	0.0093	0.0133	0.0092	0.0123
Sulfate	mg/L	-	-	-	684	570	696	489
Total coliform bacteria	cfu/100mL	-	-	260	1000	ND(1000)	600	2200
Total dissolved solids (TDS)	mg/L	-	1370	-	1420	1130	1370	1040
Total kjeldahl nitrogen (TKN)	mg/L	-	0.49	-	0.51	0.80	0.66	0.49
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	11.6	-	5.6	12.8	15.2	7.2
Turbidity	NTU	-	-	1.11	2.20	3.45	12.6	4.83
Un-ionized ammonia	mg/L	0.02	-	-	0.000189	0.000171	0.000153	0.0068

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW1-09	SW1-09	SW1-09
Sample ID:			SW-45804-051412-MB-005	SW-45804-052312-mb-003	SW-45804-111312-MB-003	SW-45804-052313-TS-004	SW-45804-111313-TS-004	SW-45804-052814-MB-003
Sample Date:			5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	2130	1920	1510	1590	1770	1560
Dissolved oxygen (DO), field	mg/L	-	-	-	12.19	8.13	10.16	8.1
Oxidation reduction potential (ORP), field	millivolts	-	-	-	66			9
pH, field	s.u.	6.5-8.5	6.97	7.06	7.02	7.23	6.35	8.14
Temperature, field	Deg C	-	18.86	17.64	7.2	20.3	2.4	20.43
Turbidity, field	NTU	-	-	-	67.1	58.8	11.5	12.4
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	ND(250)	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051810-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010	11/11/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.010)	ND(0.0010)	0.0011	0.0033	-
Boron	mg/L	0.2	0.096	0.11	ND(0.10)	-	-	-
Cadmium	mg/L	0.0002	0.00011	ND(0.00090)	ND(0.00010)	0.00027	0.00054	-
Chromium	mg/L	-	ND(0.0010)	ND(0.0050)	ND(0.0050)	-	-	-
Cobalt	mg/L	0.0009	0.00131	ND(0.0050)	0.0021	-	-	-
Copper	mg/L	0.005	0.0013	ND(0.010)	ND(0.010)	-	-	-
Iron	mg/L	0.3	0.061	ND(0.50)	ND(0.50)	0.221	5.36	-
Lead	mg/L	0.005	ND(0.0010)	ND(0.0050)	ND(0.0010)	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0334	0.136	0.0843	0.0760	0.869	-
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.000010)	ND(0.000010)	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.301	0.338	0.226	0.208	0.741	-
Nickel	mg/L	0.025	0.0165	0.023	0.0196	-	-	-
Zinc	mg/L	0.03	0.0068	ND(0.030)	ND(0.030)	0.0136	0.0438	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	235	197	203	161	217	-
Ammonia-N	mg/L	-	0.081	1.10	ND(0.050)	0.079	0.162	-
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	4.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-
Chemical oxygen demand (COD)	mg/L	-	24	12	16	-	-	-
Chloride	mg/L	-	224	87.1	221	89.0	66.8	-
Color (apparent)	TCU	-	9.0	12.4	8.7	17.4	-	23.7
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.0	2.7	3.9	3.6	5.2	-
Escherichia coli	cfu/100mL	100	4	50	1	178	-	3
Fecal coliform bacteria	cfu/100mL	4800	6	110	10	190	-	3
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.56	2.90	0.68	ND(0.10)	0.74	-
Nitrite (as N)	mg/L	0.3	ND(0.10)	0.047	ND(0.050)	ND(0.10)	ND(0.10)	-
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	7.88	8.14	7.85	-	-	-
Phenol	mg/L	0.005	ND(0.0010)	0.0021	0.0012	-	-	-
Phosphorus	mg/L	0.01	0.0088	0.0335	0.0082	0.0063	0.224	-
Sulfate	mg/L	-	597	683	950	-	-	-
Total coliform bacteria	cfu/100mL	-	1900	2000	500	270	-	2400
Total dissolved solids (TDS)	mg/L	-	1440	1110	1630	1170	780	-
Total kjeldahl nitrogen (TKN)	mg/L	-	0.31	1.34	0.32	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	ND(2.0)	52.3	2.8	-	-	-
Turbidity	NTU	-	4.39	36.0	3.10	-	-	-
Un-ionized ammonia	mg/L	0.02	0.00089	0.0039	ND(0.0032)	0.0025	0.00053	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW1-09	SW1-09	SW1-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-112614-TS-003	SW-45804-052715-TS-003	SW-45804-110915-TS-001	SW-45804-051810-MB-003	SW-45804-110510-TS-015	SW-45804-111110-TS-002
Sample Date:			11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010	11/11/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	960	1.53	2.36	1445	1200	1610
Dissolved oxygen (DO), field	mg/L	-	21.17	10.05	6.58	-	12.6	12.04
Oxidation reduction potential (ORP), field	millivolts	-	117	-	46	-	-	-
pH, field	s.u.	6.5-8.5	7.64	8.23	8.51	7.79	7.26	6.56
Temperature, field	Deg C	-	2.57	19.92	9.12	21.3	7.2	6
Turbidity, field	NTU	-	-	106	1.3	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	170	ND(100)	ND(100)	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	450	ND(250)	ND(250)	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(360)	ND(360)	620	ND(250)	ND(250)	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	170	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	450	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	ND(250)	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.022	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0556	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004
Sample Date:			5/17/2011	5/17/2011	11/17/2011	5/14/2012	5/23/2012	11/13/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)	-	ND(0.0010)
Boron	mg/L	0.2	-	-	-	ND(0.050)	-	ND(0.050)
Cadmium	mg/L	0.0002	0.00077	0.00091	0.00067	ND(0.000010)	-	ND(0.000010)
Chromium	mg/L	-	-	-	-	0.0013	-	ND(0.0010)
Cobalt	mg/L	0.0009	-	-	-	ND(0.000050)	-	ND(0.000050)
Copper	mg/L	0.005	-	-	-	0.0022	-	ND(0.0010)
Iron	mg/L	0.3	0.180	0.184	ND(0.050)	0.717	-	0.157
Lead	mg/L	0.005	-	-	-	ND(0.0010)	-	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0945	0.0961	0.201	0.186	-	0.123
Mercury	mg/L	0.0002	-	-	-	ND(0.000010)	-	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.238	0.242	0.178	0.0050	-	0.0058
Nickel	mg/L	0.025	-	-	-	0.0021	-	ND(0.0020)
Zinc	mg/L	0.03	0.0178	0.0161	0.0057	0.0273	-	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	190	186	303	215	-	240
Ammonia-N	mg/L	-	0.080	0.073	ND(0.050)	0.068	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	-	-	40	-	42
Chloride	mg/L	-	70.0	59.8	182	88.2	-	121
Color (apparent)	TCU	-	23.5	19.0	13.7	-	67.9	29.6
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	4.4	4.1	5.1	17.6	-	8.0
Escherichia coli	cfu/100mL	100	22	19	0	-	182	11
Fecal coliform bacteria	cfu/100mL	4800	20	30	2	-	254	13
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	1.16	1.16	1.13	ND(0.10)	-	0.11
Nitrite (as N)	mg/L	0.3	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	-	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	-	-	7.97	-	8.19
Phenol	mg/L	0.005	-	-	-	ND(0.0010)	-	ND(0.0010)
Phosphorus	mg/L	0.01	0.0090	0.0074	0.0043	0.0738	-	0.0226
Sulfate	mg/L	-	-	-	-	-	-	205
Total coliform bacteria	cfu/100mL	-	1400	1600	130	-	1200	1200
Total dissolved solids (TDS)	mg/L	-	976	940	1390	514	-	762
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	0.64	-	0.52
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	-	-	26.4	-	4.0
Turbidity	NTU	-	-	-	-	-	4.20	0.85
Un-ionized ammonia	mg/L	0.02	0.000125	0.000113	ND(0.000086)	-	-	ND(0.00014)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-051711-MMD-001	SW-45804-051711-MMD-002	SW-45804-111711-TS-004	SW-45804-051412-MB-004	SW-45804-052312-mb-004	SW-45804-111312-MB-004
Sample Date:			5/17/2011	5/17/2011	11/17/2011	5/14/2012	5/23/2012	11/13/2012
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1600	1600	1830	812	973	900
Dissolved oxygen (DO), field	mg/L	-	-	-	17.19	-	-	13.64
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	57
pH, field	s.u.	6.5-8.5	6.8	6.8	7.03	7.04	7.42	7.22
Temperature, field	Deg C	-	11.13	11.13	5.7	19.03	21.28	8.3
Turbidity, field	NTU	-	14.2	14.2	24.7	-	-	35.7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052814-MB-005	SW-45804-112614-TS-001	SW-45804-052715-TS-004
Sample Date:			5/23/2013	5/23/2013	11/13/2013	5/28/2014	11/26/2014	5/27/2015
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	0.0022 J	ND(0.0010) J	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt	mg/L	0.0009	0.00086	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	0.0027 J	0.0016 J	ND(0.0010)	0.0011	ND(0.0010)	ND(0.0010)
Iron	mg/L	0.3	9.35 J	8.998 J	0.164	6.385	8.459	0.291
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.120	0.0864	0.0716	0.133	0.0860	0.209
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0057	0.0058	0.0033	0.0080	0.0082	0.0044
Nickel	mg/L	0.025	0.0027	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)
Zinc	mg/L	0.03	0.0094	0.0072	0.0059	0.0046	0.0039	0.0046
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	168	163	240	234	203	238
Ammonia-N	mg/L	-	0.056	0.051	ND(0.050)	0.077	0.102	0.150
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	32	40	34	25	22	29
Chloride	mg/L	-	81.6	82.6	112	119	109	150
Color (apparent)	TCU	-	58.5 J	59.4 J	30.3	37.4	35.2	51.5
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	12.7	12.6	9.2	9.8	8.4	10.9
Escherichia coli	cfu/100mL	100	46 J	20 J	10	70	50	210
Fecal coliform bacteria	cfu/100mL	4800	80 J	150 J	30	100	70	340
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.14	0.14	0.18	0.18	0.43	ND(0.020)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.07	8.07	8.08	8.25	8.01	8.13
Phenol	mg/L	0.005	0.0080 J	0.0090 J	0.0044	0.0020	ND(0.0010)	0.0080
Phosphorus	mg/L	0.01	0.0870	0.0883	0.0213	0.0229	0.0368	0.0429
Sulfate	mg/L	-	119	119	134	188	179	113
Total coliform bacteria	cfu/100mL	-	21000	17000	3000	2900	1500	4000
Total dissolved solids (TDS)	mg/L	-	474	462	606	730	637	596
Total kjeldahl nitrogen (TKN)	mg/L	-	0.61	0.54	1.03	0.65	0.49	1.30
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	69.0	93.0	5.2	5.2	8.0	7.6
Turbidity	NTU	-	3.34	4.31	2.49	3.62	7.32	7.11
Un-ionized ammonia	mg/L	0.02	0.000014	ND(0.000013)	ND(0.000016)	0.0049	0.00174	0.0044

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW2-09	SW2-09	SW2-09	SW2-09	SW2-09
Sample ID:			SW-45804-052313-TS-002	SW-45804-052313-TS-003	SW-45804-111313-TS-003	SW-45804-052814-MB-005	SW-45804-112614-TS-001	SW-45804-052715-TS-004
Sample Date:			5/23/2013	5/23/2013	11/13/2013	5/28/2014	11/26/2014	5/27/2015
			Original	Duplicate	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	750	-	1040	1220	473	0.722
Dissolved oxygen (DO), field	mg/L	-	7.64	-	10.24	10.3	21.98	5.47
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	64	123.1	-
pH, field	s.u.	6.5-8.5	9.26 J	9.25 J	8.32 J	8.21	8.17	7.75
Temperature, field	Deg C	-	19.1	19.1	2.1	17.97	1.83	21.32
Turbidity, field	NTU	-	43.9	-	0	9.2	-	0
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-110915-TS-004	SW-45804-051810-MB-004	SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/9/2015	5/18/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.00030	ND(0.0010)	ND(0.0010)	0.0014	-	ND(0.0010)
Boron	mg/L	0.2	0.037	-	-	-	-	-
Cadmium	mg/L	0.0002	0.000011	0.00021	0.00031	0.00013	-	0.00020
Chromium	mg/L	-	0.00100	-	-	-	-	-
Cobalt	mg/L	0.0009	0.00026	-	-	-	-	-
Copper	mg/L	0.005	ND(0.0010)	-	-	-	-	-
Iron	mg/L	0.3	0.481	0.179	0.166	1.67	-	0.153
Lead	mg/L	0.005	0.00019	-	-	-	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.149	0.110	0.105	0.199	-	0.101
Mercury	mg/L	0.0002	ND(0.000010)	-	-	-	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0102	0.116	0.116	0.0330	-	0.0539
Nickel	mg/L	0.025	0.0022	-	-	-	-	-
Zinc	mg/L	0.03	0.0033	0.0127	0.0040	0.0104	-	0.0062
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	234	214	208	229	-	239
Ammonia-N	mg/L	-	ND(0.050)	0.105	0.153	0.058	-	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	-	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	ND(10)	-	-	-	-	-
Chloride	mg/L	-	123	100	107	74.3	-	69.1
Color (apparent)	TCU	-	31.7	33.1	25.8	-	35.1	39.8
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.4	5.9	5.5	9.2	-	11.2
Escherichia coli	cfu/100mL	100	20	28	388	-	12	31
Fecal coliform bacteria	cfu/100mL	4800	40	120	170	-	23	39
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.48	ND(0.10)	0.51	0.14	-	ND(0.30)
Nitrite (as N)	mg/L	0.3	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	-	ND(0.30)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.02	-	-	-	-	-
Phenol	mg/L	0.005	0.0017	-	-	-	-	-
Phosphorus	mg/L	0.01	0.0213	0.0230	0.0380	0.0618	-	0.0109
Sulfate	mg/L	-	243	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	800	240	260	-	300	1500
Total dissolved solids (TDS)	mg/L	-	988	960	942	572	-	634
Total kjeldahl nitrogen (TKN)	mg/L	-	0.61	-	-	-	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.0	-	-	-	-	-
Turbidity	NTU	-	3.81	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	ND(0.0065)	0.0070	0.0102	0.00034	-	ND(0.00022)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW2-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-110915-TS-004	SW-45804-051810-MB-004	SW-45804-051810-MB-005	SW-45804-110510-TS-016	SW-45804-111110-TS-003	SW-45804-051711-MMD-003
Sample Date:			11/9/2015	5/18/2010	5/18/2010	11/5/2010	11/11/2010	5/17/2011
			Original	Original	Duplicate	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	0.947	1219	1219	970	1060	739
Dissolved oxygen (DO), field	mg/L	-	5.99	-	-	12.49	11.84	9.64
Oxidation reduction potential (ORP), field	millivolts	-	66	-	-	-	-	231
pH, field	s.u.	6.5-8.5	8.03	8.02	8.02	7.55	6.97	7.25
Temperature, field	Deg C	-	8.3	24.6	24.6	6.0	5.54	11.18
Turbidity, field	NTU	-	1	-	-	-	-	3.6
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(250)	ND(250)	ND(250)	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		ND(250)	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		ND(250)	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0147	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-111711-TS-005	SW-45804-051412-MB-003	SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	-	ND(0.050)	-	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.00010)	0.00013	-	ND(0.00010)	0.00012	ND(0.00010)
Chromium	mg/L	-	-	ND(0.0010)	-	0.0011	0.0011	ND(0.0010)
Cobalt	mg/L	0.0009	-	0.00085	-	ND(0.00050)	ND(0.00050)	0.00086
Copper	mg/L	0.005	-	0.0019	-	0.0014	0.0018	ND(0.0010)
Iron	mg/L	0.3	0.523	0.471	-	0.521	0.634	0.369
Lead	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.116	0.167	-	0.149	0.0924	0.108
Mercury	mg/L	0.0002	-	ND(0.00010)	-	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0064	0.017	-	0.0265	0.0308	0.0122
Nickel	mg/L	0.025	-	0.0049	-	0.0032	0.0028	0.0063
Zinc	mg/L	0.03	0.0043	0.0094	-	0.0045	0.0052	0.0116
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	242	209	-	246	175	239
Ammonia-N	mg/L	-	ND(0.050)	0.122	-	ND(0.050)	0.076	0.126
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	-	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	-	21	-	51	38	38
Chloride	mg/L	-	81.2	94.0	-	120	84.0	110
Color (apparent)	TCU	-	30.3	-	55.2	34.0	53.8 J	27.6
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	7.0	13.0	-	7.8	12.4	9.8
Escherichia coli	cfu/100mL	100	24	-	77	11	120	10
Fecal coliform bacteria	cfu/100mL	4800	10	-	360	12	140	20
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.49	-	0.14	0.19	0.37
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	-	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	-	8.06	-	8.24	8.09	8.11
Phenol	mg/L	0.005	-	ND(0.0010)	-	ND(0.0010)	0.0050	0.0015
Phosphorus	mg/L	0.01	0.0212	0.0135	-	0.0088	0.061	0.0275
Sulfate	mg/L	-	-	-	-	226	145	295
Total coliform bacteria	cfu/100mL	-	290	-	1000	1500	12000	1000
Total dissolved solids (TDS)	mg/L	-	518	738	-	792	518	758
Total kjeldahl nitrogen (TKN)	mg/L	-	-	0.61	-	0.57	0.54	0.46
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	-	20.8	-	19.2	67.0	4.8
Turbidity	NTU	-	-	-	4.50	1.36	5.35	8.96
Un-ionized ammonia	mg/L	0.02	ND(0.000071)	-	-	ND(0.000058)	0.0000144	0.000034

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-111711-TS-005	SW-45804-051412-MB-003	SW-45804-052312-mb-005	SW-45804-111312-MB-005	SW-45804-052313-TS-001	SW-45804-111313-TS-002
Sample Date:			11/17/2011	5/14/2012	5/23/2012	11/13/2012	5/23/2013	11/13/2013
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	799	1200	76.86	999	800	1230
Dissolved oxygen (DO), field	mg/L	-	15.93	-	-	13.97	7.75	8.35
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	98	-	-
pH, field	s.u.	6.5-8.5	8.91	7	7.64	6.87	8.62	7.37
Temperature, field	Deg C	-	8.7	18.31	22.78	5.4	19.2	1.8
Turbidity, field	NTU	-	28.2	-	-	45.7	94.7	4.1
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	ND(250)	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	-	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	-	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0006	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00029	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	0.057	0.061	-	-
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000030)	0.00011	ND(0.00010)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00071	-	-
Cobalt	mg/L	0.0009	0.00051	ND(0.00050)	0.00071	0.00031	-	-
Copper	mg/L	0.005	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	-	-
Iron	mg/L	0.3	0.239	0.339	0.387	0.190	0.271	0.475
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00010	-	-
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.110	0.0971	0.227	0.122	0.0542	0.0262
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	-	-
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.157	0.0221	0.0852	0.0622	0.0536	0.0230
Nickel	mg/L	0.025	0.0058	0.0031	0.0053	0.0055	-	-
Zinc	mg/L	0.03	ND(0.0030)	0.0057	0.0030	0.0054	0.0056	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	216	214	235	205	135	116
Ammonia-N	mg/L	-	0.071	0.097	0.072	0.067	0.142	0.354
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.3	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	21	24	25	16	-	-
Chloride	mg/L	-	120	109	181	131	100	36.9
Color (apparent)	TCU	-	30.9	31.2	41.0	22.9	21.2	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	5.3	9.3	9.5	6.3	6.8	9.6
Escherichia coli	cfu/100mL	100	40	70	388	30	5	-
Fecal coliform bacteria	cfu/100mL	4800	50	80	260	40	2	-
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	0.25	0.61	0.562	0.68	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	0.011	ND(0.050)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.23	8.02	8.18	8.05	-	-
Phenol	mg/L	0.005	0.0044	ND(0.0010)	0.0016	0.0022	-	-
Phosphorus	mg/L	0.01	0.0218	0.0126	0.0318	0.0151	0.0258	0.0343
Sulfate	mg/L	-	305	303	245	625	-	-
Total coliform bacteria	cfu/100mL	-	2700	1800	3000	500	50	-
Total dissolved solids (TDS)	mg/L	-	675	637	791	1250	936	548
Total kjeldahl nitrogen (TKN)	mg/L	-	0.51	0.45	0.91	0.51	-	-
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	6.8	8.4	14.0	ND(2.0)	-	-
Turbidity	NTU	-	3.24	7.27	10.5	2.93	-	-
Un-ionized ammonia	mg/L	0.02	0.0045	0.00159	0.0029	0.0112	0.0029	0.00079

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09	SW3-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-004	SW-45804-112614-TS-002	SW-45804-052715-TS-005	SW-45804-110915-TS-005	SW-45804-051810-MB-001	SW-45804-110510-TS-013
Sample Date:			5/28/2014	11/26/2014	5/27/2015	11/9/2015	5/18/2010	11/5/2010
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1440	582	1.15	1.53	1207	910
Dissolved oxygen (DO), field	mg/L	-	10.59	21.46	8.64	8.62	-	12.47
Oxidation reduction potential (ORP), field	millivolts	-	45	98.1	-	74	-	-
pH, field	s.u.	6.5-8.5	9.22	8.13	7.87	9.81	7.6	7.13
Temperature, field	Deg C	-	17.62	2.36	21.97	7.7	21	5.9
Turbidity, field	NTU	-	9.2	-	6.1	0.1	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	-	-	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	ND(100)	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	ND(250)	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	-	0.0011	0.0012	0.0012	ND(0.0005)	0.0009
Boron	mg/L	0.2	-	-	-	-	0.011	0.038
Cadmium	mg/L	0.0002	-	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	-	-	-	-	ND(0.002)	0.003
Cobalt	mg/L	0.0009	-	-	-	-	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	-	-	-	-	0.002	0.004
Iron	mg/L	0.3	-	0.129	0.830	0.585	-	-
Lead	mg/L	0.005	-	-	-	-	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.0757	0.132	0.117	-	-
Mercury	mg/L	0.0002	-	-	-	-	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0163	0.0124	0.0119	-	-
Nickel	mg/L	0.025	-	-	-	-	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	-	0.0124	0.0033	ND(0.0030)	ND(0.005)	0.011
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	135	143	138	-	-
Ammonia-N	mg/L	-	-	0.146	0.056	0.053	0.15	0.78
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	7	28
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	ND(2.0)	19.5	18.7	-	-
Chemical oxygen demand (COD)	mg/L	-	-	-	-	-	33	88
Chloride	mg/L	-	-	60.6	35.3	35.1	-	-
Color (apparent)	TCU	-	43.4	26.7	25.8	24.9	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	-	11.9	11.2	10.7	5.6	12.4
Escherichia coli	cfu/100mL	100	6	80	44	58	ND(10)	ND(2)
Fecal coliform bacteria	cfu/100mL	4800	15	140	70	80	-	-
Mineral oil and grease	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.62	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	0.2
Nitrite (as N)	mg/L	0.3	-	ND(0.30)	ND(0.30)	ND(0.30)	ND(0.1)	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	ND(1.0)	1.9
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	ND(1.0)	ND(1.0)
pH, lab	s.u.	6.5-8.5	-	-	-	-	7.95	8.14
Phenol	mg/L	0.005	-	-	-	-	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	-	0.0182	0.0852	0.137	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	30	2900	600 J	300 J	-	-
Total dissolved solids (TDS)	mg/L	-	-	792	474	468	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	-	-	-	-	1.55	3.48
Total phosphorus	mg/L	-	-	-	-	-	0.12	0.21
Total suspended solids (TSS)	mg/L	-	-	-	-	-	9	40
Turbidity	NTU	-	-	-	-	-	-	-
Un-ionized ammonia	mg/L	0.02	-	0.00101	0.0040	0.0038	-	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111110-TS-004	SW-45804-051711-MMD-005	SW-45804-111011-TS-001	SW-45804-111011-TS-002	SW-4	SW-4
Sample Date:			11/11/2010	5/17/2011	11/10/2011	11/10/2011	3/1/2012	4/1/2012
			Original	Original	Original	Duplicate	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	980	873	677	-	489	1020
Dissolved oxygen (DO), field	mg/L	-	12.91	10.95	18.38	-	15	10.1
Oxidation reduction potential (ORP), field	millivolts	-	-	218	-	-	-	-
pH, field	s.u.	6.5-8.5	6.6	7.37	8.62	7.47	-	-
Temperature, field	Deg C	-	9.69	13.5	7.2	7.2	-	-
Turbidity, field	NTU	-	-	0	57	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	ND(0.020)	-	-
Acenaphthene	µg/L	-	-	-	-	ND(0.020)	-	-
Acenaphthylene	µg/L	-	-	-	-	ND(0.020)	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	-	ND(0.020)	ND(0.020)	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	ND(0.020)	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	0.0060	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	ND(0.020)	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	ND(0.020)	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	ND(0.020)	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	ND(0.020)	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	ND(0.020)	-	-
Fluoranthene	µg/L	0.0008	-	-	-	ND(0.020)	-	-
Fluorene	µg/L	0.2	-	-	-	0.023	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	ND(0.020)	-	-
Naphthalene	µg/L	7	-	-	-	ND(0.020)	-	-
Phenanthrene	µg/L	0.03	-	-	-	ND(0.020)	-	-
Pyrene	µg/L	-	-	-	-	ND(0.020)	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	6/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0027	0.0014	0.0014	-	-	0.0024
Boron	mg/L	0.2	0.044	ND(0.050)	ND(0.050)	-	-	0.041
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.00010)	ND(0.00010)	-	-	ND(0.005)
Chromium	mg/L	-	ND(0.002)	ND(0.0010)	ND(0.0010)	-	-	ND(0.002)
Cobalt	mg/L	0.0009	ND(0.005)	0.00071	0.00089	-	-	ND(0.005)
Copper	mg/L	0.005	0.002	0.0015	0.0014	-	-	ND(0.002)
Iron	mg/L	0.3	-	0.630	0.817	-	-	-
Lead	mg/L	0.005	ND(0.02)	ND(0.0010)	ND(0.0010)	-	-	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	0.443	0.399	-	-	-
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00010)	ND(0.00010)	-	-	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	0.0087	0.0086	-	-	-
Nickel	mg/L	0.025	ND(0.01)	0.0025	0.0024	-	-	ND(0.01)
Zinc	mg/L	0.03	0.006	0.0041	ND(0.0030)	-	-	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	87	85	-	-	-
Ammonia-N	mg/L	-	0.09	ND(0.050)	ND(0.050)	-	-	ND(0.01)
Biochemical oxygen demand (BOD)	mg/L	-	8	-	-	-	-	3
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	9.1	8.3	-	-	-
Chemical oxygen demand (COD)	mg/L	-	61	78	72	-	-	40
Chloride	mg/L	-	-	80.3	81.0	-	-	-
Color (apparent)	TCU	-	-	-	-	125	116	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.7	21.2	21.8	-	-	10.3
Escherichia coli	cfu/100mL	100	4	-	-	158	132	28
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	1880 J	880 J	-
Mineral oil and grease	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Nitrate (as N)	mg/L	1.62	0.1	ND(0.10)	ND(0.10)	-	-	0.1
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.10)	ND(0.10)	-	-	ND(0.1)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	-	-	-	-	ND(1.0)
pH, lab	s.u.	6.5-8.5	8.33	9.49	9.57	-	-	8.21
Phenol	mg/L	0.005	ND(0.001)	ND(0.0010)	ND(0.0010)	-	-	ND(0.001)
Phosphorus	mg/L	0.01	-	0.197	0.203	-	-	-
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	420 J	1100 J	-
Total dissolved solids (TDS)	mg/L	-	-	579	596	-	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.38	2.19	1.66	-	-	1.73
Total phosphorus	mg/L	-	0.21	-	-	-	-	0.11
Total suspended solids (TSS)	mg/L	-	23	17.2	18.0	-	-	11
Turbidity	NTU	-	-	-	-	14.5	16.3	-
Un-ionized ammonia	mg/L	0.02	-	-	-	-	-	-

003798

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-45804-051412-MB-001	SW-45804-051412-MB-002	SW-45804-052312-MB-001	SW-45804-052312-MB-002	SW-4
Sample Date:			5/1/2012	5/14/2012	5/14/2012	5/23/2012	5/23/2012	6/1/2012
			Original	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1010	1000	-	1020	-	980
Dissolved oxygen (DO), field	mg/L	-	9.4	-	-	-	-	8.5
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	-	7.6	-	7.14	-	-
Temperature, field	Deg C	-	-	22.73	-	21.02	-	-
Turbidity, field	NTU	-	-	-	-	-	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	ND(250)	ND(250)	-	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
Acenaphthene	µg/L	-	-	-	-	-	-	-
Acenaphthylene	µg/L	-	-	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	-	ND(0.020)	ND(0.020)	-	-	-
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	-	ND(0.0050)	ND(0.0050)	-	-	-
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	-
Fluoranthene	µg/L	0.0008	-	-	-	-	-	-
Fluorene	µg/L	0.2	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	-
Naphthalene	µg/L	7	-	-	-	-	-	-
Phenanthrene	µg/L	0.03	-	-	-	-	-	-
Pyrene	µg/L	-	-	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45804-111212-MB-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0006	0.0019	0.001	0.0012	0.0008	ND(0.0010)
Boron	mg/L	0.2	0.047	0.047	0.038	0.049	0.057	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	0.003	0.003	0.076	0.02	0.0013
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	0.00074
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	0.003	0.005	0.004	0.0025
Iron	mg/L	0.3	-	-	-	-	-	0.745
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	-	-	0.346
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	-	-	0.0120
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	0.02	0.07	0.02	0.0035
Zinc	mg/L	0.03	0.006	0.008	ND(0.005)	0.016	0.009	0.0059
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	-	-	155
Ammonia-N	mg/L	-	ND(0.01)	0.24	ND(0.01)	0.31	0.08	0.161
Biochemical oxygen demand (BOD)	mg/L	-	6	ND(3)	3	8	13	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	-	-	14.0
Chemical oxygen demand (COD)	mg/L	-	58	52	30	70	52	62
Chloride	mg/L	-	-	-	-	-	-	47.5
Color (apparent)	TCU	-	-	-	-	-	-	76.8 J
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.9	10.3	8.3	9.2	11.5	12.0
Escherichia coli	cfu/100mL	100	230	420	650	60	100	60
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	-	-	140
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
Nitrate (as N)	mg/L	1.62	ND(0.1)	0.1	ND(0.1)	0.1	ND(0.1)	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(1.0)	ND(0.1)	ND(0.1)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(0.1)	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	-
pH, lab	s.u.	6.5-8.5	7.76	7.86	7.99	8	8	8.18
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)
Phosphorus	mg/L	0.01	-	-	-	-	-	0.318
Sulfate	mg/L	-	-	-	-	-	-	-
Total coliform bacteria	cfu/100mL	-	-	-	-	-	-	1000
Total dissolved solids (TDS)	mg/L	-	-	-	-	-	-	566
Total kjeldahl nitrogen (TKN)	mg/L	-	2.94	1.76	1.26	2.62	3.14	2.00
Total phosphorus	mg/L	-	0.29	0.19	0.12	0.32	0.21	-
Total suspended solids (TSS)	mg/L	-	20	11	9	69	34	50.0
Turbidity	NTU	-	-	-	-	-	-	39.0 J
Un-ionized ammonia	mg/L	0.02	-	-	-	-	-	0.003

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-4	SW-4	SW-45804-111212-MB-001
Sample Date:			7/1/2012	8/1/2012	9/1/2012	10/1/2012	11/1/2012	11/12/2012
			Original	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	1030	947	718	992	810	965
Dissolved oxygen (DO), field	mg/L	-	1.6	2	8.1	11.1	11.9	18.17
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	126
pH, field	s.u.	6.5-8.5	-	-	-	-	-	9.65
Temperature, field	Deg C	-	-	-	-	-	-	8.1
Turbidity, field	NTU	-	-	-	-	-	-	275
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	-	-	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	-	-	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	ND(100)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	-	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	-	-	-	-	-	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	-	-	ND(0.010)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.026)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.020)
Phenanthrene	µg/L	0.03	-	-	-	-	-	0.021
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	0.0009	0.0011	0.0010	0.0012	0.0015
Boron	mg/L	0.2	ND(0.050)	0.03	0.038	ND(0.050)	0.023	0.026
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.005)	ND(0.005)
Chromium	mg/L	-	0.0017	ND(0.002)	ND(0.002)	ND(0.0013)	ND(0.002)	0.002
Cobalt	mg/L	0.0009	0.00076	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.005)	ND(0.005)
Copper	mg/L	0.005	0.0027	0.002	0.002	0.0014	0.002	0.002
Iron	mg/L	0.3	0.830	-	-	0.152	-	-
Lead	mg/L	0.005	ND(0.0010)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.02)	ND(0.02)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.343	-	-	0.203	-	-
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00002)	ND(0.00002)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0123	-	-	0.0174	-	-
Nickel	mg/L	0.025	0.0035	ND(0.01)	ND(0.01)	0.0025	ND(0.01)	ND(0.01)
Zinc	mg/L	0.03	0.0061	0.033	0.013	ND(0.0030)	ND(0.005)	0.006
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	163	-	-	106	-	-
Ammonia-N	mg/L	-	0.171	0.88	0.47	0.797	ND(0.01)	0.02
Biochemical oxygen demand (BOD)	mg/L	-	-	ND(3)	ND(3)	-	ND(3)	ND(3)
Biochemical oxygen demand (carbonaceous)	mg/L	-	13.5	-	-	2.8	-	-
Chemical oxygen demand (COD)	mg/L	-	66	34	26	27	27	29
Chloride	mg/L	-	48.5	-	-	90.5	-	-
Color (apparent)	TCU	-	53.3 J	-	-	28.2 J	-	-
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	11.3	5.2	7.2	9.8	8.5	9.2
Escherichia coli	cfu/100mL	100	80	22	76	ND(10)	3	50
Fecal coliform bacteria	cfu/100mL	4800	210	-	-	40	-	-
Mineral oil and grease	mg/L	-	-	ND(1.0)	ND(1.0)	-	ND(1.0)	ND(1.0)
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.2	0.2	0.11	0.4	0.1
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.1)	ND(0.1)	ND(0.10)	0.1	ND(0.1)
Oil and grease (HEM), total	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
Oil and grease, animal and vegetable	mg/L	-	-	ND(1.0)	ND(1.0)	-	3.5	1.5
pH, lab	s.u.	6.5-8.5	8.15	7.72	8.35	8.18	8.09	8.15
Phenol	mg/L	0.005	ND(0.0010)	ND(0.001)	ND(0.001)	0.00091	ND(0.001)	ND(0.001)
Phosphorus	mg/L	0.01	0.115	-	-	0.0623	-	-
Sulfate	mg/L	-	-	-	-	340	-	-
Total coliform bacteria	cfu/100mL	-	1100	-	-	1000	-	-
Total dissolved solids (TDS)	mg/L	-	566	-	-	718	-	-
Total kjeldahl nitrogen (TKN)	mg/L	-	2.01	1.94	2.06	1.85	1.14	1.92
Total phosphorus	mg/L	-	-	0.13	0.08	-	0.05	0.19
Total suspended solids (TSS)	mg/L	-	44.0	7	14	4.4	5	48
Turbidity	NTU	-	31.9 J	-	-	2.71	-	-
Un-ionized ammonia	mg/L	0.02	0.003	-	-	0.000323	-	-

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-111212-MB-002	SW-4	SW-4	SW-45804-052313-TS-005	SW-4	SW-4
Sample Date:			11/12/2012	4/1/2013	5/1/2013	5/23/2013	6/1/2013	7/1/2013
			Duplicate	Original	Original	Original	Original	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	837	1080	1150	980	851
Dissolved oxygen (DO), field	mg/L	-	-	5.4	13.1	8.09	8.9	-
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	-
pH, field	s.u.	6.5-8.5	8.08	-	-	7.99	-	-
Temperature, field	Deg C	-	8.1	-	-	20.8	-	-
Turbidity, field	NTU	-	-	-	-	119	-	-
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	-	-	ND(100)	-	-
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	-	-	ND(250)	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	ND(100)	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(250)	-	-	ND(250)	-	-
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	ND(0.028)	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	-	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	-	-	ND(0.020)	-	-
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.010)	-	-	ND(0.0050)	-	-
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0008	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.020)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			9/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	0.0002	0.0003	ND(0.0001)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron	mg/L	0.2	0.025	0.007	0.027	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium	mg/L	0.0002	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium	mg/L	-	ND(0.002)	ND(0.002)	ND(0.002)	ND(0.0010)	0.0012	ND(0.0010)
Cobalt	mg/L	0.0009	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper	mg/L	0.005	ND(0.002)	ND(0.002)	ND(0.002)	0.0016 J	0.0026 J	0.0011
Iron	mg/L	0.3	-	-	-	0.360	0.557	0.226
Lead	mg/L	0.005	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	-	-	-	0.150	0.165	0.0571
Mercury	mg/L	0.0002	ND(0.00002)	ND(0.00002)	ND(0.00002)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	-	-	-	0.0078	0.0075	0.0124
Nickel	mg/L	0.025	ND(0.01)	ND(0.01)	ND(0.01)	0.0022 J	0.0043 J	ND(0.0020)
Zinc	mg/L	0.03	ND(0.005)	0.005	0.009	0.0072 J	0.0133 J	ND(0.0030)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	-	-	-	160	170	145
Ammonia-N	mg/L	-	ND(0.01)	ND(0.01)	0.99	0.659	0.696	0.190
Biochemical oxygen demand (BOD)	mg/L	-	5	ND(3)	8	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	-	-	-	3.3	3.9	ND(2.0)
Chemical oxygen demand (COD)	mg/L	-	33	25	11	70	72	39
Chloride	mg/L	-	-	-	-	51.4	50.5	84.2
Color (apparent)	TCU	-	-	-	-	43.5	45.6	32.0
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	10.1	9.9	11.3	10.6	10.5	9.1
Escherichia coli	cfu/100mL	100	2	18	96	30	20	1 J
Fecal coliform bacteria	cfu/100mL	4800	-	-	-	50	50	3 J
Mineral oil and grease	mg/L	-	ND(1.0)	ND(1.0)	ND(1.0)	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.1)	0.1	0.2	ND(0.10)	0.14	ND(0.10)
Nitrite (as N)	mg/L	0.3	ND(0.1)	ND(0.1)	ND(0.1)	ND(0.10)	ND(0.10)	ND(0.10)
Oil and grease (HEM), total	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
Oil and grease, animal and vegetable	mg/L	-	ND(1.0)	2	ND(1.0)	-	-	-
pH, lab	s.u.	6.5-8.5	8.2	8.33	8.03	8.16	8.23	8.20
Phenol	mg/L	0.005	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.0010)	0.0019	0.0014 J
Phosphorus	mg/L	0.01	-	-	-	0.0536	0.0788	0.0538 J
Sulfate	mg/L	-	-	-	-	183	181	240
Total coliform bacteria	cfu/100mL	-	-	-	-	4000	5000	300 J
Total dissolved solids (TDS)	mg/L	-	-	-	-	488	486	636
Total kjeldahl nitrogen (TKN)	mg/L	-	1.26	0.87	2.69	2.26	1.71	1.25
Total phosphorus	mg/L	-	0.1	0.04	0.1	-	-	-
Total suspended solids (TSS)	mg/L	-	8	ND(3)	10	8.8 J	14.0 J	4.4
Turbidity	NTU	-	-	-	-	6.76	10.0	3.15
Un-ionized ammonia	mg/L	0.02	-	-	-	0.000227	0.000240	0.0194

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-4	SW-4	SW-4	SW-45804-111313-TS-001	SW-45804-111313-TS-005	SW-45804-052814-MB-001
Sample Date:			9/1/2013	9/1/2013	11/1/2013	11/13/2013	11/13/2013	5/28/2014
			Original	Original	Original	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	775	699	765	824	-	1120
Dissolved oxygen (DO), field	mg/L	-	11.1	13.3	12.5	14.72	-	1.53
Oxidation reduction potential (ORP), field	millivolts	-	-	-	-	-	-	5
pH, field	s.u.	6.5-8.5	-	-	-	7.35	6.36	8.34
Temperature, field	Deg C	-	-	-	-	4.9	4.9	20.8
Turbidity, field	NTU	-	-	-	-	7.6	-	7
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-	-	-	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	-	-	-	ND(250)	ND(250)	ND(380)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	-
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	-
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	-	-	-	-	-	ND(0.020)
Acenaphthene	µg/L	-	-	-	-	-	-	ND(0.020)
Acenaphthylene	µg/L	-	-	-	-	-	-	ND(0.020)
Acridine	µg/L	-	-	-	-	-	-	ND(4.0)
Anthracene	µg/L	0.0006	-	-	-	ND(0.020)	ND(0.030)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-	-	-	-	-	ND(0.020)
Benzo(a)pyrene	µg/L	-	-	-	-	0.0086 J	0.0118 J	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	-	-	-	-	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	10	-	-	-	-	-	ND(0.040)
Benzo(g,h,i)perylene	µg/L	0.00002	-	-	-	-	-	ND(0.020)
Benzo(k)fluoranthene	µg/L	0.0002	-	-	-	-	-	ND(0.020)
Carcinogenic potency equivalent	µg/L	-	-	-	-	-	-	ND(0.060)
Chrysene	µg/L	0.0001	-	-	-	-	-	ND(0.020)
Dibenz(a,h)anthracene	µg/L	0.002	-	-	-	-	-	ND(0.020)
Fluoranthene	µg/L	0.0008	-	-	-	-	-	ND(0.020)
Fluorene	µg/L	0.2	-	-	-	-	-	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	-	-	-	-	-	-	ND(0.020)
Naphthalene	µg/L	7	-	-	-	-	-	ND(0.050)
Phenanthrene	µg/L	0.03	-	-	-	-	-	ND(0.020)
Pyrene	µg/L	-	-	-	-	-	-	ND(0.020)

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Metals (Total)								
Arsenic	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00063
Boron	mg/L	0.2	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.029
Cadmium	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium	mg/L	-	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	ND(0.0010)	0.00169 J
Cobalt	mg/L	0.0009	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	0.00040
Copper	mg/L	0.005	0.0012	ND(0.0010)	ND(0.0010)	0.0013	0.0012	0.0015
Iron	mg/L	0.3	0.239	0.180	0.173	0.284	0.248	0.545
Lead	mg/L	0.005	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00037
Magnesium	mg/L	-	-	-	-	-	-	-
Manganese	mg/L	-	0.0546	0.170	0.166	0.0449	0.0503	0.146
Mercury	mg/L	0.0002	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Mercury (dissolved)	mg/L	-	-	-	-	-	-	-
Molybdenum	mg/L	0.04	0.0120	0.0055	0.0053	0.0128	0.0130	0.00576
Nickel	mg/L	0.025	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0021	ND(0.0020)	0.0016
Zinc	mg/L	0.03	ND(0.0030)	0.0046	0.0043	0.0066 J	0.0030 J	0.0075
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	-	143	176	162	115	113	163
Ammonia-N	mg/L	-	0.193	1.88	1.93	0.084	0.128	ND(0.050)
Biochemical oxygen demand (BOD)	mg/L	-	-	-	-	-	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	ND(2.0)	4.7	4.1	2.4	2.0	16.2
Chemical oxygen demand (COD)	mg/L	-	30	43	41	36	29	130
Chloride	mg/L	-	84.5	47.2	46.9	87.5	87.5	50.7
Color (apparent)	TCU	-	32.4	36.0	38.5	35.5	36.0	80.9
Conductivity	umhos/cm	-	-	-	-	-	-	-
Dissolved organic carbon (DOC)	mg/L	-	8.8	10.9	11.2	12.7	12.0	15.9
Escherichia coli	cfu/100mL	100	4 J	100	90	180	220	60
Fecal coliform bacteria	cfu/100mL	4800	7 J	110	100	190	240	100
Mineral oil and grease	mg/L	-	-	-	-	-	-	-
Nitrate (as N)	mg/L	1.62	ND(0.10)	0.10	ND(0.10)	ND(0.020)	ND(0.020)	0.025
Nitrite (as N)	mg/L	0.3	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)	ND(0.010)	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-	-	-	-	-	-
Oil and grease, animal and vegetable	mg/L	-	-	-	-	-	-	-
pH, lab	s.u.	6.5-8.5	8.19	7.94	7.95	8.02	8.08	8.43
Phenol	mg/L	0.005	0.0034 J	ND(0.0010)	ND(0.0010)	0.0045 J	0.0025 J	0.0028 J
Phosphorus	mg/L	0.01	0.123 J	0.158	0.176	0.0697	0.0777	0.347
Sulfate	mg/L	-	241	115	114	96.4	96.1	82.9
Total coliform bacteria	cfu/100mL	-	500 J	600	900	1000	2000	26000
Total dissolved solids (TDS)	mg/L	-	632	406	404	384	405	390
Total kjeldahl nitrogen (TKN)	mg/L	-	1.01	2.94	2.29	1.35	1.30	1.05 J
Total phosphorus	mg/L	-	-	-	-	-	-	-
Total suspended solids (TSS)	mg/L	-	4.0	9.2	9.6	7.5	5.8	35.0
Turbidity	NTU	-	2.76	9.18	8.17	3.34	4.15	17.8
Un-ionized ammonia	mg/L	0.02	0.0198	0.0637	0.0429	0.0105	0.0165	ND(0.036)

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09	SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-052814-MB-002	SW-45804-112614-TS-004	SW-45804-112614-TS-005	SW-45804-052715-TS-001	SW-45804-052715-TS-002	SW-45804-110915-TS-002
Sample Date:			5/28/2014	11/26/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015
			Duplicate	Original	Duplicate	Original	Duplicate	Original
Parameters:	**Units**	**PWQO**						
Field Parameters								
Conductivity, field	uS/cm	-	-	319	-	0.453	0.453	0.462
Dissolved oxygen (DO), field	mg/L	-	-	16.58	-	8.12	8.12	9.76
Oxidation reduction potential (ORP), field	millivolts	-	-	16.5	-	-	-	49
pH, field	s.u.	6.5-8.5	-	8.34	8.34	8.39	8.28	9.57
Temperature, field	Deg C	-	-	3.16	3.2	23.84	23.84	9.6
Turbidity, field	NTU	-	-	-	-	0	0	2.2
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	110
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100)	-	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	520
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	ND(250)	ND(250)	ND(250)	-	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	250
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	-	-	-	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	880
Total Petroleum Hydrocarbons (C10-C16)	µg/L		-	-	-	-	-	110
Total Petroleum Hydrocarbons (C16-C34)	µg/L		-	-	-	-	-	520
Total Petroleum Hydrocarbons (C34-C50)	µg/L		-	-	-	-	-	250
Semi-Volatiles								
1-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-	-	-	-	-	-
2-Methylnaphthalene	µg/L	2	ND(0.020)	-	-	-	-	-
Acenaphthene	µg/L	-	ND(0.020)	-	-	-	-	-
Acenaphthylene	µg/L	-	ND(0.020)	-	-	-	-	-
Acridine	µg/L	-	ND(4.0)	-	-	-	-	-
Anthracene	µg/L	0.0006	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	ND(0.020)	-	-	-	-	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	ND(0.020)	-	-	-	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	ND(0.050)	-	-	-	-	-
Benzo(g,h,i)perylene	µg/L	0.00002	ND(0.020)	-	-	-	-	-
Benzo(k)fluoranthene	µg/L	0.0002	ND(0.020)	-	-	-	-	-
Carcinogenic potency equivalent	µg/L	-	ND(0.050)	-	-	-	-	-
Chrysene	µg/L	0.0001	ND(0.020)	-	-	-	-	-
Dibenz(a,h)anthracene	µg/L	0.002	ND(0.020)	-	-	-	-	-
Fluoranthene	µg/L	0.0008	ND(0.020)	-	-	-	-	-
Fluorene	µg/L	0.2	ND(0.020)	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	µg/L	-	ND(0.020)	-	-	-	-	-
Naphthalene	µg/L	7	ND(0.050)	-	-	-	-	-
Phenanthrene	µg/L	0.03	ND(0.020)	-	-	-	-	-
Pyrene	µg/L	-	ND(0.020)	-	-	-	-	-

Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO). July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value.
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09
Sample ID:			SW-45804-110915-TS-003
Sample Date:			11/9/2015
			Duplicate
Parameters:	**Units**	**PWQO**	
Metals (Total)			
Arsenic	mg/L	0.005	0.00064
Boron	mg/L	0.2	0.022
Cadmium	mg/L	0.0002	ND(0.000010)
Chromium	mg/L	-	0.00130 J
Cobalt	mg/L	0.0009	0.00031
Copper	mg/L	0.005	0.0012
Iron	mg/L	0.3	8.381
Lead	mg/L	0.005	0.00029
Magnesium	mg/L	-	-
Manganese	mg/L	-	0.139
Mercury	mg/L	0.0002	ND(0.000010)
Mercury (dissolved)	mg/L	-	-
Molybdenum	mg/L	0.04	0.00662
Nickel	mg/L	0.025	0.0016
Zinc	mg/L	0.03	0.0085
General Chemistry			
Alkalinity, total (as CaCO3)	mg/L	-	162
Ammonia-N	mg/L	-	0.051
Biochemical oxygen demand (BOD)	mg/L	-	-
Biochemical oxygen demand (carbonaceous)	mg/L	-	18.9
Chemical oxygen demand (COD)	mg/L	-	114
Chloride	mg/L	-	51.0
Color (apparent)	TCU	-	103
Conductivity	umhos/cm	-	-
Dissolved organic carbon (DOC)	mg/L	-	18.4
Escherichia coli	cfu/100mL	100	80
Fecal coliform bacteria	cfu/100mL	4800	100
Mineral oil and grease	mg/L	-	-
Nitrate (as N)	mg/L	1.82	0.022
Nitrite (as N)	mg/L	0.3	ND(0.010)
Oil and grease (HEM), total	mg/L	-	-
Oil and grease, animal and vegetable	mg/L	-	-
pH, lab	s.u.	6.5-8.5	8.37
Phenol	mg/L	0.005	0.0013 J
Phosphorus	mg/L	0.01	0.327
Sulfate	mg/L	-	83.5
Total coliform bacteria	cfu/100mL	-	31000
Total dissolved solids (TDS)	mg/L	-	385
Total kjeldahl nitrogen (TKN)	mg/L	-	4.27 J
Total phosphorus	mg/L	-	-
Total suspended solids (TSS)	mg/L	-	41.0
Turbidity	NTU	-	17.1
Un-ionized ammonia	mg/L	0.02	0.019

003808

Table E.4.4

Surface Water Analytical Results
2014 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09
Sample ID:			SW-45804-110915-TS-003
Sample Date:			11/9/2015
			Duplicate
Parameters:	**Units**	**PWQO**	
Field Parameters			
Conductivity, field	uS/cm	-	0.462
Dissolved oxygen (DO), field	mg/L	-	8.76
Oxidation reduction potential (ORP), field	milivolts	-	49
pH, field	s.u	6.5-8.5	8.37
Temperature, field	Deg C	-	9.6
Turbidity, field	NTU	-	2.2
Petroleum Products			
Petroleum hydrocarbons F1 (C6-C10)	µg/L	-	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	130
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	-
Petroleum hydrocarbons F3 (C16-C34)	µg/L	-	370
Petroleum hydrocarbons F3 minus Polynuclear Aromatic Hydrocarbons	µg/L	-	-
Petroleum hydrocarbons F4 (C34-C50)	µg/L	-	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-
Total Petroleum Hydrocarbons (C6-C50)	µg/L	-	500
Total Petroleum Hydrocarbons (C10-C16)	µg/L		130
Total Petroleum Hydrocarbons (C16-C34)	µg/L		370
Total Petroleum Hydrocarbons (C34-C50)	µg/L		ND(250)
Semi-Volatiles			
1-Methylnaphthalene	µg/L	2	-
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	2	-
2-Methylnaphthalene	µg/L	2	-
Acenaphthene	µg/L	-	-
Acenaphthylene	µg/L	-	-
Acridine	µg/L	-	-
Anthracene	µg/L	0.0008	ND(0.020)
Benzo(a)anthracene	µg/L	0.0004	-
Benzo(a)pyrene	µg/L	-	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-
Benzo(b)pyridine (Quinoline)	µg/L	10	-
Benzo(g,h,i)perylene	µg/L	0.00002	-
Benzo(k)fluoranthene	µg/L	0.0002	-
Carcinogenic potency equivalent	µg/L	-	-
Chrysene	µg/L	0.0001	-
Dibenz(a,h)anthracene	µg/L	0.002	-
Fluoranthene	µg/L	0.0003	-
Fluorene	µg/L	0.2	-
Indeno(1,2,3-cd)pyrene	µg/L	-	-
Naphthalene	µg/L	7	-
Phenanthrene	µg/L	0.03	-
Pyrene	µg/L	-	-

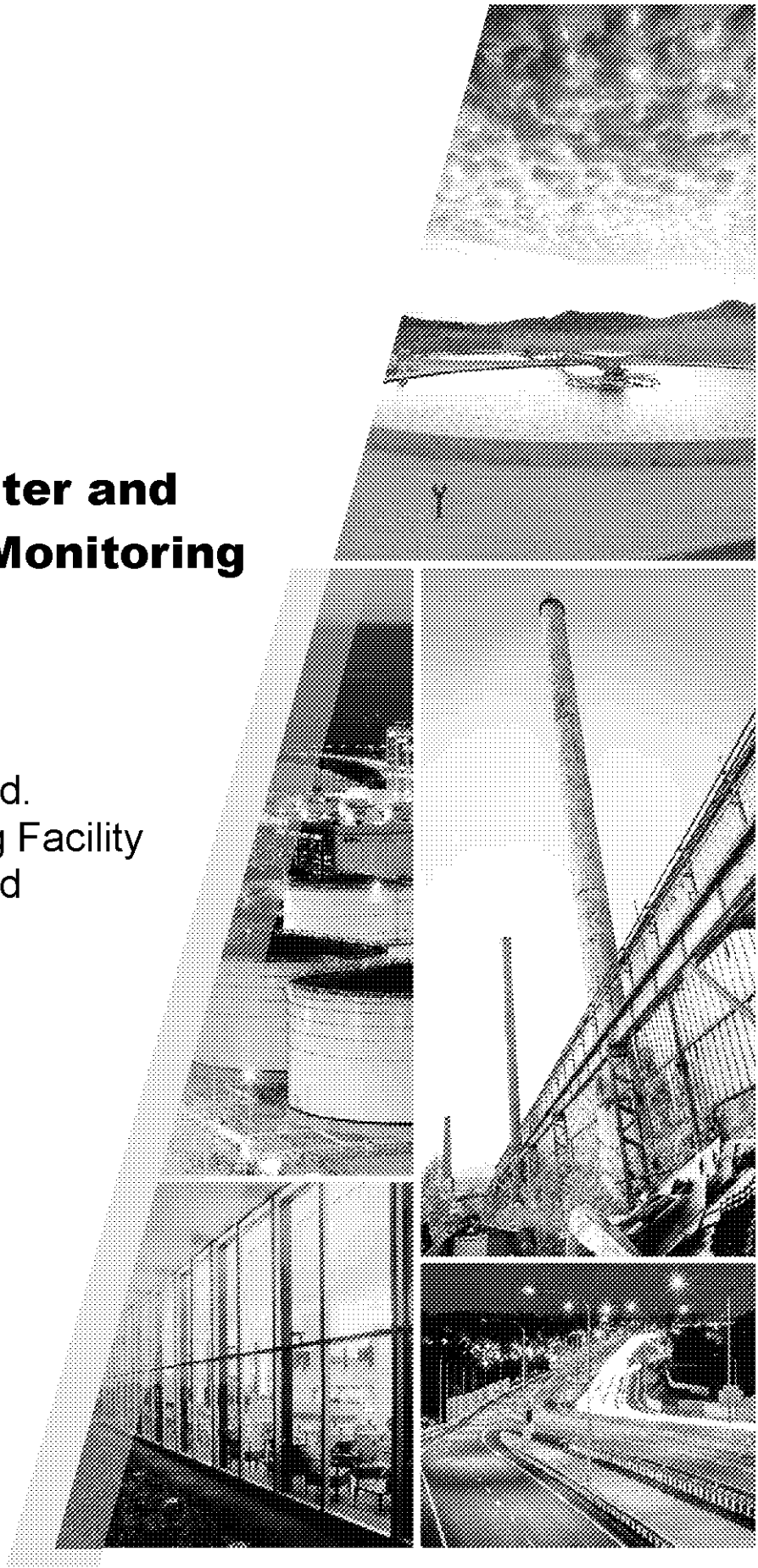
Notes:

(1) Ministry of Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
J - Estimated concentration.
ND - Non-detect at associated value
U - Not present at or above the associated value.
R - Rejected.
- - Not analyzed.
[ ] - Exceedence of the PWQO

608309

www.ghd.com





2019 Groundwater and Surface Water Monitoring Report

Convertus Canada Ltd.
Organics Composting Facility
5123 Hawthorne Road
Ottawa, Ontario

Executive Summary

GHD was retained by Convertus Canada Ltd. (formerly Renewi Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Convertus Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

The 2019 Monitoring Program was completed in general accordance with the requirements of the Facility's *Industrial Sewage Works Environmental Compliance Approval (*No. 2844-9YNGZC) as amended on February 1, 2017.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

GHD completed three monitoring events at the Site in 2019: June, September, and November. Monitoring included groundwater elevation measurements, groundwater quality sampling, and surface water sampling. Based on the groundwater elevations gathered in June, September and November 2019, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.

Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being affected by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with the presence of an organic contaminant source.

Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing ammonia concentrations during previous monitoring periods had been observed downgradient of the Facility at TW-8, however recent results show decreases and stabilization in ammonia concentrations. Based on the expanded dataset of water quality from 2019, there is no evidence that Facility operations are having a significant affect on deep bedrock groundwater quality.

The 2019 groundwater quality results were assessed using the Site's Trigger Level Program. Within the shallow unconfined aquifer, ammonia was found at concentrations greater than those specified by the Site's trigger concentrations at several of the near Facility monitoring wells as well as some downgradient monitoring locations.

In the unconfined shallow aquifer, Tier I trigger level exceedances were noted at five monitoring locations in 2019. These locations included MW5-09, MW101-13, MW102-09, and MW105-13 (spring and fall) and MW104-13 (spring). During fall 2019, multiple trigger level parameters were exceeded at MW104-13 (ammonia and nitrate). Therefore, MW5-09, MW101-13, MW102-09, and MW105-13 will be sampled according to the Tier I sampling protocol and MW104-13 will be sampled according to the Tier II sampling protocol during the spring 2020 monitoring event.

In the deep bedrock aquifer, a single trigger level exceedance (ammonia) was noted at monitoring well TW-4 (spring). Multiple trigger level exceedances (ammonia and nitrate) were noted at TW-4 (fall) and TW-8 (spring and fall). Therefore, monitoring locations TW-4 and TW-8 will be sampled under Tier II protocols during the spring 2020 monitoring event.

Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2019 monitoring period.

Surface water was discharged once from the on-Site Stormwater Management Pond during the 2019 monitoring period (April). All parameters were below their respective trigger levels, listed in the Site ECA, in samples collected from the Stormwater Management Pond prior to discharging.

Substantial improvements were made to Site operations during a significant capital upgrade effort undertaken in 2019 totalling $8.5 million. The following points summarize the main improvements:

- The original ammonia scrubber was removed and replaced with three new ammonia scrubber units. Leakage from the old ammonia scrubber was suspected to be a contributing source to the elevated ammonia concentrations observed in shallow groundwater adjacent to the facility.
- The floors in the vicinity of the ammonia scrubber were bermed and sealed with a chemical-resistant epoxy coating to reduce the possibility of leakage from within the Facility to the subsurface via leaking through cracks in the floor.
- EW107-15 was plumbed directly into the Facility's process water supply system. EW107-15 is now used as the principal source of water supply for process-related demands, replacing the stormwater retention pond. This improvement allowed for a significant increase in the amount of groundwater extracted from EW107-15 during 2019, which is expected to continue in future years.
- The SCADA system controlling and logging the operation of EW107-15 was upgraded to improve tracking of groundwater extraction volumes.
- Changes to Facility operations have been implemented to ensure that the receiving, processing, storage, and shipping operations are completed in such a way that stockpiling of materials is significantly minimized. These operational changes have improved the Facility's throughput and significantly reduced on-Site storage times of both processed and unprocessed materials which would minimize leachate runoff.
- Significant improvements have been made in the management of leachate within the composting process. Higher volumes of leachate are now recycled within the composting tunnels, and less comingling occurs between leachate and duct condensate water reducing the volume of excess leachate requiring UST storage while awaiting off-site disposal.
- Two new composting tunnels were commissioned (Tunnels #8 & #9), two new storage tunnels were constructed (Tunnels #9 & #10) that could be outfitted as composting tunnels at a future date, a new biofilter was built (Biofilter #3) and a new ventilation system was installed throughout the processing areas to capture odour while minimizing fog during the winter months.

Table of Contents

1. Introduction 1
   - 1.1 Site Background 1
   - 1.2 Site Setting 2
   - 1.3 Site Processes 3
   - 1.4 Site Improvements – 2019 3
   - 1.5 MECP Correspondence to Date 5
2. Physical Setting 6
   - 2.1 Site Geology 6
   - 2.2 Site Hydrogeology 8
   - 2.3 Surface Water and Drainage Features 8
   - 2.4 Groundwater Use 9
3. Monitoring Program 9
   - 3.1 Monitoring Network 10
   - 3.2 Monitoring Protocol 10
     - 3.2.1 Groundwater Monitoring 10
     - 3.2.2 Surface Water Monitoring 11
   - 3.3 Quality Assurance/Quality Control Program 11
4. Monitoring Results 12
   - 4.1 Groundwater Hydraulic Monitoring 12
   - 4.2 Water Quality Monitoring 14
     - 4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality 14
     - 4.2.2 Deep Bedrock Aquifer Groundwater Quality 19
     - 4.2.3 Surface Water Quality 21
5. Shallow Groundwater Extraction System 23
6. Compliance and Trigger Level Program 24
   - 6.1 Trigger Parameters 24
   - 6.2 Trigger Concentrations 24
   - 6.3 Trigger Level Assessment 25
7. MECP Correspondence 27
   - 7.1 MECP Surface Water Comments 27
   - 7.2 MECP Groundwater Comments 27
8. Conclusions 28
9. Recommendations 29
10. References 29

Figure Index

Figure 1.1	Site Location Map
Figure 1.2	Site Plan
Figure 3.1	Groundwater and Surface Water Monitoring Locations
Figure 3.2	Convertus Property Groundwater and Surface Water Monitoring Locations
Figure 4.1	Unconfined Shallow Groundwater Elevations – June 17-18, 2019
Figure 4.2	Unconfined Shallow Groundwater Elevations – November 26-27, 2019
Figure 4.3	Bedrock Groundwater Elevations – June 17-18, 2019
Figure 4.4	Bedrock Groundwater Elevations – November 26-28, 2019
Figure 4.5	Median 2019 Ammonia Concentration Isopleths
Figure 4.6	Median 2019 Dissolved Iron Concentration Isopleths
Figure 4.7	Median 2019 Dissolved Manganese Concentration Isopleths
Figure 4.8	Median 2019 Dissolved Organic Carbon Concentration Isopleths
Figure 4.9.1	Temporal Plots Selected Parameters - MW1-08
Figure 4.9.2	Temporal Plots Selected Parameters - MW2-08
Figure 4.9.3	Temporal Plots Selected Parameters - MW3-08
Figure 4.9.4	Temporal Plots Selected Parameters - MW4-08 & MW4-09
Figure 4.9.5	Temporal Plots Selected Parameters - MW5-09
Figure 4.9.6	Temporal Plots Selected Parameters - MW101-09 & MW101-13
Figure 4.9.7	Temporal Plots Selected Parameters - MW102-09
Figure 4.9.8	Temporal Plots Selected Parameters - MW103-09
Figure 4.9.9	Temporal Plots Selected Parameters - MW104-13
Figure 4.9.10	Temporal Plots Selected Parameters - MW105-13
Figure 4.9.11	Temporal Plots Selected Parameters - MW106-15
Figure 4.9.12	Temporal Plots Selected Parameters - EW107-15
Figure 4.10	Northern Ditch Topography with June 17-18, 2019 Groundwater Contours
Figure 4.11.1	Temporal Plots Selected Parameters - TW-7
Figure 4.11.2	Temporal Plots Selected Parameters - TW-4
Figure 4.11.3	Temporal Plots Selected Parameters – TW-8
Figure 4.12	Temporal Plot Select Parameter – SW-4

Table Index

Table 2.1	Monitoring Location Details
Table 3.1	Monitoring Program Schedule
Table 4.1	Groundwater Elevations
Table 4.2	Shallow Unconfined Aquifer Groundwater Analytical Results
Table 4.2A	MW103-09 Analytical Results – PWQO Comparison
Table 4.3	Deep Bedrock Aquifer Groundwater Analytical Results
Table 4.4	Surface Water Analytical Results
Table 4.5	SW-4 Monthly Sampling Analytical Results
Table 5.1	EW107-15 Daily Pumping Log

Appendix Index

Appendix A	Environmental Compliance Approval (No. 7251-8GKRPD and No. 2844-9YNGZC)
Appendix B	Background Correspondence
	Appendix B.1 Compliance and Trigger Level Program Memorandum
	Appendix B.2 Monitoring Program Rationalization Memorandum
	Appendix B.3 Groundwater Assessment and Work Plan Memorandum
Appendix C	Stratigraphic and Instrumentation Logs
	Appendix C.1 Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs
	Appendix C.2 Deep Bedrock Water Well and Stratigraphic Logs
Appendix D	QA/QC Assessment Memorandum and Laboratory Analytical Reports
Appendix E	2010 – 2019 Analytical Data

1. Introduction

GHD was retained by Convertus Canada Ltd. (formerly Renewi Canada Ltd.) to conduct a Groundwater and Surface Water Monitoring Program (Monitoring Program) at the Convertus Source Separated Organics (SSO) Processing Facility (Facility) located at 5123 Hawthorne Road in Ottawa, Ontario (Site).

A Site location map is provided on Figure 1.1.

The 2019 Monitoring Program was completed in general accordance with the requirements of the Facility's *Industrial Sewage Works Environmental Compliance Approval (*No. 2844-9YNGZC) as amended on February 1, 2017 (herein referred to as the ECA). A copy of the Facility's ECA is provided as Appendix A which is included on the USB stick at the end of this report. Please note that all Appendices are included on the USB stick.

The purpose of the Monitoring Program is, in accordance with the ECA, to assess the potential for Site activities to adversely affect the surrounding surface water and groundwater quality.

1.1 Site Background

The Site consists of an area of approximately 10-hectares that is located within an industrial development area. The area, known as the Hawthorne Industrial Park, occupies a surface area of approximately 80-hectares (referred to herein as the HIP subdivision) and has been developed by R.W. Tomlinson (Tomlinson) as an industrial business area. Convertus is a tenant of Tomlinson.

Between June and August 2008, GHD conducted Phase I and II Environmental Site Assessment (ESA) investigations for Tomlinson to determine the general suitability of the HIP subdivision lands for development as an industrial park. More specifically, the ESAs were completed to support a Site Plan Control Application for the lease and subsequent development and operation of the SSO Facility in the southwest portion of the HIP (CRA, 2008a). GHD submitted the ESAs to the City of Ottawa on behalf of Convertus.

Site clearing and preparation was completed in 2008, Facility was constructed during 2009, and initial receipt of materials for processing was in January of 2010.

The 2008 groundwater monitoring/sampling activities included sampling of ten shallow aquifer wells (MW1-08 to MW10-08) and three surface water locations (SW1 to SW3). In addition, Golder Associates Ltd. (Golder) conducted a pumping test and sampling of the deep groundwater wells in August 2008 (TW-2 and TW-3) and October 2008 (TW-4 to TW-6) (Golder, 2008).

In 2009, GHD was tasked by Convertus to generate the Monitoring Program, based on a request from the Ministry of Environment, Conservation & Parks (MECP) through the process of reviewing the ECA application. In March 2010, the Monitoring Program was modified through an ECA amendment to reflect Site conditions and monitoring well availability. Further modifications to the monitoring program were required in 2013, to reflect additional changes in the monitoring well network (replacement and addition of new monitoring wells).

Condition 9(8) of the former ECA (Industrial Sewage Works No. 7251-8GKRPD) states that:

> *"the Owner shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this Certificate to the Director and the District Manager."*

In order to satisfy this condition, GHD prepared a Compliance and Trigger Level Monitoring Program (TLP) in 2014/2015. The TLP was submitted to the MECP along with an application to amend the ECA in March 2015. The updated TLP uses a focused set of parameters and statistically based upper tolerance limits (UTLs) developed from historical data for the purpose of setting Site-specific trigger levels for the selected parameters. A complete discussion and assessment consistent with the TLP is included in Section 6. For reference, a copy of the memorandum sent to the MECP that outlines the updated TLP is included in Appendix B.1.

GHD prepared a Monitoring Program Rationalization (MPR) for the Site during 2015. The purpose of the MPR was to ensure that groundwater and surface water was being adequately monitored. This was accomplished through a review of the monitoring program and removal of any redundant or unnecessary monitoring. The principal recommendations of the MPR are as follows:

- Incorporate the proposed monitoring and extraction wells into the monitoring program upon installation
- Reduce monitoring from quarterly to three times per year
- Remove polycyclic aromatic hydrocarbon and petroleum hydrocarbon monitoring from the program

A copy of GHD's memorandum outlining the MPR is included in Appendix B.2.

On February 1, 2017, the MECP issued a revised ECA (No. 2844-9YNGZC) for the Facility. The revised ECA incorporates the updated TLP submitted to the MECP in March 2015.

The 2019 monitoring program was completed in accordance to the schedules in the revised ECA. A copy of the revised ECA is included in Appendix A.

This report presents an assessment of the groundwater and surface water quality at the Site and covers the period between January and December 2019.

1.2 Site Setting

The Site is located at the southwest corner of the HIP subdivision lands, located within the former Township of Gloucester (community of South Gloucester), which was amalgamated in January 2001 as part of the City of Ottawa. The HIP subdivision was developed by Tomlinson, and is located southeast of the Hawthorne Road and Rideau Road intersection, in the southeast area of the City of Ottawa.

The layout of the Site, commencing at the western portion of the Site off the Hawthorne Road entrance, consists of a large processing plant with a delivery/receiving area, administrative office, septic bed area, and emission stack. An asphalt skirt extends around three sides of the building, which slopes north, east, and south towards an on-Site perimeter ditch system. The on-Site

perimeter ditch system drains to the storm water management (SWM) pond located at the east side of the Site. The layout of the SWM and the drainage ditches are illustrated on Figure 1.2.

Surface water run-off from the Site generally drains to the on-Site perimeter ditch system which, in turn, drains to the on-Site SWM pond where it is impounded until it is manually released off-Site. Water that is released flows through local roadside ditches within the HIP subdivision, which discharge to a central stormwater dry pond for the HIP subdivision, and then to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

The central and southwestern portions of the Site are unfinished and consist of exposed bedrock, gravelly sands, levelled fill material, and a few shrubs and grass scrub.

Historically, since the early 1990's, the HIP Subdivision lands have been used for the placement of inert fill from construction and demolition projects and as a temporary storage area for precast concrete pipe and chambers. The fill placement on the HIP lands represented materials that were being progressively used for backfill/leveling operations throughout the Industrial Park. A ditch used to convey groundwater pumped from the Rideau Road Quarries (Quarry #1 and Quarry #2) and the Dibblee Quarry (all located west/southwest of the Site) has been observed along the western and northern boundaries of the HIP subdivision. This ditch eventually flows into the Findlay Creek Municipal Drain at the northeast corner of the HIP subdivision. Findlay Creek Municipal Drain is situated along the northeastern boundary of the HIP subdivision.

1.3 Site Processes

The Facility is an aerobic composting operation that is approved to receive and process organics including source separated organics (SSO), leaf & yard waste, food wastes, commercial waste (restaurant wastes, etc.) and certain organic sludges. Organics are processed into a Non-Agricultural Source Material (NASM) and into animal bedding for agriculturally-beneficial applications. The Facility is designed to receive and process organics, to manage the resulting products and emissions, and to manage environmental impacts that are a result of the processing operations.

Storm water run-off from the Site drains to the on-Site SWM pond in accordance with the Site's ECA. Convertus undertakes analysis and testing of the pond water in accordance with the Site's ECA. If analysis and testing show acceptable water quality, the excess stormwater can be discharged into the HIP roadside ditch network.

1.4 Site Improvements – 2019

Several substantial improvements were made to Site operations during a significant capital upgrade effort undertaken in 2019 totalling $8.5 million. A principal objective of these improvements was to continue to improve the Facility's environmental performance. Several of the improvements relate directly to the groundwater remediation system, as discussed below.

The following points summarize the main improvements implemented:

- The original ammonia scrubber was removed and replaced with three new ammonia scrubber units. Leakage from the old ammonia scrubber was suspected to be a contributing source to the elevated ammonia concentrations observed in shallow groundwater adjacent to the Facility.
- The floors in the vicinity of the ammonia scrubber were bermed and sealed with a chemical-resistant epoxy coating to reduce the possibility of leakage from within the Facility to the subsurface via leaking through cracks in the floor.
- EW107-15 was plumbed directly into the Facility's process water supply system. EW107-15 is now used in place of the stormwater management pond as the principal source of make-up water supply for process-related demands. Process water is used to spray on the compost tunnels, used in the ammonia scrubbers and bioscrubbers, used to humidify the biofilters, and is used as fire suppression water supply. This improvement allowed for a significant increase in the amount of groundwater extracted from EW107-15 during 2019, which is expected to continue in future years.
- The SCADA system controlling and logging the operation of EW107-15 was upgraded to improve tracking of groundwater extraction volumes.
- Changes to Facility operations have been implemented to ensure that the receiving, processing, storage and shipping operations are completed in such a way that stockpiling of materials is significantly minimized. These operational changes have improved the Facility's throughput and significantly reduced on-Site storage times of both processed and unprocessed materials which would minimize leachate runoff.
- Significant improvements have been made in the management of leachate within the composting process. Higher volumes of leachate are now recycled within the composting tunnels, and less comingling occurs between leachate and duct condensate water reducing the volume of excess leachate requiring UST storage while awaiting off-site disposal.
- Two new composting tunnels were commissioned (Tunnels #8 & #9), two new storage tunnels were constructed (Tunnels #9 & #10) that could be outfitted as composting tunnels at a future date, a new biofilter was built (Biofilter #3) and a new ventilation system was installed throughout the processing areas to capture odour while minimizing fog during the winter months.

Acting on a recommendation of the MECP Technical Services Branch, GHD and Convertus staff undertook an 8-hour pumping test at EW107-15 on July 30, 2019. The test was undertaken to better understand the zone of hydraulic influence of EW107-15. The test was conducted at a pumping rate of 34.5 litres per minute (LPM) with a total observed drawdown of approximately 0.06 m in EW107-15. No drawdown was observed at any contiguous monitoring wells during the test.

The results of this pumping test confirm that the transmissivity of the shallow flow zone is high in the vicinity of EW107-15 (approximately 1,015 m^2/day). In addition, the maximum capture width upgradient of the extraction well was calculated to be only 2.5 m (~8 feet).

Groundwater extraction at EW107-15 is considered an appropriate remedial strategy, despite the limited capture zone, because of the position of this well in the interpreted zone of most pronounced impact. Removal of impacted shallow groundwater at this location will result in significant contaminant mass reduction in the subsurface and over the long-term will augment existing natural

attenuation processes at further reducing concentrations downgradient of the interpreted source area.

1.5 MECP Correspondence to Date

The correspondence below documents selected communications between Convertus and the MECP with regards to the application, requested amendments, and subsequent issuance of the Site's current ECA (Industrial Sewage Works) No. 2844-9YNGZC (formerly covered under ECA No. 7251-8GKRPD):

- Application for Approval of Industrial Sewage Works, Storm Water Management Facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; September 19, 2008) (CRA, 2008b).
- Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29 (CRA; June 25, 2009).
- Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MOE; September 16, 2009).
- Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario (CRA; February 5, 2010a).
- Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2010b).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; September 7, 2010).
- Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (CRA; March 18, 2010c).
- Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3 (MOE; May 30, 2011).
- Letter RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility — SWM Pond, from Ministry of the Environment Ottawa District Office (MOE, September 13, 2013).
- Memorandum RE: Groundwater Assessment and Work Plan – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; July 16, 2014).
- Memorandum RE: Recommended Compliance and Trigger Level Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 3, 2015a).

- Memorandum RE: Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario (CRA; February 27, 2015b).
- Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario (CRA; March 25, 2015d).
- Memorandum RE: Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa- Hydrogeologic Assessment from Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region (MECP, January 3, 2017a).
- Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario (MECP, February 1 ,2017b).

2. Physical Setting

2.1 Site Geology

The Site-specific geology was determined through visual examination of the soil samples collected across the HIP subdivision lands during previous investigations and through examination of the stratigraphic logs.

A total of 19 monitoring wells and one extraction well have been completed in the shallow unconfined aquifer unit throughout the HIP subdivision, 16 of which have been completed within the limits of the Convertus Site.

Test wells (TW-1 to TW-6) were completed by Golder in 1993 and 2008. TW-1 through TW-6 extend into the deep bedrock aquifer unit which was identified as the Nepean bedrock formation (Golder Associates, 2008).

In May 2010, GHD oversaw the installation of two on-Site deep bedrock test wells (TW-7 and TW-8). The stratigraphic logs from GHD's monitoring wells confirmed the presence of sandstone but also identified limestone at TW-8.

Ontario Geologic Survey (OGS) mapping shows the Oxford Formation (Dolostone) covers much of the Site with the March and Nepean Formations (Dolostone/Sandstone formations) present in the Northern portions of the HIP (OGS, Map 1508A).

The geological unit intercepted at each well is summarized in the monitoring well construction details provided in Appendix C for the overburden and deep bedrock wells. Monitoring location details are provided in Table 2.1.

Examination of the stratigraphic logs prepared by GHD indicates that the geology is generally consistent across the HIP subdivision. Five main geologic units were identified across the area investigated; these units are:

- Heterogeneous fill
- Topsoil layer

- Alluvial sand and silts
- Glacial till
- Bedrock

The topography and geology observed throughout the region are remnants of glacial scour, and more recently, marine deposits with some removal by fluvial erosion. The Site is located on a former quarry and thus filling activities have been carried out since the early 1990's which have significantly altered the local topography.

For 15 years or so prior to Facility construction, portions of the HIP subdivision have reportedly received inert fill from construction and demolition projects throughout the Ottawa area. The fill material received at the HIP subdivision was historically used to level some of the ground surface; however, the southern and eastern areas have historically received very little amounts of fill.

The HIP subdivision is generally flat with the exception of the southwest corner, where there formerly existed a rock knoll, now a rock outcrop. The top of this rock outcrop is approximately 10 m higher than the surrounding grades of the HIP subdivision.

The geology and hydrogeology of the geological units identified are discussed below.

Fill

Results of borehole drilling and soil sampling investigations by GHD indicate that most of the HIP subdivision is overlain by fill material. The fill was found to be heterogeneous and generally consisted of a granular matrix (sand, silts, and gravel) with traces of construction waste (concrete, asphalt, wood, and brick), occasionally some clay, boulders, and dredged sediment. The fill material was generally observed to be in a compact and moist state.

Topsoil

The topsoil found was generally fine silty sand with organic material. It was dark brown to black in colour, and was generally loose and moist. Topsoil was found in most locations that were not used as roads. In several locations, the topsoil contained roots and wood debris.

Alluvial Sands and Silts

Underlying the fill and/or topsoil, alluvial sand and silt deposits were observed. Where encountered, these deposits were found to vary in density from loose to dense, and generally described as very moist to wet.

Glacial Till

A glacial till was encountered below the fill and/or alluvial sands and silts in the western half of the HIP subdivision. The glacial till encountered was predominately a silty sand matrix with some gravel, cobbles, and trace clay and boulders. The material was brown to grey in colour, was generally very moist to wet, and was in a compact to dense state. The glacial till was observed to be directly overlying the bedrock.

Bedrock

On a regional basis, the bedrock underlying the HIP subdivision consists predominantly of limestone, sandstone, and dolostone of the Nepean, March and Oxford Formations. Top of bedrock was observed at depths varying from surface outcrops to a depth of approximately 7.6 metres below ground surface (m bgs) at the location of MW6-08. Bedrock core extending from 1.1 to 2.6 m into the bedrock was collected from MW2-08 and MW4-08 to identify and characterize the bedrock. The bedrock at MW2-08 and MW4-08 was described as fractured grey limestone. The bedrock was generally found to be fractured in the upper meter, where core recovery ranged from 93 to 94 percent and Rock Quality Designation (RQD) ranged from 63 to 75 percent. At depths in excess of 1 m into the bedrock, at MW2-08, the bedrock was found to be more competent with a recovery of 100 percent and a RQD of 93 percent.

2.2 Site Hydrogeology

Based on the review of information, the geological sequence observed at the HIP subdivision can be grouped into the two main hydrogeological units:

- A shallow unconfined groundwater unit (referred to as shallow unconfined aquifer) within the permeable fill, alluvial sands and silts and shallow fractured bedrock.
- A deep confined bedrock unit (referred to as the deep bedrock aquifer).

The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA, 2008a). Additional groundwater information regarding groundwater flow direction and velocity within the unconfined shallow aquifer unit is discussed in Section 4.1.

As part of GHD's Phase II ESA in 2008 (CRA, 2008a), an assessment of the connectivity between the shallow unconfined aquifer unit and the underlying deep bedrock aquifer unit was conducted by performing pumping tests at TW-1 through TW-3 in the deep bedrock aquifer unit. During the pumping test, water levels gathered from the shallow unconfined aquifer unit indicated no corresponding drawdown between the shallow and deep wells. Water levels in the deep bedrock aquifer unit lowered from 1.2 to 3.7 m during the 6-hour period. Based on the data, it was concluded that the shallow unconfined aquifer unit and the deep bedrock aquifer units are not hydraulically connected.

2.3 Surface Water and Drainage Features

Surface water run-off from the HIP subdivision generally drains through local ditches to Findlay Creek Municipal Drain, to Shields Creek, to North Castor River, to South Nation River, and then to the Ottawa River.

A series of ditches within the Site drains to the on-Site SWM pond. The flow of the water from the SWM pond is controlled by a valve that outlets to a ditch which runs along the HIP subdivision internal roadway (Somme Street), towards the east through a central SWM pond, eventually outletting to Findlay Creek.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek; this ditch does not connect to the Convertus Site at Hawthorne Road or to Somme Street.

2.4 Groundwater Use

Water well data reviewed by GHD shows that the shallow unconfined water table unit is not locally used as a potable water source (Golder, 2008) (deemed unsuitable due to proximity to ground surface, limited saturated thickness, and low yield). The water well records indicate that the deep bedrock aquifer test wells located in proximity of the HIP subdivision are all installed within the deep bedrock aquifer formation at depths generally at or in excess of 30 m bgs (Appendix C.2). Bottled water is brought in for consumption at the Site, while water from TW-4 supplies sinks, showers, toilets, and the dishwashing machine for the Facility. If necessary, TW-4 can also be used as an alternative refilling source for replenishing the fire suppression water holding tank.

3. Monitoring Program

In accordance with recommendations of the Groundwater/Surface Water Monitoring Program (CRA, 2009) and Amendment Application (CRA, 2010b), GHD has completed ongoing monitoring from 2009 to present.

The following monitoring activities were completed at the Site during the current monitoring period:

- June 2019 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples
- September 2019 - Tri-annual sampling:
  - Hydraulic monitoring and sampling at six shallow unconfined aquifer wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW106-15) and one deep bedrock aquifer well (TW-4)
  - Sampling and hydraulic monitoring at the extraction well, EW107-15
  - Hydraulic monitoring of the staff gauges in the northern ditch
  - Collection and analysis of QA/QC samples
- November 2019 - Semi-annual sampling:
  - Sampling at four surface water locations (SW-1 to SW-4)
  - Sampling and hydraulic monitoring at all shallow unconfined aquifer and deep bedrock aquifer wells

- Sampling and hydraulic monitoring at the extraction well, EW107-15
- Hydraulic monitoring of the staff gauges in the northern ditch
- Collection and analysis of QA/QC samples

3.1 Monitoring Network

Currently the groundwater monitoring network consists of the following monitoring wells:

- Shallow unconfined aquifer unit: 11 groundwater monitoring wells and one extraction well: MW01-08, MW2-08, MW3-08, MW4-09, MW5-09, MW101-13, MW102-09, MW103-09, MW104-13, MW105-13, MW106-15, and EW107-15.
- Deep bedrock aquifer unit: three monitoring wells: TW-4, TW-7, and TW-8.

Surface water quality is monitored through four surface water monitoring locations (SW-1 to SW-4). Surface water level monitoring in the northern ditch is monitored by the four staff gauges (SG-1 through SG-4).

Table 3.1 provides a summary of the 2019 monitoring program.

The groundwater and surface water monitoring locations within the HIP subdivision are provided on Figure 3.1. Figure 3.1 also shows the Site limits included in the Convertus lease and the boundary of the HIP subdivision.

Figure 3.2 shows the groundwater and surface water locations on the Convertus Property.

3.2 Monitoring Protocol

3.2.1 Groundwater Monitoring

The depth to groundwater was measured using an electronic water level meter with the top of the monitoring well riser pipe as the reference point, or to the top of the steel casing for all deep bedrock aquifer monitoring wells. Groundwater elevations were subsequently calculated for each monitoring well by subtracting the depth to water measurement from the reference point elevation.

Groundwater samples were collected by following GHD's field method guideline protocols, which are consistent with MECP requirements. All shallow aquifer monitoring wells and deep aquifer monitoring wells, except TW-8, were purged and sampled using low-flow sampling techniques with dedicated polyethylene tubing and a peristaltic pump. Wells were sampled following stabilized field readings.

Due to the greater depth to groundwater, deep bedrock aquifer unit monitoring well TW-8 was sampled using low-flow methods with dedicated polyethylene tubing and a bladder pump system.

During mid-2016, a dedicated sampling port was installed in the Facility to facilitate sampling from EW107-15. The sample is collected after the extraction well and sample port are purged for several minutes to ensure the sample port and associated lines are clear of stagnant water.

The samples collected for metals analysis were field filtered using disposable 0.45 µm in-line filters. All groundwater samples collected were submitted for analysis, under chain-of-custody protocol, to

the Ottawa depot of ALS Environmental (ALS), based in Waterloo. Analytical results are discussed in Section 4.

The analytical parameter list for groundwater is summarized in Table 3.1. Due to a change in field staff and a coordination oversight, the September 2019 groundwater samples were analyzed for the stormwater management pond parameter list. As a result, several parameters normally included in the groundwater parameter list were inadvertently excluded from this event. Actions have been undertaken to ensure this error will not be repeated.

The original laboratory analytical reports are provided in Appendix D.

3.2.2 Surface Water Monitoring

Surface water samples were collected at four locations (SW-1 to SW-4) following GHD's field method guidelines. Surface water samples were collected by gently immersing the sample bottles in the ditch or pond water, taking care not to disturb the underlying sediments. Readings for pH, conductivity, dissolved oxygen, oxidation reduction potential (ORP), turbidity, and temperature were recorded at the time of sample collection. All surface water samples were collected without field filtering and as such, represent total parameter concentrations. It should be noted that potential dissolution of particulates by the acid preservative in the metals sample bottles can artificially increase parameter concentrations in surface water samples. Acid preservation is a standard method for preserving water samples for metals analysis. All surface water samples collected were submitted to the laboratory for analysis under standard chain-of-custody protocol. The sample parameter list for surface water sampling is the same as the parameter list for groundwater (refer to Table 3.1).

Hydraulic level monitoring is completed at four staff gauges located throughout the roadside ditch adjacent to the Site along the south side of Somme Street. The depth to standing-surface water was visually observed to be nil/dry during all three of the staff gauge monitoring events in 2019.

3.3 Quality Assurance/Quality Control Program

A QA/QC program was undertaken as part of the Monitoring Program. This program involved the collection and analysis of field duplicate samples and the evaluation of standard laboratory quality control samples and procedures. The potential for contamination of samples through field and laboratory procedures is monitored through the analysis of field and laboratory blanks and duplicates samples.

The quality control parameters were found to be within acceptable ranges of standard laboratory practice. Several qualifications of the 2019 analytical data were made through the QA/QC assessment.

Details of the QA/QC Assessment for the current monitoring period are provided in Appendix D. The qualifications indicated in Appendix D do not significantly alter the interpretation of the data or affect the conclusions provided in this report.

4. Monitoring Results

The results of the Monitoring Program for the current monitoring period are presented in the following sections as follows:

- Section 4.1 - Groundwater Hydraulic Monitoring
- Section 4.2 - Water Quality Monitoring

To better facilitate discussion of the water quality, the sampling points for the Monitoring Program have been divided into the following areas: shallow unconfined aquifer unit, deep bedrock aquifer unit, and surface water. Each is discussed in an upgradient to downgradient or upstream to downstream fashion.

4.1 Groundwater Hydraulic Monitoring

Groundwater elevation data collected during the current monitoring period is presented in Table 4.1. Groundwater elevations measured during the June, September and November 2019 monitoring events are consistent with those observed historically at the Site, and were used to develop groundwater contour figures, as presented on Figures 4.1 to 4.4. Shallow unconfined aquifer and deep bedrock aquifer groundwater elevations and contours for the June 2019 monitoring event are presented on Figures 4.1 and 4.3, respectively, and shallow unconfined aquifer and deep bedrock aquifer groundwater levels and contours for the November 2019 monitoring event are presented on Figures 4.2 and 4.4, respectively.

The shallow aquifer water table was encountered at elevations varying from 90.43 to 98.37 metres above mean sea level (m AMSL) at MW103-09 and MW3-08 during the June monitoring event, 91.53 to 93.13 m AMSL at MW102-09 and MW105-13 during the September monitoring event and 90.37 to 98.39 m AMSL at MW103-09 and MW3-08 during the November event. During 2019, the depth below grade to the shallow aquifer water table generally varied from 0.2 to 2.0 m BGS. The groundwater elevations measured at MW1-08 were above the surveyed ground surface elevation by 0.16 metres and below the ground surface by 0.01 meters during the June and November 2019 events, respectively. This is due to the low ground surface elevation around the Stormwater Management Pond. Based on the groundwater elevations gathered in June and November 2019, flow occurs in an east-northeast direction in the shallow unconfined aquifer. This is consistent with previous monitoring years.

The horizontal hydraulic gradients for the shallow unconfined aquifer unit for the May and November 2019 monitoring events were estimated from groundwater contours presented on Figures 4.1 and 4.2 to be approximately 0.02 m/m across the Site. The horizontal hydraulic conductivity determined from single well response tests ranged from less than 1.0×10^{-7} cm/sec to 4.4×10^{-4} cm/sec (CRA 2008b). Assuming an effective porosity of 40 percent for the shallow

unconfined aquifer unit, an estimate of the groundwater flow velocity can be determined from the following equation:

$$v = \frac{Ki}{n}$$

Where:

v = groundwater flow velocity (L/T)

K = hydraulic conductivity (L/T)

i = horizontal hydraulic gradient (unitless)

n = effective porosity

Based on this equation, the local groundwater velocity is estimated to range from a few millimeters per year to a high of approximately 6.4 m per year in the fill deposits and shallow fractured bedrock. Note that the hydraulic conductivity was estimated prior to development of the Site and may not be reflective of the current conditions at the Site.

During the 2019 monitoring period, the deep bedrock aquifer unit groundwater levels ranged from a low of 83.18 m AMSL (TW-8) to high of 90.74 m AMSL (TW-7). The seasonal water level fluctuation ranged from 0.56 m (TW-8) to 1.35 m (TW-7). Based on the 2019 groundwater elevations, groundwater in the deep bedrock aquifer unit flows in a west-southwest direction, which is opposite to the flow direction of the shallow unconfined aquifer unit. It is likely that the presence of a quarry to the west and southwest of the Site has influenced the groundwater flow direction within the deep bedrock aquifer unit. This is consistent with previous interpretations of groundwater flow across the Site.

Based on groundwater contours generated for the Site, hydraulic gradients for the deep aquifer unit were calculated at 0.017 and 0.015 m/m for the June and November 2019 events, respectively.

Acting on a recommendation of the MECP Technical Services Branch, GHD and Convertus staff undertook an 8-hour pumping test at EW107-15 on July 30, 2019. The test was undertaken to better understand the zone of hydraulic influence of EW107-15. The test was conducted at a pumping rate of 34.5 litres per minute (LPM) with a total observed drawdown of approximately 0.06 m in EW107-15. No drawdown was observed at any contiguous monitoring wells during the test.

The results of this pumping test confirm that the transmissivity of the shallow flow zone is high in the vicinity of EW107-15 (approximately 1,015 m^2/day). In addition, the maximum capture width upgradient of the extraction well was calculated to be only 2.5 m (~8 feet).

Groundwater extraction at EW107-15 is considered an appropriate remedial strategy, despite the limited capture zone, because of the position of this well in the interpreted zone of most pronounced impact. Removal of impacted shallow groundwater at this location will result in significant contaminant mass reduction in the subsurface and over the long-term and will augment existing natural attenuation processes at further reducing concentrations downgradient of the interpreted source area.

4.2 Water Quality Monitoring

The following Sections provide a discussion regarding the spatial and temporal trends of selected indicator parameters at the Site.

4.2.1 Shallow Unconfined Aquifer Unit Groundwater Quality

Groundwater flow in the shallow unconfined aquifer occurs in an east-northeast direction, as illustrated on Figures 4.1 and 4.2. According to the position relative to the Facility, the groundwater monitoring wells can be grouped as:

- Upgradient wells: MW3-08 and MW4-09
- Upgradient/cross gradient wells: MW2-08
- Facility Area: EW107-15, MW101-13, and MW105-13
- Downgradient: MW1-08, MW5-09, MW102-09, MW103-09, MW104-13, and MW106-15

Tabulated analytical results for the shallow unconfined aquifer from the 2019 sampling program are provided in Table 4.2.

On behalf of Convertus, GHD completed a Groundwater Assessment and Work Plan in July 2014 (Groundwater Assessment, Appendix B.3). The Groundwater Assessment evaluated the 2013 and historical groundwater quality in order to determine appropriate parameters of concern for the Site. Previous evaluations of groundwater quality at the Site identified ammonia as the primary indicator parameter for Facility-related groundwater quality impacts at the Site. The Groundwater Assessment confirmed the presence of an ammonia plume within the shallow unconfined aquifer unit

The Groundwater Assessment also identified additional parameters of concern through a comparison of the 2013 water quality data to background water quality and the MECP criteria listed in the Ontario Drinking Water Standards (ODWS) (MOE, 2003, as amended). The comparison identified the following additional indicator parameters for identifying potential groundwater impacts from Facility operations: iron, manganese, dissolved organic carbon (DOC), sulfate, and total dissolved solids (TDS).

Ammonia and DOC are commonly used as indicators of groundwater quality impacts associated with the discharge of organic waste related contaminants to the subsurface. Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Figures 4.5 through 4.8 provide concentration isopleths (lines of inferred equal concentration) for ammonia, dissolved iron, dissolved manganese, and DOC. The 2019 median concentrations from the shallow unconfined aquifer unit monitoring wells have been used to create the isopleths. Concentration isopleth figures are useful for evaluating and presenting spatial patterns in groundwater chemistry.

On Figures 4.5 through 4.8, the presence of elevated concentrations of the indicator parameters are identified in close proximity to, or just downgradient from, the Facility. The elevated concentrations appear to extend from the Facility to the east-northeast following the direction of groundwater flow. Some decreases in concentrations are observed with increased distance from the Facility (following the path of groundwater flow in the shallow unconfined aquifer) for ammonia in particular and concentrations remain low to the west, south, and southeast of the Facility. Note that due to the highly variable concentrations of ammonia, iron and manganese at EW107-15 water quality from this location has not been included in the contouring presented on Figures 4.5, 4.6 and 4.7. Pumping at EW107-15 is suspected to contribute to the highly variable water quality observed at this location. Further discussion of the extraction well is provided in Section 5.

The pattern of iron and manganese concentrations presented on Figures 4.6 and 4.7 is different than that observed for ammonia and DOC in that the concentrations reported in close proximity to the Facility are lower than those reported at the downgradient Site boundary. Notwithstanding this difference, the pattern of elevated concentrations on Site is consistent with a source emanating from the Facility. The pattern is likely attributable to the complex behaviour of these parameters in the subsurface, but also to the effects of periodic groundwater extraction adjacent to the Facility.

This distribution of elevated concentrations of ammonia, DOC, and to a lesser extent iron, and manganese is consistent with an organics-related contaminant source.

Figures 4.9.1 to 4.9.12 present the evolution of groundwater chemistry at the wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

The following tables provide summaries of the trends and concentration ranges for ammonia in the shallow unconfined aquifer:

Location	Trend	Ammonia Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**
MW4-09	↑	ND(0.050) – 0.554	ND(0.020) – 1.3
MW3-08	↑	ND(0.020) – 0.264	ND(0.020)
MW2-08	(2011-2018) Stable to ↑ and 2019 ↓	ND(0.020) – 0.171	ND(0.010) – ND(1.0)
EW107-15	↑ and ↓	0.123 – 88.0/91.1	31.4 – 83.8
MW105-13	↓	4.88 – 76.0	5.6 – 19.3
MW101-13	Stable	0.237 – 34.9	13.9/14.0 – 14.1
MW104-13	↑ and ↓	1.20 – 20.0	6.30/7.3 – 16.8
MW5-09	↓	0.32 – 31.4	12.8 – 14.4/16.1
MW102-09	↑	ND(0.050) – 15.2	9.61 – 11.6
MW1-08	↑	0.335 – 3.67	3.0 – 3.16
MW103-09	Stable	0.217/0.255 –2.35	0.95 – 1.7
MW106-15	Stable to ↑	1.91 – 18.6	1.68 – 3.3

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

As presented above, each of the upgradient locations (MW2-08, MW3-08 and MW4-09) have low ammonia levels. MW2-08 is located cross-gradient from the Facility and has shown little evidence of impacts. Ammonia concentrations at MW2-08 have shown some evidence of increases in recent monitoring, however concentrations remain relatively low. There is some evidence of recent increases in ammonia concentrations at upgradient monitoring wells during recent monitoring years. This pattern may suggest an upgradient off-Site source of ammonia contributing to the ammonia concentrations observed at these monitoring wells.

During the 2019 reporting year, overall trends in ammonia concentrations have been decreasing, particularly near the Facility. Ammonia concentrations at MW105-13 and MW101-13 had previously showed increasing trends. Current analytical data indicates declining and stable trends at each Facility area well. The analytical results for EW107-15 show highly variable concentrations during the period of operation of this extraction well. Active pumping at this location is suspected to be the principal source of the observed variability. Notwithstanding the fluctuations, the presence of elevated ammonia in the extraction well indicates that active groundwater extraction at this location is an appropriate remedial strategy.

Ammonia concentrations at MW5-09 followed a clear increasing trend between 2009 and mid-2015. Monitoring results from 2016 through 2019 demonstrate a more stable trend with ammonia concentrations ranging between 10 mg/L and 20 mg/L. Convertus's efforts to eliminate the source of subsurface discharge through the replacement of the existing ammonia scrubber with three new units in July 2019, along with the remediation of the zone of elevated ammonia adjacent to the Facility through operation of EW107-15, are likely responsible for the observed improvements in water quality at MW5-09 during this period.

Ammonia concentrations at downgradient locations MW102-09 and MW104-13 continue to demonstrate trends of increasing concentrations. The ammonia trends downgradient of the Facility are all increasing with the exception of MW103-09 and MW106-15 which continue to show fairly stable concentrations. MW5-09 and MW102-09 continue to exhibit elevated concentrations downgradient of the Facility.

The following table summarizes recent trends in iron and manganese concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**	**Historic (pre-2019)**	**2019**
MW4-09	↓	ND(0.010) – 1.86	ND(0.10) – 0.15	0.0556 – 1.25	0.0582 – 0.240
MW3-08	Stable	ND(0.010) – 1.04	ND(0.010)	ND(0.00050) – 0.0987	0.00074 – 0.0226
MW2-08	Stable	ND(0.010) – ND(0.10)	ND(0.010)	0.00058 – 0.207	0.00068 – 0.00566
EW107-15	Stable and ↓	0.022 – 2.56	ND(0.10) – 0.63	0.435/0.441 – 4.52/4.57	0.388 – 1.45
MW105-13	↑ and ↓	0.080/0.095 – 7.61	2.10 – 3.95	0.145 – 1.06	0.722 – 0.990
MW101-13	↓	ND(0.050) – 34.5	0.069/0.071 – 2.84/2.97	0.0114 – 2.24	0.671/0.685 – 1.36/1.42

Location	Trend	Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)	
MW104-13	↓	0.071 – 23.9	0.051/0.052 – 9.96/10.6	0.548 -19.4	1.95/1.98 – 5.33/5.46
MW5-09	Stable to ↓	1.99 – 14.5	3.22– 5.01/5.05	1.09 – 5.33	1.45 – 1.85/1.86
MW102-09	↓ and Stable	ND(0.010) – 24.0/24.7	2.41 – 4.53	ND(0.00050) – 5.16	1.69 – 2.39
MW1-08	↓	0.897 – 16.6/17.2	0.260 – 2.00	0.539 – 10.9/11.0	0.453 – 0.729
MW103-09	↓	0.60 – 22.9/23.8	4.67 – 5.46	0.458/0.460 – 7.70/7.77	1.96 – 2.65
MW106-15	Stable to ↓	0.838 – 6.05	1.08 – 4.03	1.06 – 2.62	1.07 – 1.63

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

Elevated concentrations of dissolved iron and manganese are apparent in the Facility area and downgradient of the Facility, with the most elevated concentrations being reported at MW105-13, MW104-13, MW5-09, MW102-09, MW106-15, and MW1-08. As discussed above, iron and manganese concentrations in the interpreted source area immediately adjacent to the Facility have been lower than at downgradient locations during recent monitoring years.

The principal observation with respect to trends in iron and manganese concentrations within shallow groundwater at the Site is that concentrations have generally followed trends of decreasing levels over time. The principal exception to this pattern is at MW105-13. It is expected that these concentrations will continue to stabilize and decrease with time through natural attenuation and in response to Convertus's efforts to control releases to the subsurface and continue to remove impacted groundwater at EW107-15.

The following table summarizes recent trends in DOC concentrations within the unconfined shallow aquifer monitoring well network.

Location	Trend	DOC Concentration Range (mg/L)	
		Historic (pre-2019)	**2019**
MW4-09	Stable to ↓	1.0 – 3.5	1.97 – 2.46
MW3-08	Stable	1.5 – 3.5/9.0	2.35 – 3.04
MW2-08	↑	1.5 – 10.0	5.28 – 9.21
EW107-15	Stable to ↑	3.2 – 965/1,030	7.88 – 34
MW105-13	Stable to ↑	2.6 – 16.0	3.02 – 6.75
MW101-13	Stable	3.6 – 14.8	5.62 – 6.76/7.29
MW104-13	↓	5.5 – 51.2	7.70/8.19 – 9.23
MW5-09	Stable	5.4 – 13.0	6.33/6.74 – 8.53
MW102-09	Stable to ↓	ND(1.0) – 18.5	9.47 – 10.7
MW1-08	Stable	6.2 – 10.7	8.07 – 9.55

Location	Trend	DOC Concentration Range (mg/L)	
MW103-09	Stable	3.0/8.9 – 17.9	8.60 – 11.6
MW106-15	Stable	8.0 – 13.0	10.2 – 12.0

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

The current levels of DOC have remained consistent with some minor decreasing trends at MW104-13 and MW102-09. Concentrations of DOC are relatively low in the upgradient monitoring wells. Monitoring wells located downgradient of the Facility had previously demonstrated trends of elevated and increasing levels of DOC. Over the past monitoring year many of the concentrations have demonstrated decreasing or stable trends. Water quality at EW107-15 is highly variable, likely due to intermittent pumping at this location.

In general, the limited increases in DOC concentrations downgradient of the Facility relative to upgradient concentrations are minor compared to those observed for ammonia, iron or manganese.

Shallow Groundwater to Surface Water Discharge

In comments provided by the MECP on the 2012 annual report, the MECP requested that a comparison of shallow groundwater quality at MW103-09 to PWQOs be completed as part of future annual monitoring reports. Table 4.2A provides the 2019 analytical data for MW103-09 along with the PWQOs for comparative reference, with exceedances highlighted.

As indicated in Table 4.2A, several parameters exceeded their respective PWQOs at MW103-09 during the current monitoring period. The following provides a summary of those few exceedances:

- Iron – 2 of 2 samples
- Phosphorus – 2 of 2 samples

The Groundwater Assessment included recommendations to further investigate the relationship between shallow groundwater and surface water. Recommendations included that staff gauges be installed at four points within the northern ditch system and that a topographic survey of the northern portion of the Site, including the ditch, be undertaken.

Topographic surveying of the northern ditch system (including the ditch which drains into the SWM Pond and the ditch that continues towards Findlay Creek – the HIP Ditch) was completed and the four staff gauges were installed in early 2015. The Site's northern ditch was dry at each of the staff gauge locations during each monitoring event in 2019, which provides evidence that a significant volume of groundwater is not likely continuously discharging to the creek. A similar observation of the lack of sustained flow in the ditch has been made during every sampling event since 2015.

Figure 4.10 presents the results of the topographic surveying of the northern ditch overlain by the June 2019 groundwater contours. The topographic contours are provided in 0.5 m intervals with the lowest elevation presented representing the bottom of the ditch.

As shown in Figure 4.10, the topography of the ditches is 'w' shaped. The two ditch valleys or troughs travel parallel to the northern Site boundary with the on-Site ditch (that drains to the SWM

Pond) found south of the HIP ditch. The inferred groundwater elevations from June 2019 coincide closely with the bottom elevation of the ditches, and are above the bottom of the northern (roadside) ditch in several locations. These locations are illustrated on Figure 4.10 and are interpreted to be areas where shallow groundwater is discharging to the northern ditch. It should be noted that cattails and other hydrophilic vegetation are present in portions of this ditch providing further evidence support to the interpretation that some groundwater is discharging to the ditch.

Figure 4.10 further shows that a substantial portion of the ditch bottom is lower than groundwater elevations where the ditch is intersected by the extrapolated contours. Therefore, groundwater is likely discharging to the north ditch, particularly during periods of high groundwater levels (typically during the spring).

However, as noted above each of the staff gauge locations did not contain sufficient standing, or flowing, water for sampling during the 2019 monitoring events (or during any previous monitoring events). Based on the information available, the volume of groundwater seeping into the ditch is too low to maintain a consistent base flow. It is likely that groundwater seepage into the ditch is largely lost to evapotranspiration.

In conclusion, small volumes of groundwater are likely seeping to the north roadside ditch but the volumes are insufficient to form a base flow. Based on current available information, groundwater discharging to the ditch is unlikely to cause any adverse impacts to the surface water bodies in the vicinity of the Site.

4.2.2 Deep Bedrock Aquifer Groundwater Quality

Based on the available data for the deep bedrock aquifer, groundwater flow in the deep bedrock aquifer occurs to the southwest across the Site, as illustrated on Figures 4.3 and 4.4. According to their position relative to the Facility, the deep bedrock groundwater monitoring wells can be grouped as:

- Upgradient well: TW-7
- Downgradient wells: TW-4, TW-8

The discussion regarding the evolution of the selected parameters will be applied in the same way as for the shallow unconfined aquifer.

Tabulated analytical results for the deep bedrock aquifer from the 2019 sampling program are provided in Table 4.3 along with a comparison of the deep bedrock water quality to the Ontario Drinking Water Quality Standards (ODWQS) (Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, MOE, June 2003, revised June 2006 and July 2017).

Table 4.3 shows that several parameters have frequently been reported above their respective ODWQS in samples collected from each of the deep bedrock wells (TW-4, TW-7, and TW-8). The following provides a summary of the parameters reported above their ODWQS limits at least once in 2019:

Location	ODWQS Exceedances		
	June 2019	September 2019	November 2019
TW-7 (upgradient)	Manganese, pH (field)	-	pH (lab), turbidity (lab), turbidity (field)
TW-4 (downgradient)	Manganese, alkalinity, dissolved organic carbon, temperature (field), turbidity (field)	Iron, manganese, temperature (field)	Iron, manganese, alkalinity, dissolved organic carbon, turbidity (lab), turbidity (field)
TW-8 (downgradient)	Temperature (field), turbidity (field)	-	Iron, manganese, turbidity (lab), turbidity (field)

ODWQS Operational Guidelines, as well as the criteria for temperature and turbidity, do not relate directly to water samples collected from monitoring wells. The criteria for each are included in the ODWQS as they related to the effectiveness of water treatment and are thus not relevant to samples collected from groundwater monitoring wells. Alkalinity and pH concentrations should be given consideration in the evaluation of water quality; however, the ODWQS established for these parameters are Operational Guidelines set for water treatment plant operations and thus these Guidelines are not relevant to evaluations of water quality samples from groundwater monitoring wells.

Table 4.3 shows that water quality within the deep bedrock aquifer was poor in 2019. This is consistent with historical water quality within the deep bedrock aquifer, including water quality in samples collected from prior to construction of the Facility (see Appendix E). Based on the upgradient water quality from TW-7 and the surrounding land uses there are several potential upgradient sources of water quality impairments within this aquifer.

Water quality results from both downgradient wells had previously demonstrated some evidence of increases in ammonia concentrations. In particular, ammonia concentrations increased between 2009 and 2014 at TW-4 and TW-8. Monitoring data post 2014 has shown a reversal of this trend, with the exception of a single anomalous detection of ammonia above 10 mg/L at TW-4 in 2018. The timing of increases followed by decreases in ammonia concentrations suggests the Facility is not the source of this pattern in water quality.

Figures 4.11.1 to 4.11.3 present the evolution of groundwater chemistry at the deep bedrock wells across the Site for the selected indicator parameters; these figures assist in visually identifying temporal trends in groundwater chemistry and are thus useful for understanding the historical evolution of groundwater.

		Ammonia Concentration Range (mg/L)		DOC Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2019)**	**2019**	**Trend**	**Historic (pre-2019)**	**2019**
TW-7	Stable to ↑	ND(0.05) – 0.825	ND(1.0) – 0.019	↓	2.1 -15.1	3.02 – 4.37
TW-4	Stable	0.218 – 13.0	0.740/0.742 – 2.1	stable	4.4 – 10.4	6.39 – 7.49/8.26
TW-8	↓ to Stable	ND(0.050) – 4.60	0.479 – 1.7	↓	1.9 – 13.5	2.77 – 3.81

		Iron (dissolved) Concentration Range (mg/L)		Manganese (dissolved) Concentration Range (mg/L)		
Location	**Trend**	**Historic (pre-2019)**	**2019**	**Trend**	**Historic (pre-2019)**	**2019**
TW-7	↓	ND(0.010) – 11.1	ND(0.010) – 0.222	↓	0.0352 – 1.71	0.0322 – 0.161
TW-4	↓	ND(0.050) – 3.30	0.11 – 0.44/0.64	Stable	0.496 – 1.94	0.969/0.976 – 1.17
TW-8	↓	ND(0.050) – 6.25	0.011 – 1.56	↓	0.00640 – 2.95	0.00252 – 0.556

Notes:
ND non-detect at the associated value
/ - indicates duplicate analytical results

It is important to note that the concentrations of iron, manganese and DOC at all on-Site deep bedrock locations remain relatively stable or have demonstrated trends of clear decreases. Considering shallow groundwater quality in the zone of most pronounced impact, it is unlikely that the Facility is a source of impact to the deep bedrock aquifer, given the temporal patterns observed in this aquifer.

A pumping test completed in 2008 showed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. The overall pattern of groundwater quality within the deep bedrock aquifer suggests that water quality is naturally poor. Notwithstanding the above, it is recommended that monitoring results for downgradient deep bedrock aquifer monitoring wells continue to be reviewed and assessed for potential Facility-related water quality impacts. If trends of deteriorating water quality are consistent, consideration should be given to undertaking further investigation or evaluating the need for a remedial strategy. Based on the monitoring results from the 2019 monitoring period, no additional investigation or remedial activities are necessary at this time, however indicator parameter concentrations at TW-4 should be closely monitored during future monitoring events.

4.2.3 Surface Water Quality

Analytical results for surface water samples collected from the storm water management pond (SW-4) and local ditch monitoring locations (SW-1 through SW-3) are presented in Table 4.4 and compared to the Provincial Water Quality Objectives (PWQO). The following table summarizes the surface water monitoring parameters that did not meet the PWQO during the 2019 sampling events.

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-1	Iron	0.3	0.324	0.368
SW-1	Phosphorus	0.01	0.0171	0.0625
SW-1	Escherichia Coli	100*	(52*)	280*
SW-2	Iron	0.3	0.576	1.22
SW-2	Phosphorus	0.01	0.0332	0.0620
SW-2	Escherichia Coli	100*	(68*)	450*

Location	Parameter	PWQO (mg/L)	Spring (mg/L)	Fall (mg/L)
SW-2	pH (field)	6.5-8.5	(7.61)	6.24
SW-3	Iron	0.3	0.481	1.13/1.19
SW-3	Phosphorus	0.01	0.0225	0.0503/0.0523
SW-3	Escherichia Coli	100*	170*	400/460*
SW-4	Phosphorus	0.01	0.177/0.210	0.110
SW-4	Phenolics	0.001	-	0.0094
SW-4	Escherichia Coli	100*	(4/16*)	900*

Notes:
*- Escherichia Coli concentrations are in colony forming units per 100 mL (CFU/100 mL)
** - temperature and species dependent
(7.16) – Brackets indicate value does not exceed PWQO

In general, water quality at the downstream surface water monitoring location (SW-3) is similar to upstream surface water monitoring location (SW-2), which indicates that contributions to surface water flow from the Convertus Facility are not impacting downstream water quality.

Concentrations of phosphorus were consistently above the PWQO at each of the monitoring locations. In addition, elevated iron concentrations were noted at SW-1, SW-2 and SW-3. E. coli levels were in exceedance of the PWQO for all fall 2019 samples.

Previous assessments of the Site concluded that concentrations of ammonia were showing increases at SW-4. Temporal concentration versus time plots for ammonia, DOC, manganese, and iron levels at SW-4 are presented on Figure 4.12. Figure 4.12 shows that ammonia concentrations are variable with elevated concentrations reported during late 2014, 2016 and late 2017 to late 2019. An overall trend of increases in ammonia concentrations within SW-4 between 2011 and 2019, as illustrated on Figure 4.12.

A total of 12 additional samples were collected by Convertus staff at surface water monitoring location SW-4 during the 2019 monitoring period. The analytical results for these samples have been included in Table 4.5.

Water was discharged from the stormwater management pond once during the 2019 monitoring period in April. The surface water quality results were compared to the trigger level parameters presented in the ECA prior to discharges to determine that the concentrations of trigger parameters were below the discharge criteria. All analytical results for samples collected prior to discharge were below their respective trigger levels. On this basis, all stormwater management pond discharge events were in compliance with the ECA trigger levels (outlined in Table 2 of the ECA) during 2019.

The stormwater management pond has had a total of six aerators installed to improve the water quality by agitating and oxygenating the ponded water. The first aerator was installed on July 10, 2018 and an additional five were installed on November 28, 2018. The 2019 sample results provide evidence that the aerators are reducing ammonia concentrations within the pond.

Based on the results of the surface water monitoring, there were no measurable effects on downstream surface water quality from the discharges during the 2019 monitoring period.

5. Shallow Groundwater Extraction System

Beginning on October 4, 2016, pumping from shallow groundwater extraction well EW107-15 commenced. The total volume pumped from extraction well EW107-15 during 2019 was 492,460 L. The 2019 pumping data is summarized in Table 5.1.

As previously mentioned, EW107-15 was sampled three times during the current reporting period with all three samples collected via the dedicated sampling port. The following table provides a summary of the 2019 indicator parameters:

Parameter (mg/L)	June 13, 2019	September 4/5, 2019	November 28, 2019
Ammonia-N	83.8	NA	31.4
Iron (dissolved)	ND(0.10)	ND(0.10)	0.63
Manganese (dissolved)	0.388	0.424	1.45
DOC	34	NA	7.88

Note:
/ - indicates duplicate analytical results

As indicated previously, the September 2019 groundwater samples were analyzed for the incorrect parameter list. Accordingly, several parameters are not available for this sample. There has been a high degree of variability in the concentrations reported in samples collected from this extraction well since installation. Groundwater quality at the Site is seasonally variable because of the effects of precipitation and runoff on shallow recharge, and periodic extraction of groundwater, as shown in Table 5.1, also likely contributes to the variability in the results. The June sample was collected during a period of infrequent pumping and the November sample was collected during a period of more regular pumping. The extraction well is primarily used during periods of water deficit when the amount of moisture contained in the incoming SSO is insufficient to maintain the various composting and process humidification purposes. This water deficit situation typically exists from late Spring to late Fall. In the colder winter months, the Facility is in a water surplus situation due to condensation and less evaporation.

Water quality results for the 2016 through 2019 monitoring periods suggest some improvement in water quality in the vicinity of EW107-15 and downgradient. This improvement is likely related to Facility improvements made to control the source of discharge and active groundwater extraction within the interpreted historical source area. It is expected that continued/improved operation of the shallow groundwater extraction well will, over time, remove the most impacted groundwater from the Facility area. This will result in improved water quality in both the Facility area and downgradient which should, in turn, reduce the occurrence of Tier I trigger exceedances.

As discussed previously, Convertus made changes to the configuration of their process water system during 2019. These changes allow for an increase in the amount of groundwater extracted from EW107-15. It is likely that the higher and more consistent extraction rates at this well will result in observable improvements in groundwater quality in the zone of most pronounced impact (near the Facility) and downgradient over the long-term.

In order to provide for a more detailed understanding of the effects of increased pumping at EW107-15 it is recommended that EW107-15 be sampled monthly for 2 years.

6. Compliance and Trigger Level Program

Condition 9(3b) of the amended ECA (2011) requires the development of trigger level criteria in accordance with MECP Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). In a memorandum to the MECP, dated February 27, 2015, GHD provided an outline for a recommended Compliance and Trigger Level Program (TLP). A copy of the memo is included in Appendix B1. The memo provides a detailed history of developing the TLP as well as the three-tiered approach to evaluating compliance at the Site.

The following Sections provide a brief summary of the key points of the TLP and an assessment of the current water quality.

6.1 Trigger Parameters

A focused set of parameters which are related to the sources of potential impacts from on-Site activities were selected for the purposes of the TLP. The TLP parameter list includes the following trigger parameters: ammonia, phosphorus, DOC, nitrate, iron, manganese, alkalinity, and E. Coli. Ammonia, phosphorus, DOC, nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic sources due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

6.2 Trigger Concentrations

The following table provides the trigger levels for the above-referenced trigger parameters.

The trigger levels for the shallow unconfined aquifer are based on the 95 percent upper-tolerance limits (UTLs) for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.). More detail on how the trigger concentrations were calculated is provided in Appendix B.1.

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the deep bedrock aquifer. As an alternative, 95 percent UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations. The UTLs were

calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g., parametric-gamma, non-parametric, etc.)

The following table provides the trigger levels for the above-referenced trigger parameters for the shallow and deep bedrock aquifer units.

Parameter	Shallow Unconfined Aquifer Trigger Level	Deep Bedrock Aquifer Trigger Level
Ammonia	4.0 mg/L	0.2 mg/L
Phosphorus	7.2 mg/L	0.5 mg/L
Dissolved Organic Carbon	34.6 mg/L	18.4 mg/L
Nitrate	1.3 mg/L	0.5 mg/L
Iron	48.3 mg/L	10.6 mg/L
Manganese	17.1 mg/L	2.1 mg/L
Alkalinity	633 mg/L	996 mg/L
Escherichia Coli	25.6 CFU/100 mL	5.0 CFU/100 mL

6.3 Trigger Level Assessment

The first Tier of the TLP consists of regular monitoring as outlined in Table 3.1. The second Tier of the TLP will be implemented if during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location. The tabulated analytical results for the shallow unconfined aquifer and deep bedrock aquifers (Tables 4.2 and 4.3, respectively) include a comparison to the established trigger level concentrations.

Tier II confirmatory monitoring consists of collecting follow-up water quality samples in duplicate from the location(s) that exceed the Tier I trigger levels. The Tier II confirmatory monitoring will be carried-out during the next scheduled monitoring event. Tier I monitoring will resume following confirmatory samples below the Tier I trigger levels.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

Shallow Unconfined Aquifer Assessment

The following table summarizes the results of the shallow unconfined groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	**September**	**November**	
MW1-08	I	None	-	None	I
MW2-08	I	None	-	None	I
MW3-08	-	None	-	None	I
MW4-08	-	None	-	None	I
MW5-09	I	Ammonia	None	Ammonia	I
MW101-13	II	Ammonia	None	Ammonia	I

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	**September**	**November**	
MW102-09	I	Ammonia	None	Ammonia	I
MW103-09	I	None	-	None	I
MW104-13	II	Ammonia	None	**Ammonia, Nitrate**	II
MW105-13	I	Ammonia	None	Ammonia	I
MW106-15	I	None	None	None	I

Note:
BOLD – Requires Tier II Sampling Protocol in 2020

As indicated in the above table, trigger level exceedances were noted in samples collected from five wells during 2019. At MW5-09, MW101-13, MW102-09, and MW105-13, only single trigger level exceedances persisted in 2019. Therefore, it is recommended that in 2020, MW5-09, MW101-13, MW102-09, and MW105-13 be sampled following Tier I protocols. Multiple trigger level exceedances (ammonia and nitrate) were noted at MW104-13 during November 2019. Therefore, MW104-13 will be sampled in duplicate following the Tier II sampling protocol in 2020.

As discussed above, the Site initiated a program of groundwater remediation in 2016 in response to elevated ammonia concentrations in shallow groundwater near and downgradient of the Facility. Operation of this system represents implementation of the contingency remedial response to observed groundwater quality impacts. Accordingly, future trigger level assessments should be undertaken for the purpose of tracking the evolution of groundwater quality as it relates to the remedial response, and should not necessarily be used for the purpose of triggering additional remedial response.

Convertus continues to explore groundwater treatment technologies which will reduce contaminant concentrations of all Trigger Contaminants, including ammonia, to levels below their respective PWQOs, thereby allowing the discharge of the treated effluent to surface water. As yet, no acceptable technology has been identified, but laboratory trials are still underway.

Deep Bedrock Aquifer

The following table summarizes the results of the deep bedrock groundwater TLP sampling undertaken during the current monitoring period:

Location ID	2019 Tier	Trigger Level Exceedances			2020 Tier
		June	September	November	
TW-7	I	None	NA	None	I
TW-4	II	Ammonia	None	**Ammonia, Nitrate**	II
TW-8	I	**Ammonia, Nitrate**	NA	**Ammonia, Nitrate**	II

Notes:
BOLD – Requires Tier II Sampling Protocol in 2020
NA – Not Analyzed

TW-4 was sampled following Tier II protocols in June 2019 and ammonia continued to exceed its Tier I trigger level. In November 2019, concentrations of ammonia and nitrate exceeded their respective deep bedrock Tier I trigger levels at TW-4 (fall) and TW-8 (spring and fall). Therefore, it is recommended that that Tier II sampling be initiated at TW-4 and TW-8 in the spring of 2020.

7. MECP Correspondence

During the fall of 2018 Convertus received three letters from the MECP with comments in relation to the 2016 and 2017 Groundwater and Surface Water Monitoring Reports (GHD, 2017 and GHD, 2018). Convertus has not received comments from the MECP on the 2018 Groundwater and Surface Water Monitoring Report (GHD, 2019).

7.1 MECP Surface Water Comments

In a letter dated September 4, 2018 the MECP presented their review of the surface water monitoring portions of the 2016 and 2017 reports (GHD, 2017 and GHD, 2018). The letter describes the MECP's general concurrence with the interpretations and conclusions provided in the 2016 and 2017 Annual Monitoring Reports.

In addition, the letter provides a brief description of the available information related to grab sampling of pond discharge water by Golder Associates in April 2018. With respect to this sampling, the MECP indicates concurrence that the results of sampling do not constitute ECA non-compliance, as there is no requirement for sampling during discharge.

The MECP provides further concurrence with Convertus' statement that future exceedances of a trigger level within the SWMP during discharge should be addressed through the "Spill Contingency and Pollution Prevention Plan", required under Condition 5(6) of the ECA.

7.2 MECP Groundwater Comments

Convertus received two letters from the MECP dated November 13, 2018 and December 10, 2018 in relation to the 2016 and 2017 reports, respectively (GHD, 2017 and GHD, 2018). The following summarizes the comments provided by the MECP Technical Services Branch Hydrogeologist on the 2016 Annual Monitoring Report:

- Pumping volumes from EW107-15 were insufficient during 2016 and 2017.
- The bedrock aquifer is showing signs of impact.
- Sampling confirms that groundwater was impaired due to elevated nitrate nitrogen levels above the ODQWS MAC of 10 mg/l at MW104-13 on August 16, 2016 and at MW105-13 on August 16, 2016, and November 15, 2016.
- The extraction well must be operated more frequently to avoid further remedial measures and groundwater impairment as required by the Tier III Trigger Level Program.
- MECP reviewer was not in agreement with GHD that the existing single extraction well is the sole remedial measure that may be required to protect groundwater at this site.

In the December 10, 2018 letter the MECP reviewer commented on the 2017 report by noting that several trigger levels exceeded several times in the shallow aquifer and ongoing impact on deep groundwater.

As discussed above, Convertus made significant improvements in the configuration of the extraction well system during 2019. These improvements allowed for a significant increase in extraction of impacted groundwater from the shallow flow system. There is currently insufficient data to observe the effect of this increased pumping.

GHD recommends that samples are collected from EW107-15 on a monthly basis for 2 years in order to observe the effect of the increased pumping rate on groundwater quality in the interpreted source area. It is further recommended that the evolution of extracted groundwater quality at EW107-15 is used to guide future decisions concerning the possibility of incorporating a groundwater treatment facility into the remediation system, or future expansion of the groundwater extraction program.

8. Conclusions

The following conclusions have been developed based on results of the groundwater and surface water monitoring and sampling activities conducted in 2019:

1. Based on the groundwater elevations gathered in June, September and November 2019, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site is being affected by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with an area of localized impact related to an organic contaminant source.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. This observation is consistent with investigations of deep bedrock groundwater quality prior to Facility construction.
4. Improvements in water quality at downgradient deep bedrock monitoring well TW-8 have been observed during recent monitoring periods. There is currently insufficient data to confirm if the Facility is the source of sporadic water quality within the deep bedrock aquifer, however trends of decreasing concentrations in the downgradient deep bedrock monitoring wells suggest that the Facility is not significantly affecting this aquifer.
5. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2019 monitoring period.
6. Surface water was discharged once from the on-Site Stormwater Management Pond during the 2019 monitoring period (April). All parameters were below their respective trigger levels listed in the Site ECA in samples collected from the Stormwater Management Pond prior to commencing discharging.

9. Recommendations

Based on the results of the water quality monitoring program conducted at the Facility, the following recommendations are presented:

1. The groundwater extraction system should be operated in such a manner that as much impacted groundwater from the shallow flow system is removed, as is practical.
2. The SCADA monitoring system should continue to be used to accurately record the volume of water pumped.
3. Groundwater samples should be collected from EW107-15 on a monthly basis for 2 years to observe the evolution of groundwater quality under the scenario of more consistent pumping. This more detailed water quality data should be used to inform decisions concerning future operation or expansion of the remediation system including the possibility of incorporating a proven groundwater treatment technology into the remediation system.
4. Tier II confirmatory sampling should be completed during the spring 2020 sampling event at MW104-13, TW-4, and TW-8.

10. References

Conestoga-Rovers & Associates, 2008a. Phase II Environmental Site Assessment and Hydrogeological Assessment Report, September 2008.

Conestoga-Rovers & Associates, 2008b. Application for Approval of Industrial Sewage Works, Stormwater management facility, Ottawa City, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2009. Proposed Groundwater/Surface Water Monitoring Program, Application for Approval of Industrial Sewage Works, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, City of Ottawa, Ontario, MOE Reference Number 4852-7KEQ29.

Conestoga-Rovers & Associates, 2010a. Summary of Pre-Start-up Groundwater/Surface Water Monitoring Program, Orgaworld Source Separated Organics Processing Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010b. Amendment Application, Deep Groundwater Monitoring Well Relocations, Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2010c. Amendment Application, New Equipment Installation, Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, Orgaworld Canada Ltd., 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2012a. Memorandum: Development of Baseline Values for Groundwater/Surface Water Monitoring.

Conestoga-Rovers & Associates, 2012b. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, 2013. Groundwater/Surface Water Monitoring and Compliance Report, Orgaworld Organics Facility, 5123 Hawthorne Road South, Ottawa, Ontario.

Conestoga-Rovers & Associates, July 16, 2014. Groundwater Assessment and Work Plan Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 3, 2015a. Recommended Compliance and Trigger Level Program Memorandum – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, February 27, 2015b. Proposed Monitoring Program – Orgaworld Canada Ltd., Ottawa, Ontario.

Conestoga-Rovers & Associates, March 23, 2015c. 2014 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Conestoga-Rovers & Associates, March 25, 2015d. Environmental Compliance Approval – Application for Amendment (ECA No. 7251-8GKRPO), Orgaworld Canada Ltd., 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2016 - 2015 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 31, 2017- 2016 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, March 15, 2018 - 2017 Groundwater and Surface Water Monitoring Report, Orgaworld Organics Facility, 5123 Hawthorne Road, Ottawa, Ontario.

GHD Limited, February 8, 2019 - 2018 Groundwater and Surface Water Monitoring Report, Renewi Canada Ltd. Organics Composting Facility, 5123 Hawthorne Road, Ottawa, Ontario.

Golder Associates, 2008. Hydrogeological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision, Lots 26 & 27, Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario.

Ministry of the Environment, 2009. Certificate of Approval (Industrial Sewage Works) No. 9465-7NVRWT, Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

Ministry of the Environment, 2010. Amended Certificate of Approval (Industrial Sewage Works) No. 7032-88XPRA, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment, 2011. Amended Certificate of Approval (Industrial Sewage Works) No. 7251-8GKRPD, 5123 Hawthorne Road South, Lot Part of West Half of 27, Concession 6, Ottawa City, K1G 3Y3.

Ministry of the Environment and Climate Change Water Resources Unit, Eastern Region, January 3, 2017a. Hydrogeologic Assessment, Orgaworld Organics Facility 2015 Groundwater and Surface Water Monitoring Report, Trigger Level Program, 5123 Hawthorne Road, City of Ottawa.

Ministry of the Environment and Climate Change, February 1, 2017b. Environmental Compliance Approval (Industrial Sewage Works) No. 2844-9YNGZC Organics Composting Facility, Part Lot 27, Concession 6, 5123 Hawthorne Road, City of Ottawa, Ontario.

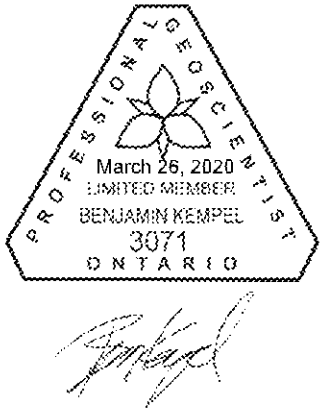
USEPA, May 2010. ProUCL Version 4.1.00 Technical Guide (Draft). United States Environmental Protection Agency, Office of Research and Development, Washington DC. EPA/600/R-07/041.

All of Which is Respectfully Submitted,

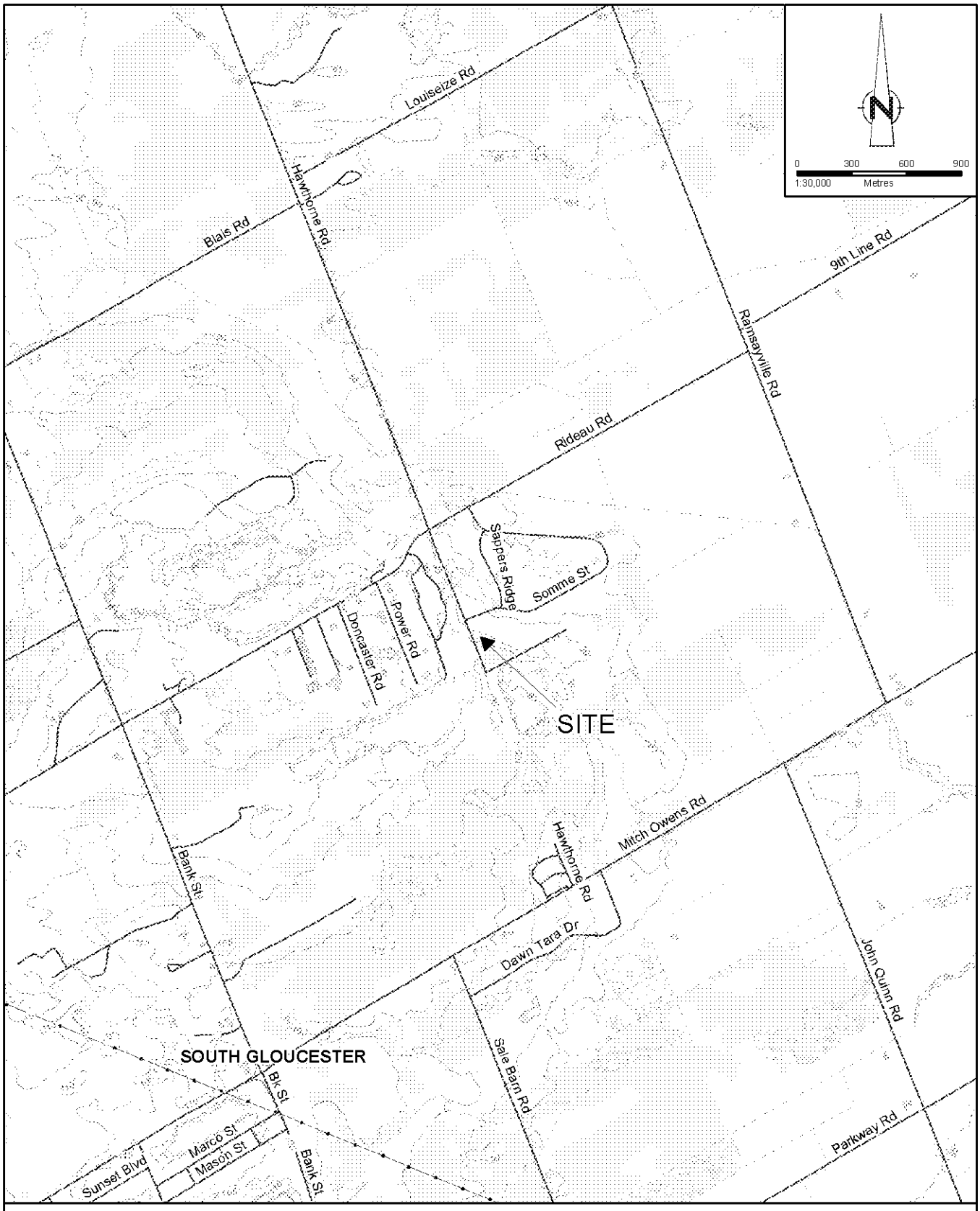
GHD



Allan Molenhuis, P.Geo. (Limited)



Ben Kempel, P.Geo. (Limited)



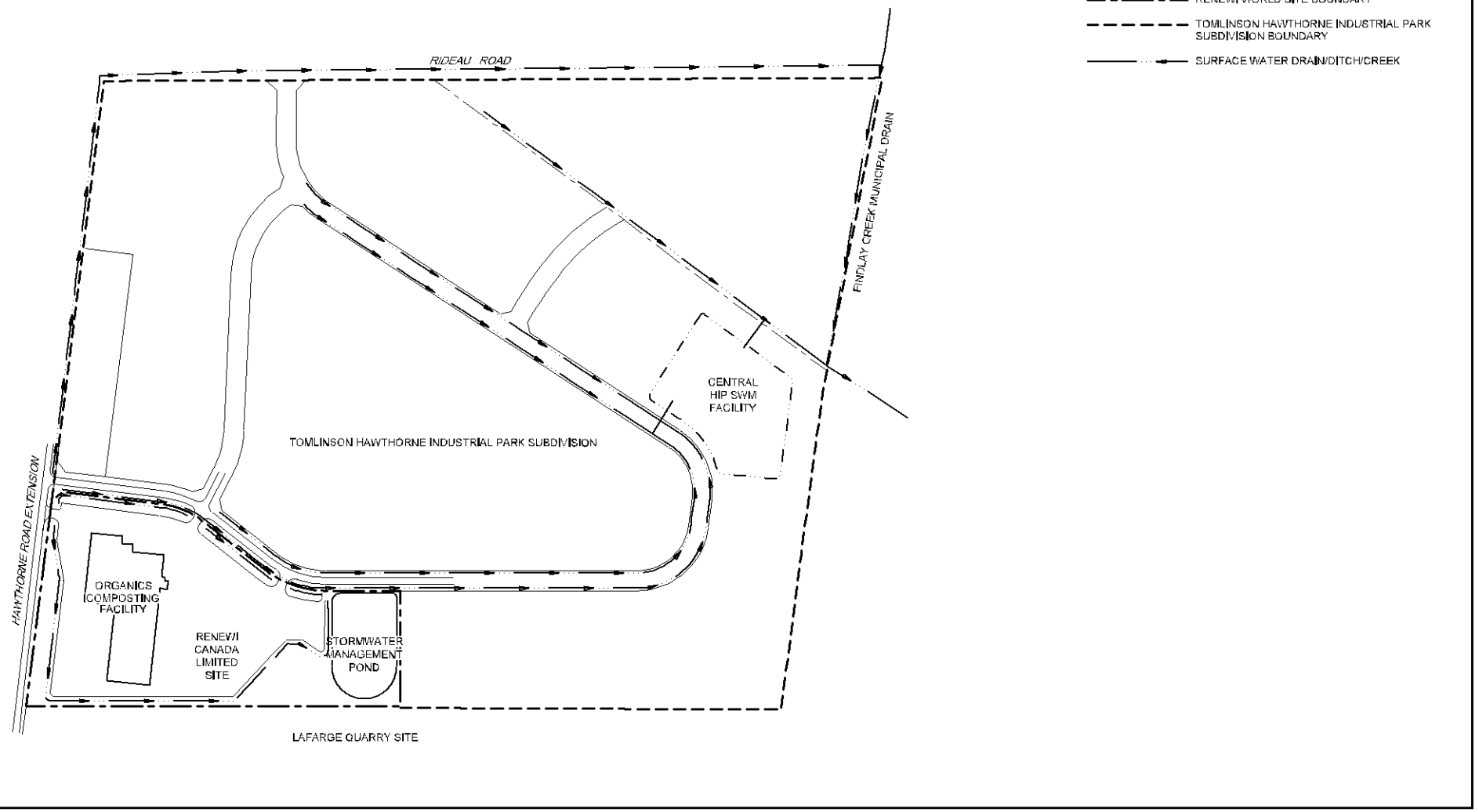
Source: MNR NRVIS, 2011. Produced by CRA under licence from Ontario Ministry of Natural Resources, © Queen's Printer 2011;
Coordinate System: NAD 1983 UTM Zone 18N

figure 1.1

SITE LOCATION MAP
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Renewi Canada Ltd.

045804-00(07)GIS-WA001 January 25, 2019

003849



0 50 100 150m

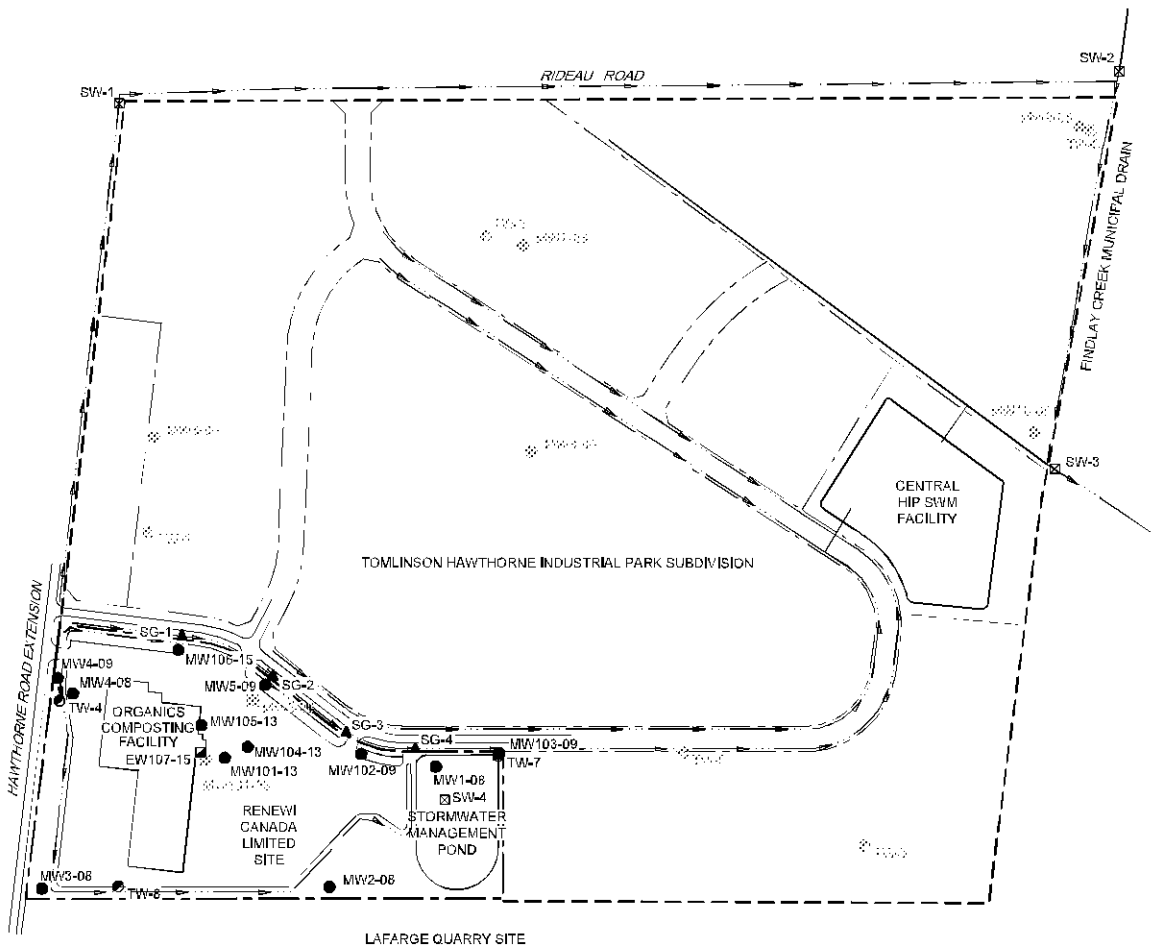
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 24, 2020

SITE PLAN

figure 1.2

003850



LEGEND

- RENEWI SITE BOUNDARY
- TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
- SURFACE WATER DRAIN/DITCH/CREEK
- MW2-08 SHALLOW MONITORING WELL LOCATION
- TW-4 DEEP BEDROCK MONITORING WELL LOCATION
- EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
- SW-3 SURFACE WATER MONITORING LOCATION
- SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
- MONITORING WELL LOCATIONS NO LONGER ACCESSIBLE (SEE NOTE BELOW)

NOTES:

1. SHALLOW AND DEEP MONITORING WELLS LOCATED OUTSIDE OF RENEWI SITE LIMITS ARE NO LONGER ACCESSIBLE TO OCL OR GHD AS OF JANUARY 2010.

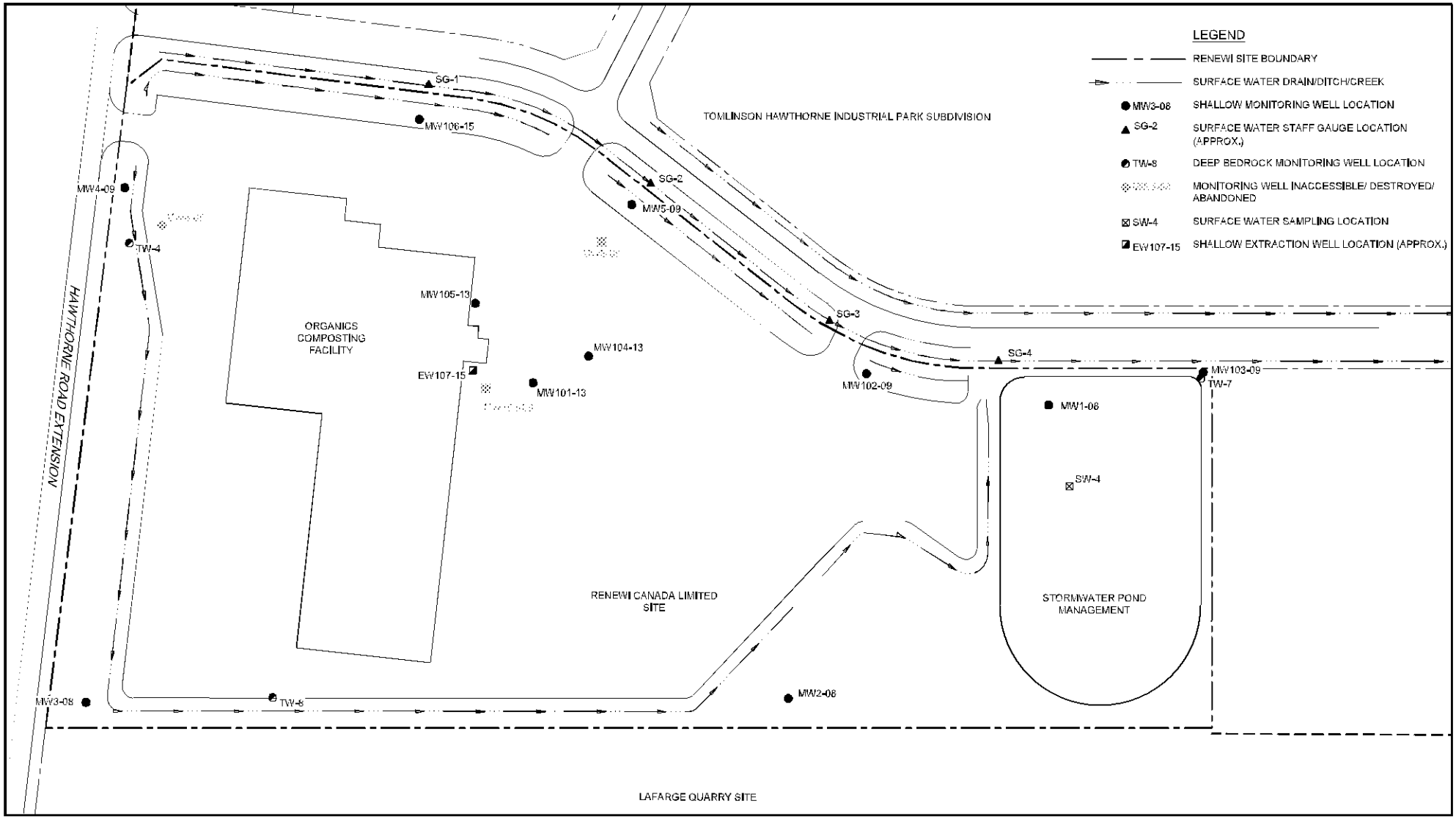
0 50 100 150m

RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 24, 2020

GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS figure 3.1

003851



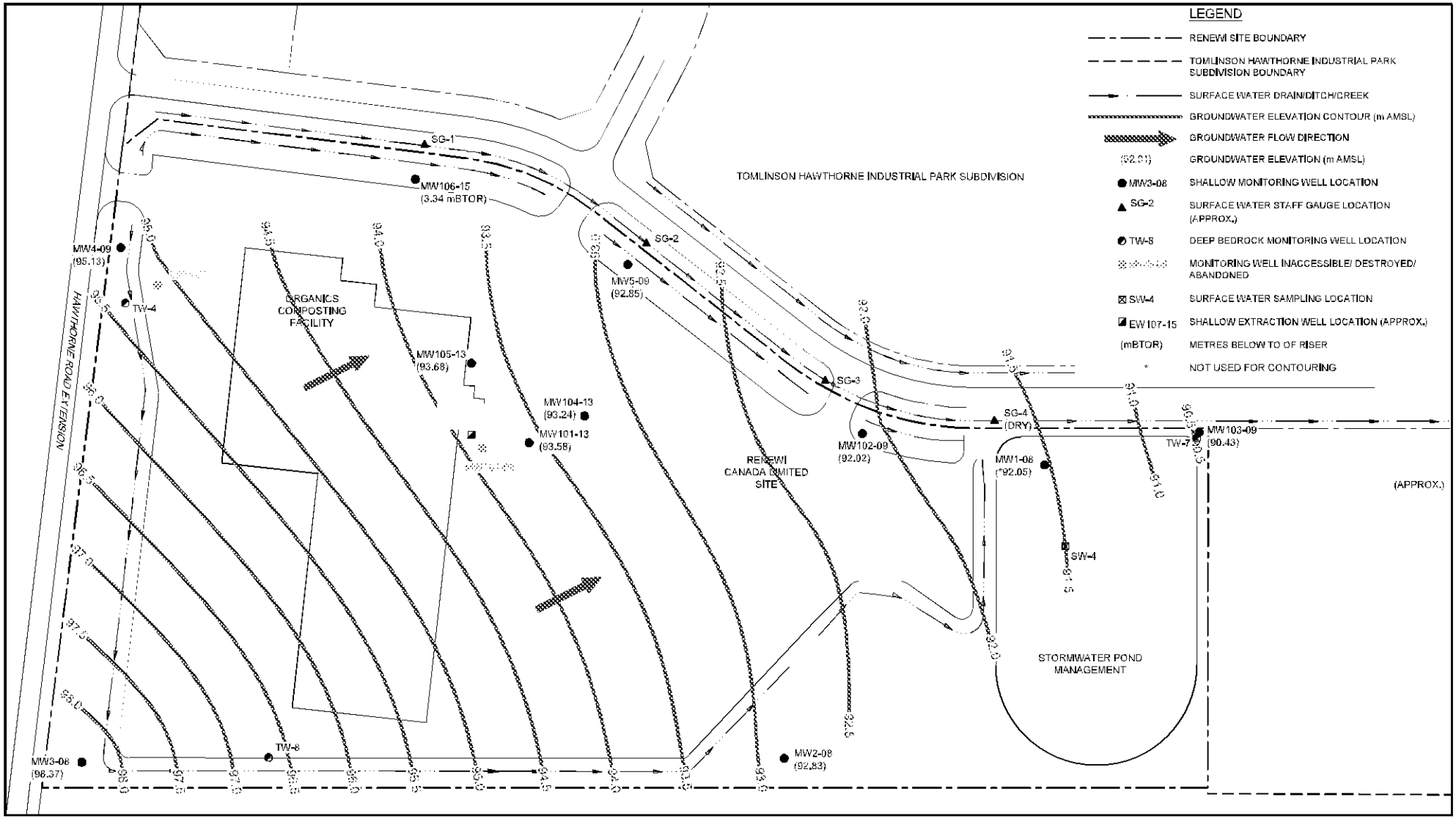
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 24, 2020

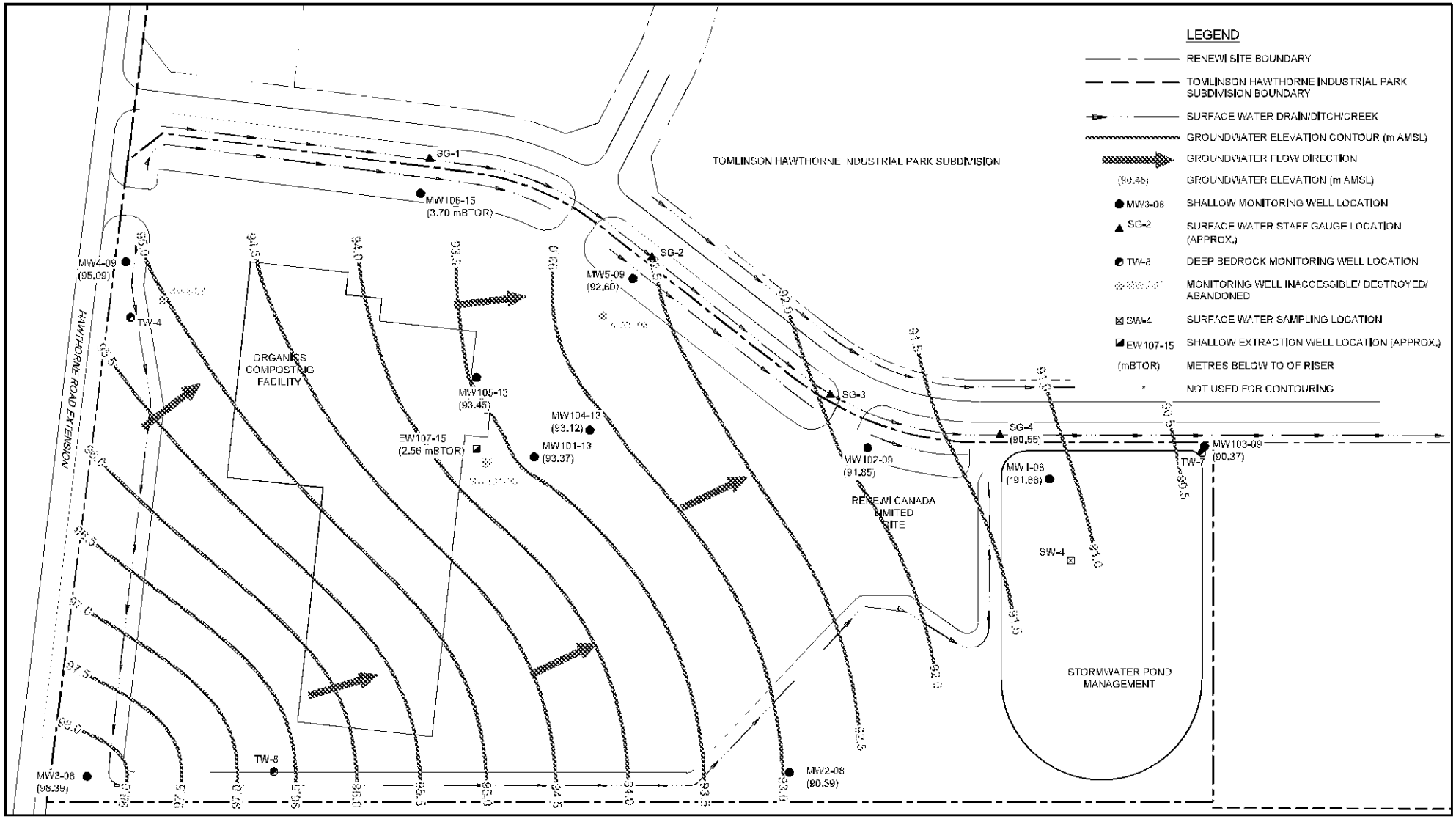
RENEWI PROPERTY GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS

figure 3.2

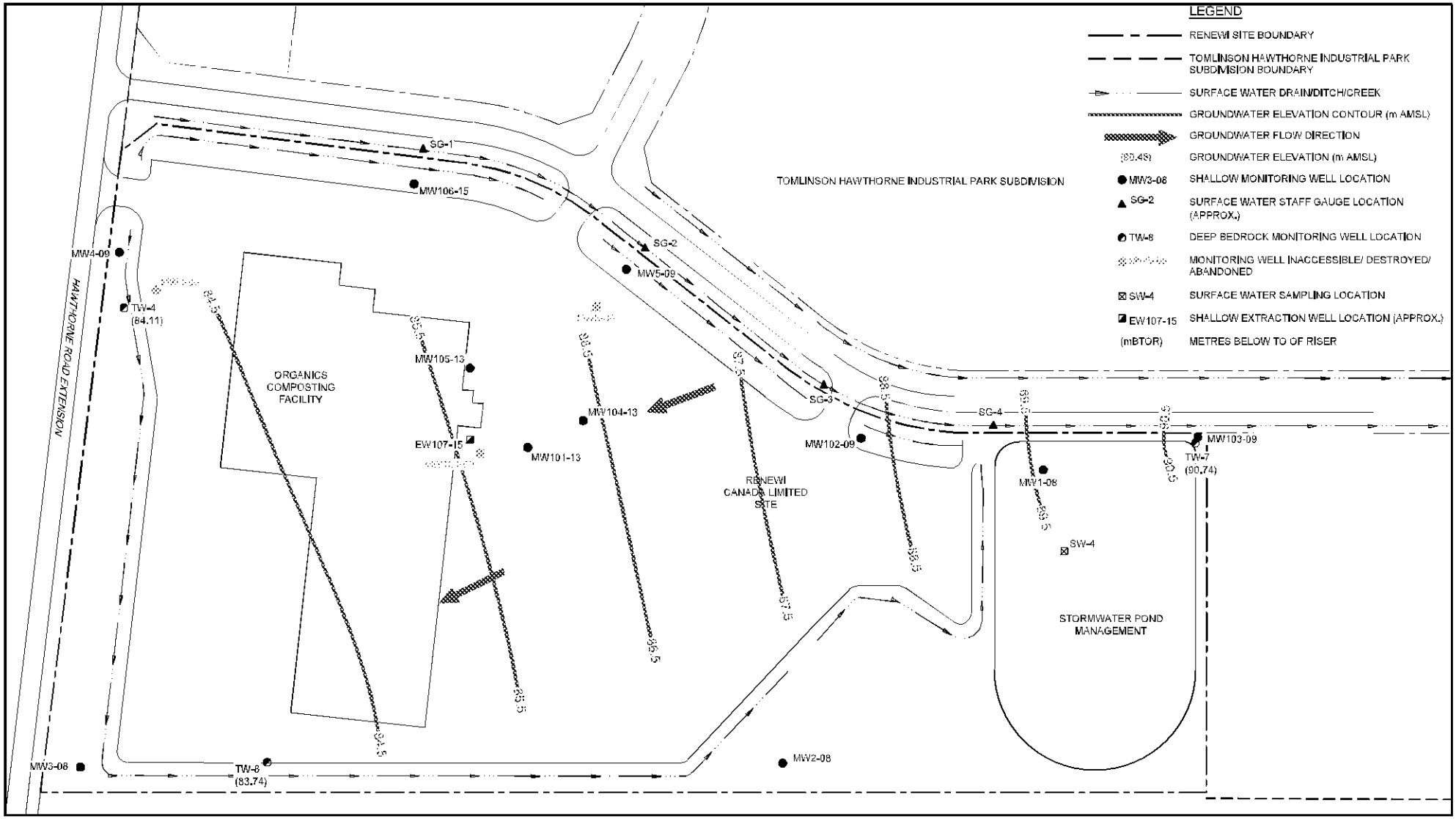
003852


LEGEND
RENEWI SITE BOUNDARY
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
SURFACE WATER DRAIN/DITCH/CREEK
GROUNDWATER ELEVATION CONTOUR (m AMSL)
GROUNDWATER FLOW DIRECTION
(92.01) GROUNDWATER ELEVATION (m AMSL)
MW3-08 SHALLOW MONITORING WELL LOCATION
SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
TW-8 DEEP BEDROCK MONITORING WELL LOCATION
MONITORING WELL INACCESSIBLE/ DESTROYED/ ABANDONED
SW-4 SURFACE WATER SAMPLING LOCATION
EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
(mBTOR) METRES BELOW TO OF RISER
* NOT USED FOR CONTOURING
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION
SG-1
MW106-15 (3.34 mBTOR)
MW4-09 (95.13)
TW-4
HAWTHORNE ROAD EXTENSION
ORGANICS COMPOSTING FACILITY
MW105-13 (93.68)
SG-2
MW5-09 (92.85)
SG-3
MW104-13 (93.24)
MW101-13 (93.58)
SG-4 (DRY)
MW102-08 (92.02)
RENEWI CANADA LIMITED SITE
MW1-08 (*92.05)
TW-7
MW103-09 (90.43)
(APPROX.)
SW-4
STORMWATER POND MANAGEMENT
MW3-08 (98.37)
TW-8
MW2-08 (92.83)
0 15 30 45m
N
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
JUNE 17 & 18, 2019
45804-58
Feb 25, 2020
figure 4.1

003853


LEGEND
RENEWI SITE BOUNDARY
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION BOUNDARY
SURFACE WATER DRAIN/DITCH/CREEK
GROUNDWATER ELEVATION CONTOUR (m AMSL)
GROUNDWATER FLOW DIRECTION
(89.45) GROUNDWATER ELEVATION (m AMSL)
MW3-08 SHALLOW MONITORING WELL LOCATION
SG-2 SURFACE WATER STAFF GAUGE LOCATION (APPROX.)
TW-6 DEEP BEDROCK MONITORING WELL LOCATION
MONITORING WELL INACCESSIBLE/ DESTROYED/ ABANDONED
SW-4 SURFACE WATER SAMPLING LOCATION
EW107-15 SHALLOW EXTRACTION WELL LOCATION (APPROX.)
(mBTOR) METRES BELOW TO OF RISER
* NOT USED FOR CONTOURING
TOMLINSON HAWTHORNE INDUSTRIAL PARK SUBDIVISION
SG-1
MW106-15 (3.70 mBTOR)
SG-2
MW5-09 (92.60)
MW4-09 (95.09)
TW-4
HAWTHORNE ROAD EXTENSION
ORGANICS COMPOSTING FACILITY
MW105-13 (93.45)
MW104-13 (93.12)
MW101-13 (93.37)
EW107-15 (2.56 mBTOR)
SG-3
SG-4 (90.55)
MW102-09 (91.85)
MW103-09 (90.37)
TW-7
MW1-08 (*91.88)
RENEWI CANADA LIMITED SITE
SW-4
STORMWATER POND MANAGEMENT
TW-6
MW3-08 (98.39)
MW2-08 (90.39)
0 15 30 45m
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
UNCONFINED SHALLOW GROUNDWATER ELEVATIONS
NOVEMBER 26-28, 2019
45804-58
Feb 25, 2020
figure 4.2

003854



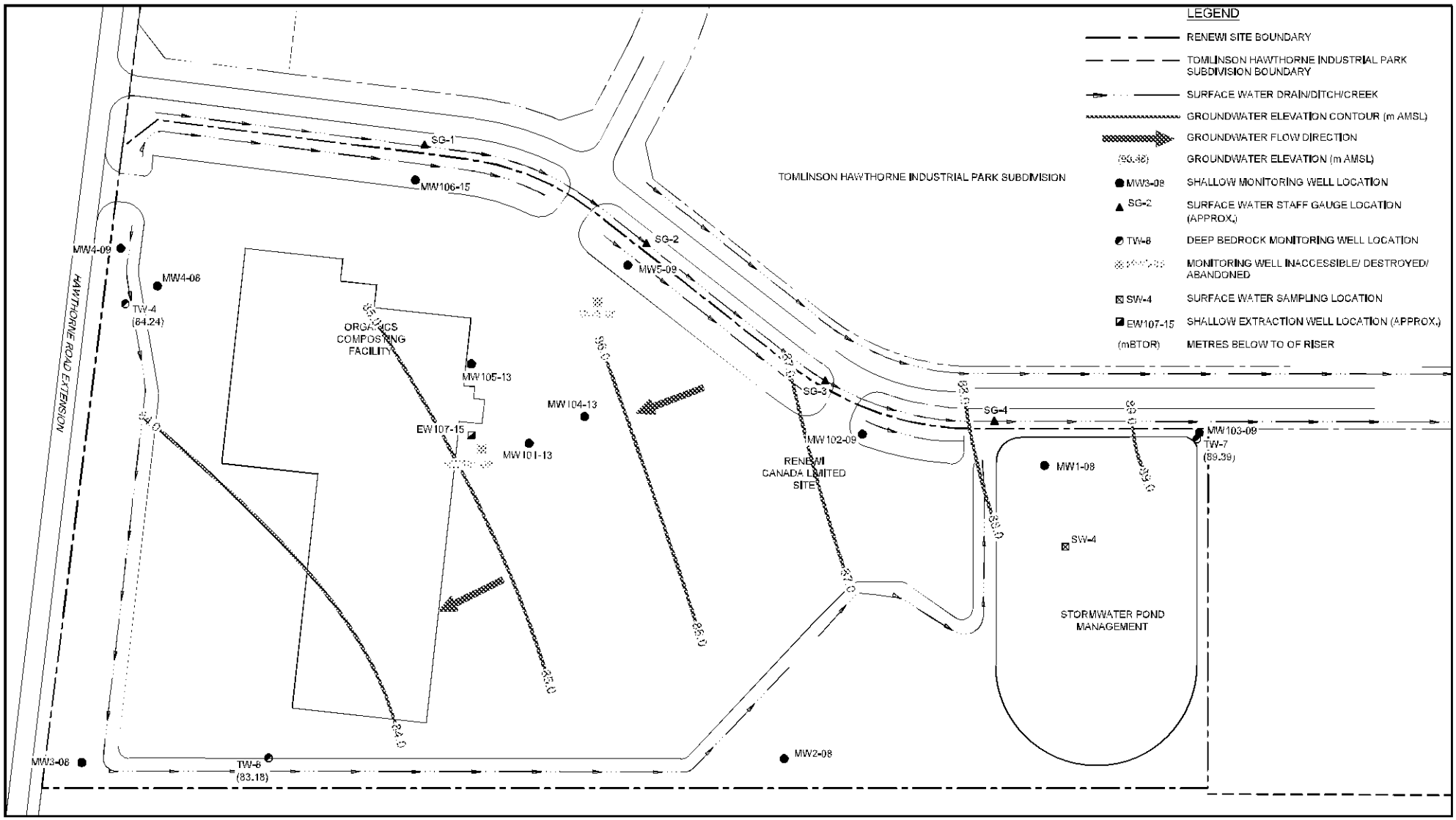
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

BEDROCK GROUNDWATER ELEVATIONS
JUNE 17 & 18, 2019

45804-58
Feb 25, 2020

figure 4.3

003855



0 15 30 45m

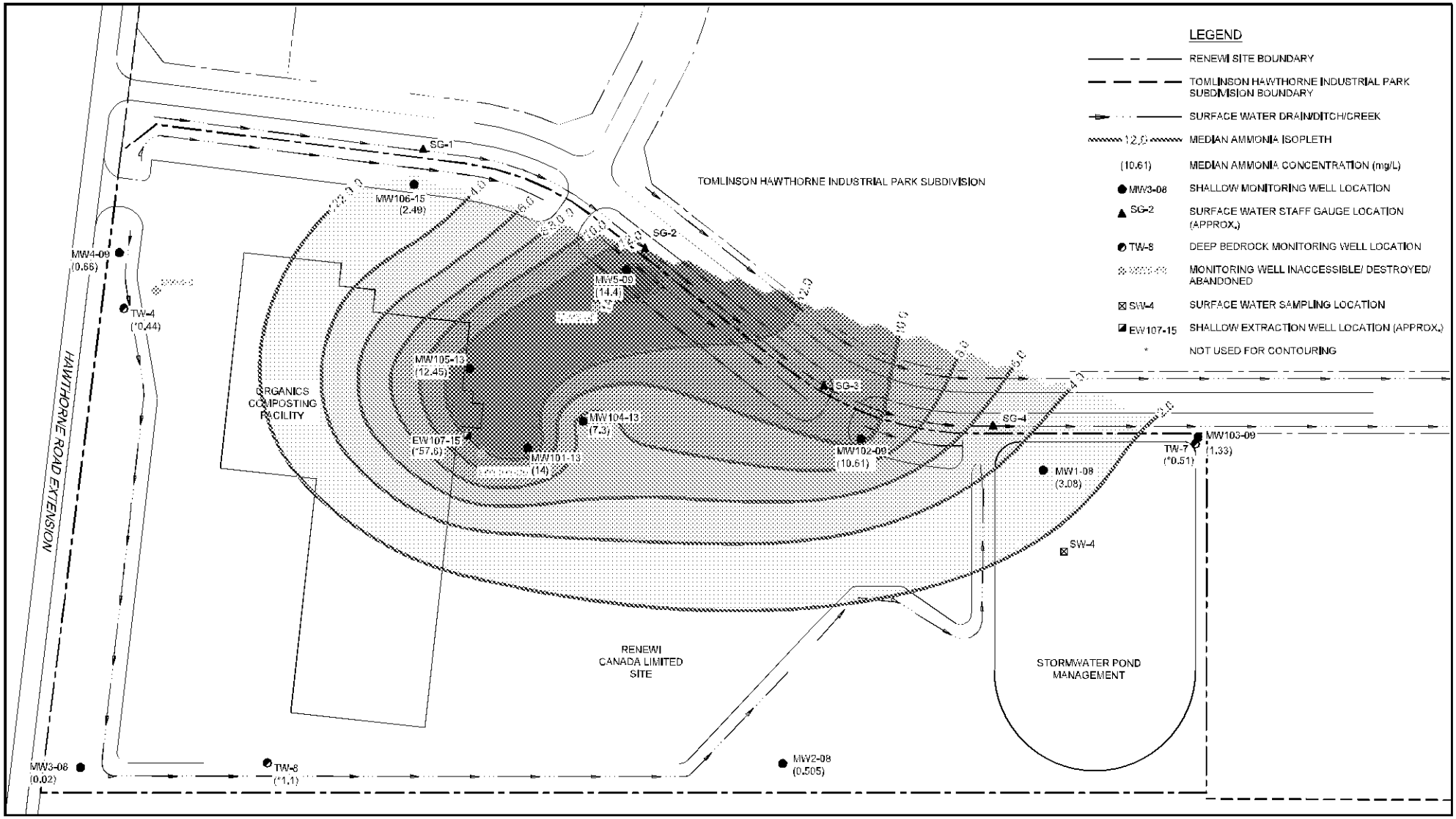
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

BEDROCK GROUNDWATER ELEVATIONS
NOVEMBER 26-28, 2019

45804-58
Feb 25, 2020

figure 4.4

003856



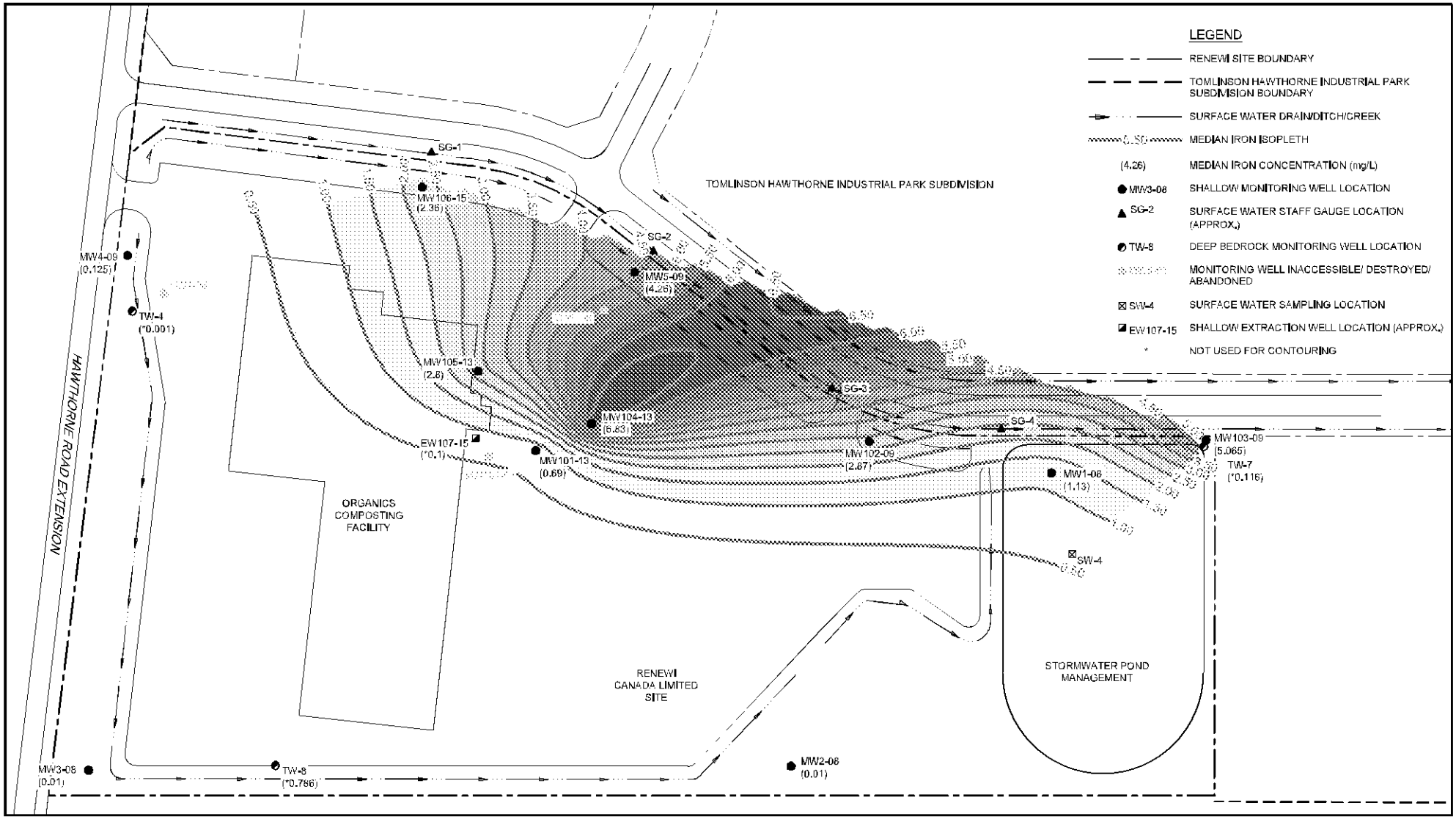
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 25, 2020

MEDIAN 2019 AMMONIA CONCENTRATION ISOPLETHS

figure 4.5

003857

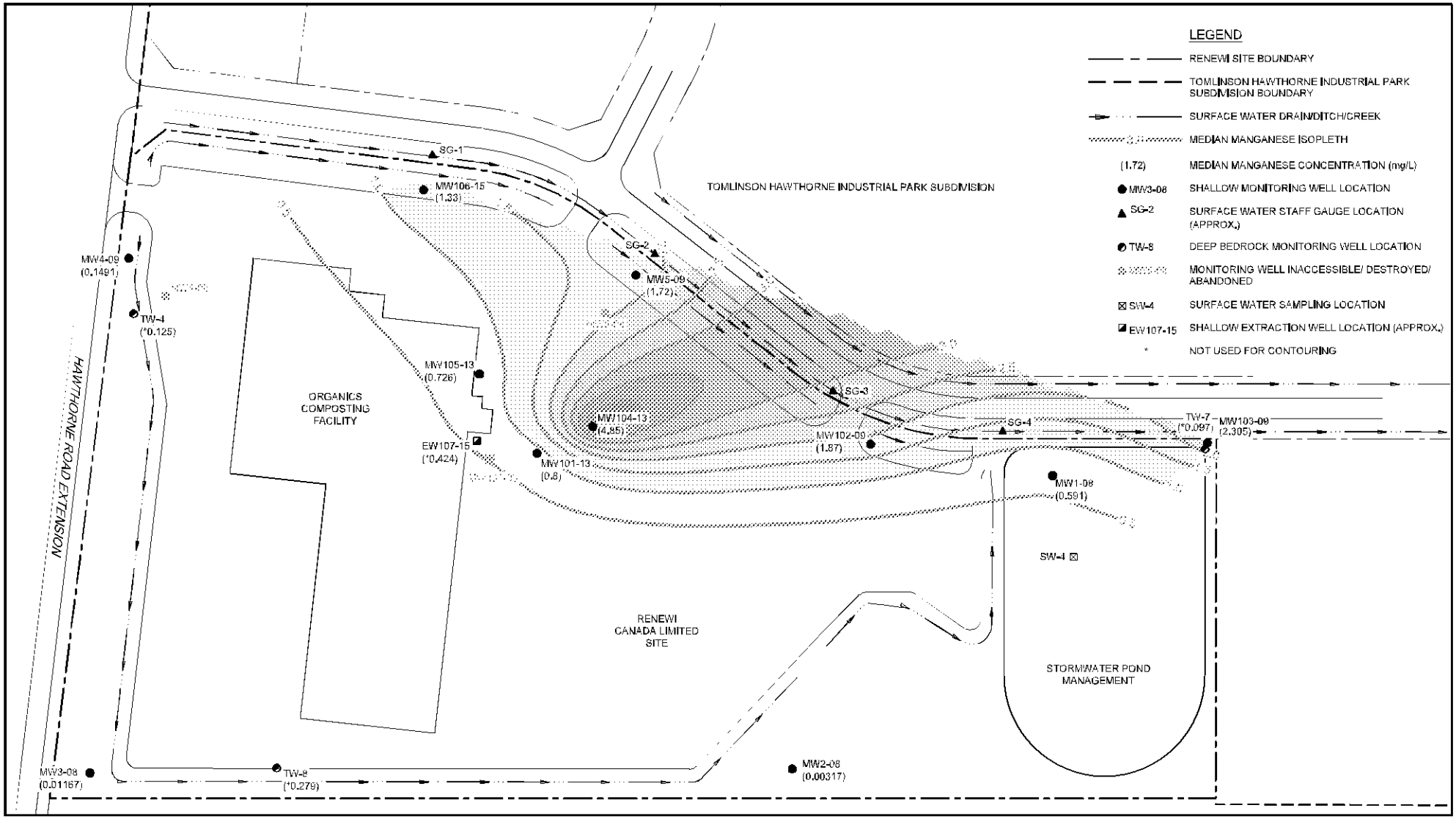


RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 25, 2020

MEDIAN 2019 DISSOLVED IRON CONCENTRATION ISOPLETHS figure 4.6

003858



0 15 30 45m

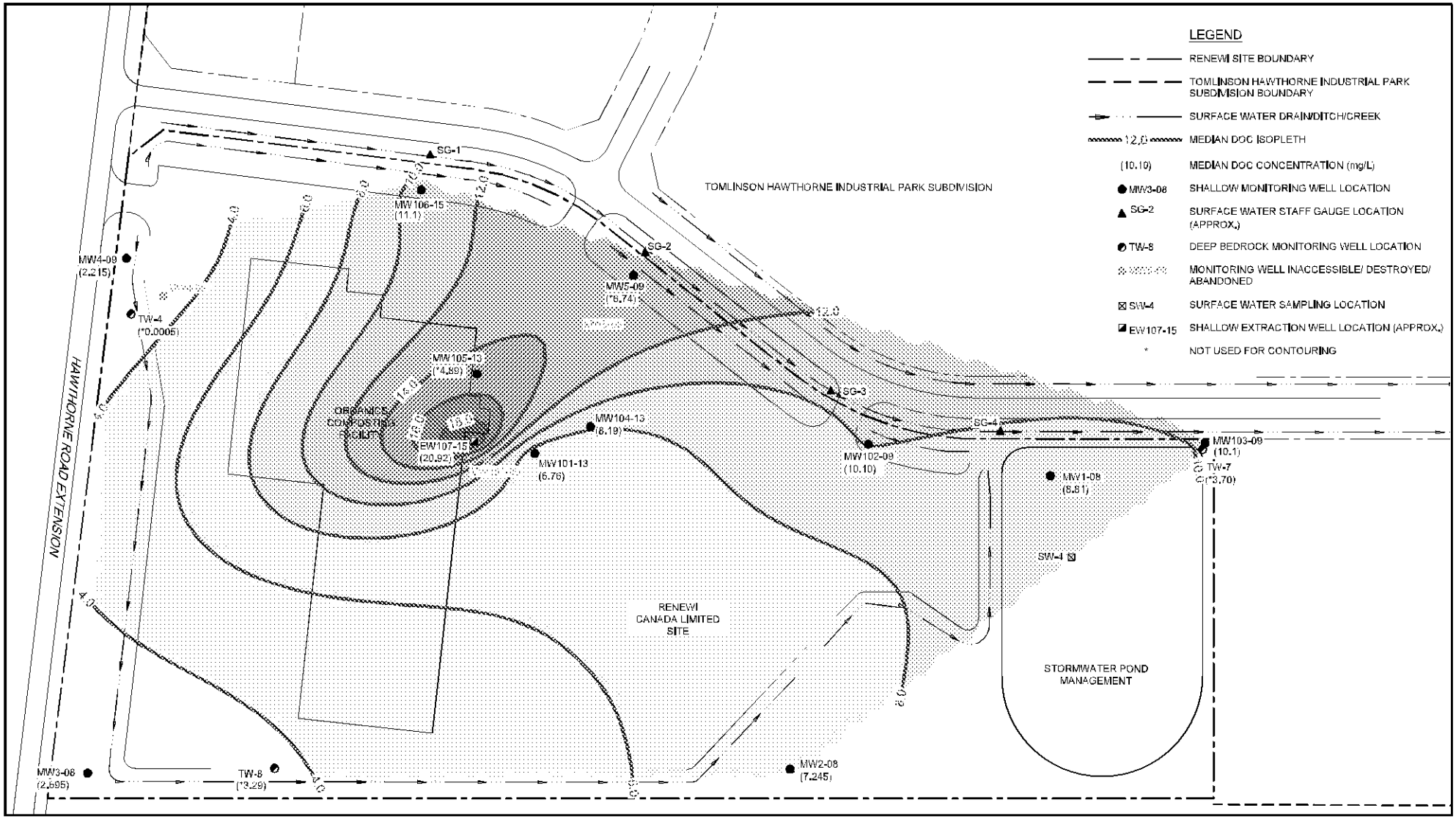
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

45804-58
Feb 25, 2020

MEDIAN 2019 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS

figure 4.7

003859



0 15 30 45m

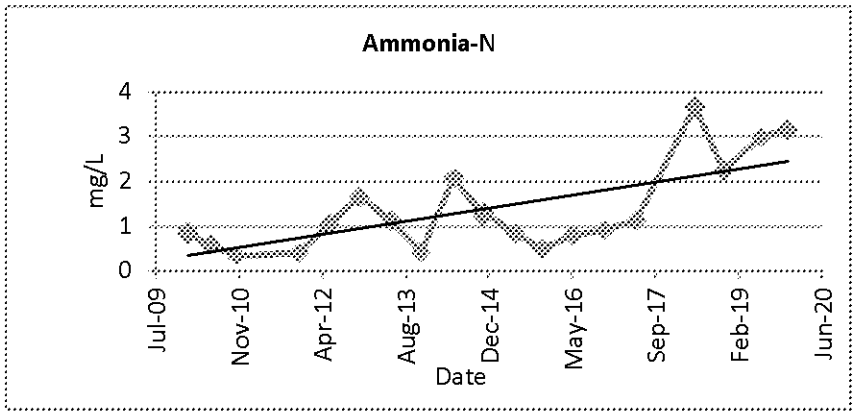
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

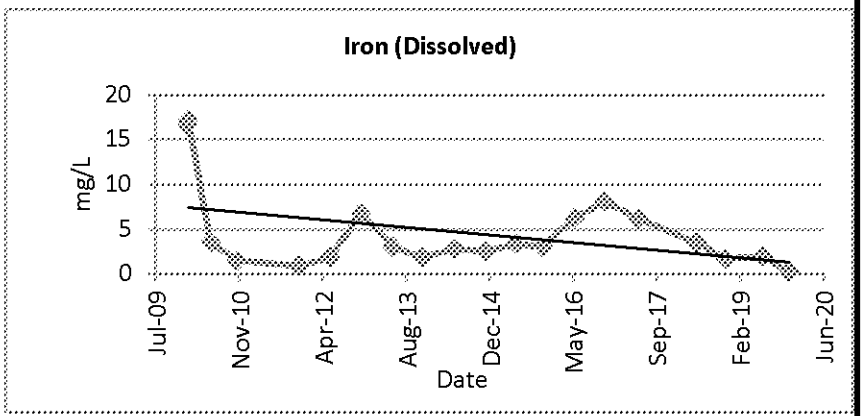
45804-58
Feb 25, 2020

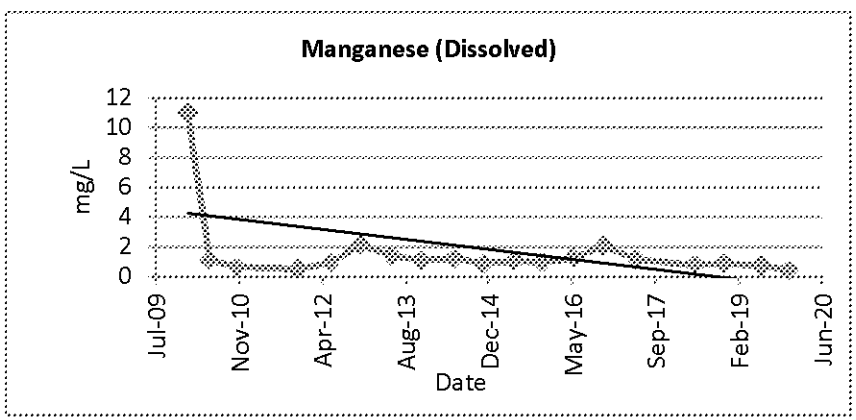
MEDIAN 2019 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS

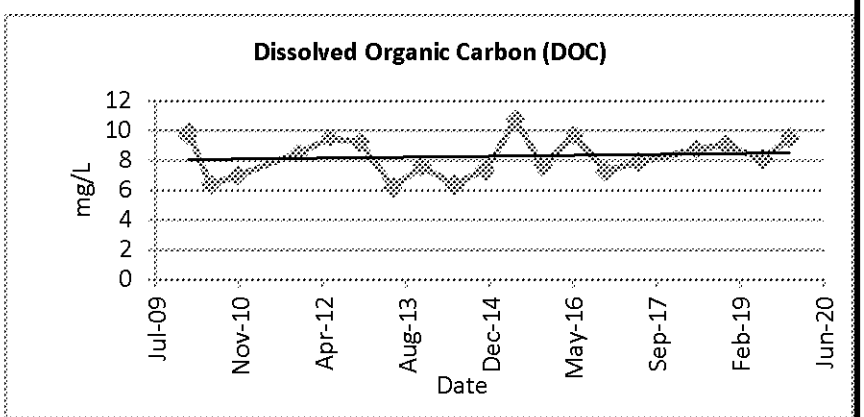
figure 4.8

C:\GIS\...\45804-58_2019_GW_SW_Report_Figures.mxd





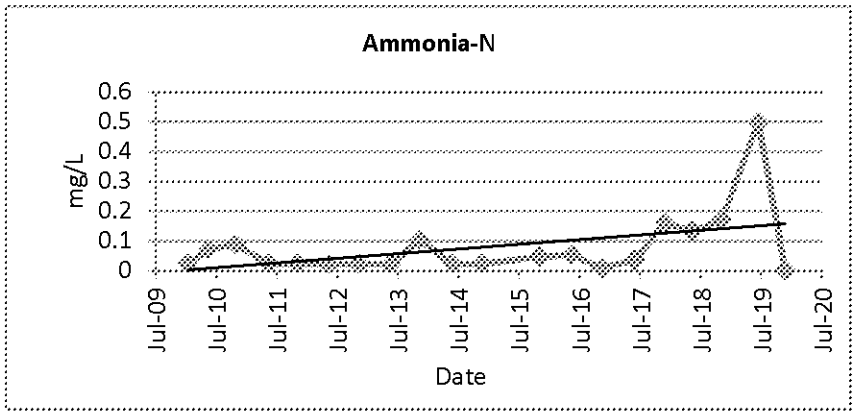


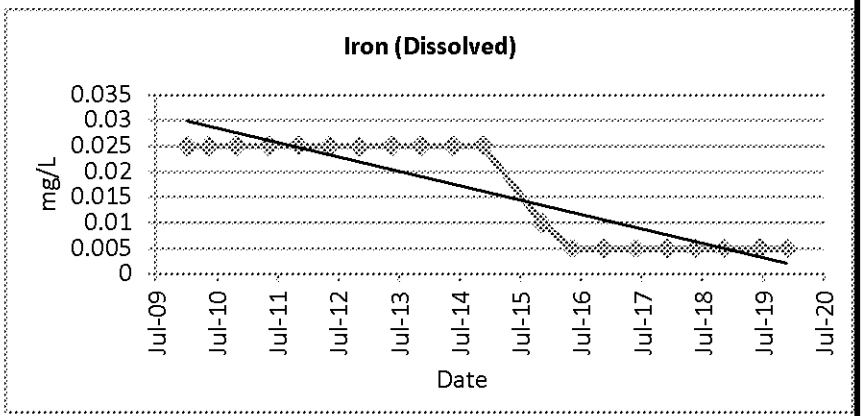


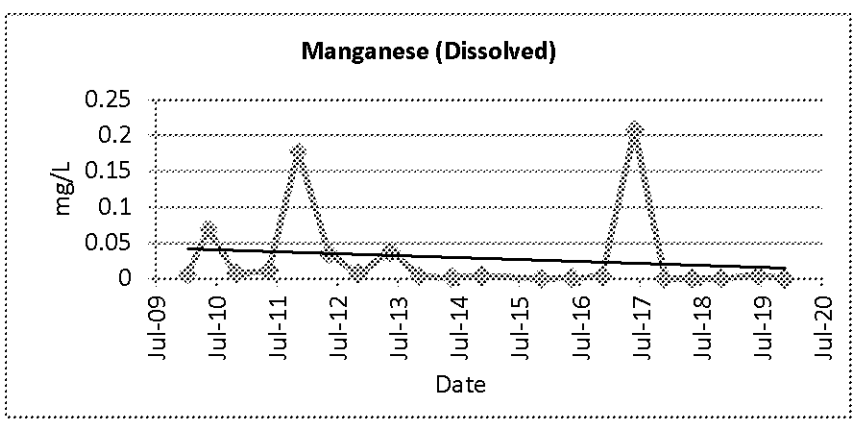
Note: ND results as 1/2 the detection limit

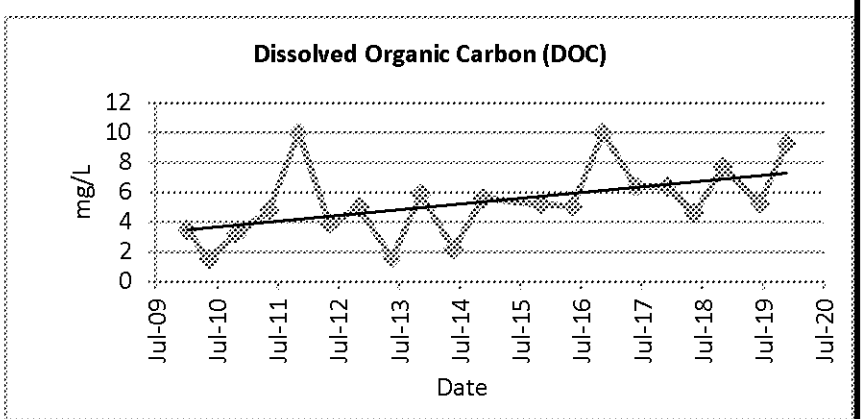
figure 4.9.1

TEMPORAL PLOTS - SELECTED PARAMETERS
MW1-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY







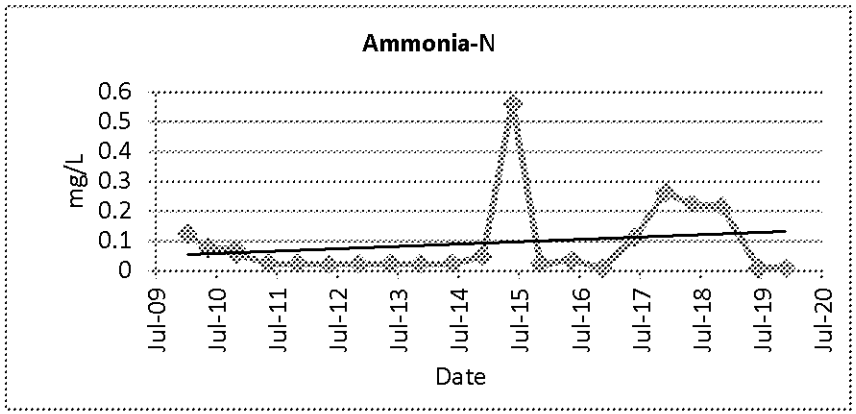


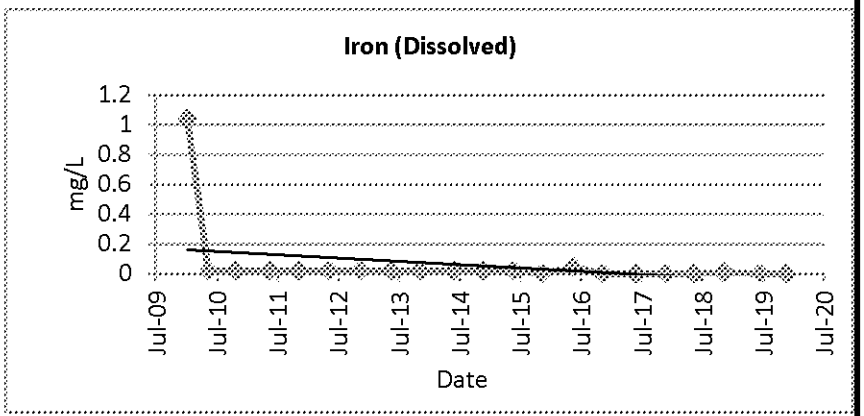
Note: ND results as 1/2 the detection limit

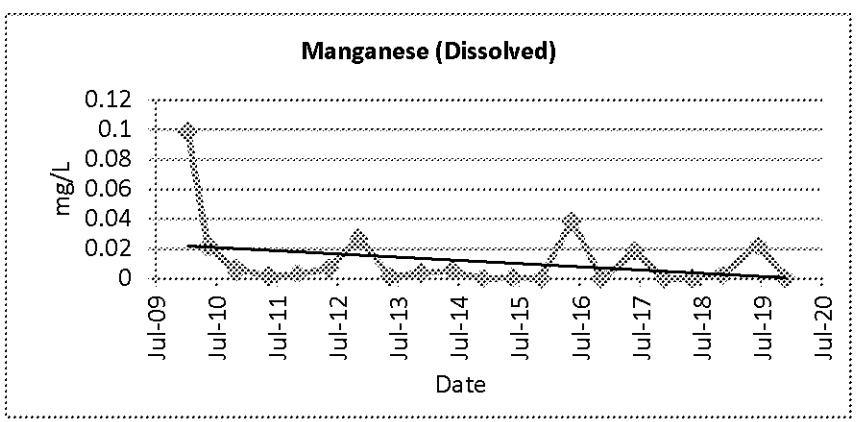
figure 4.9.2

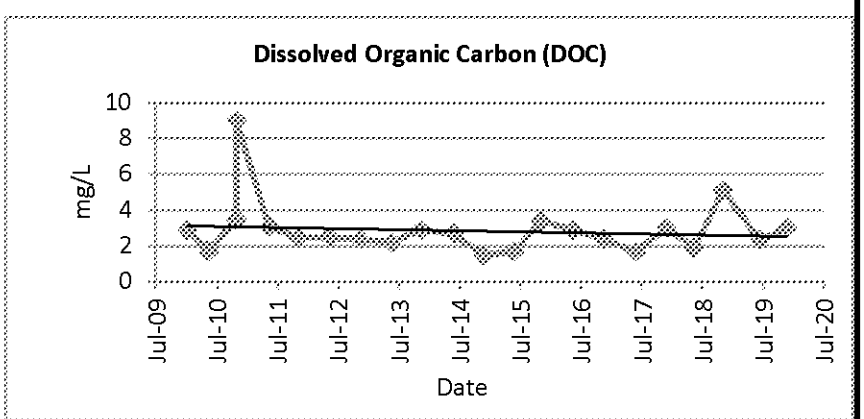
TEMPORAL PLOTS - SELECTED PARAMETERS
MW2-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

003862







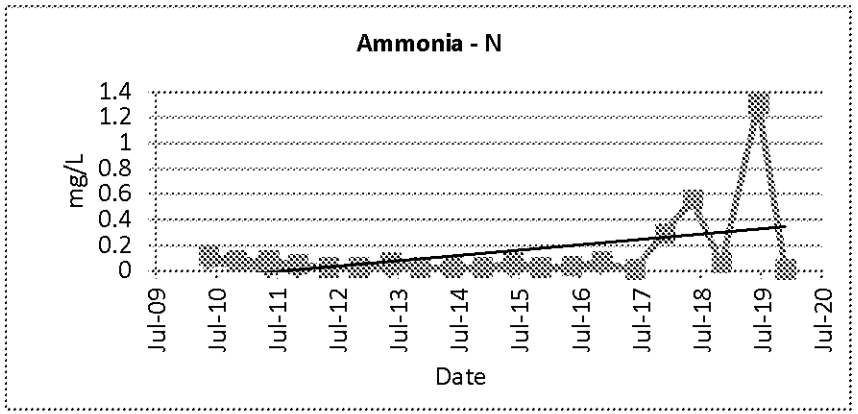


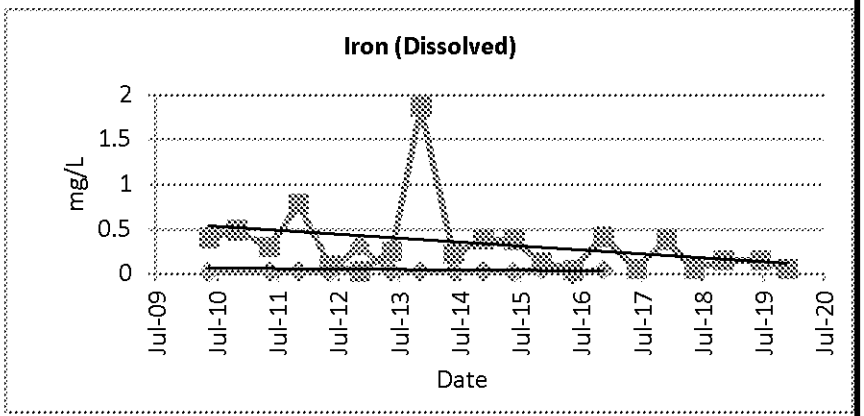
Note: ND results as 1/2 the detection limit

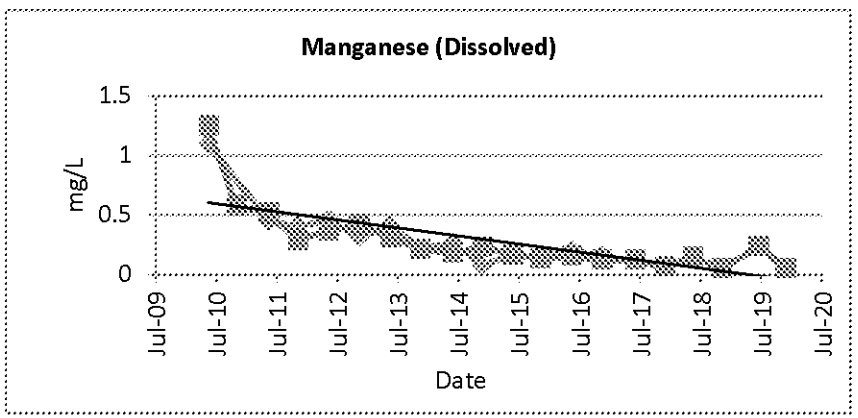
figure 4.9.3

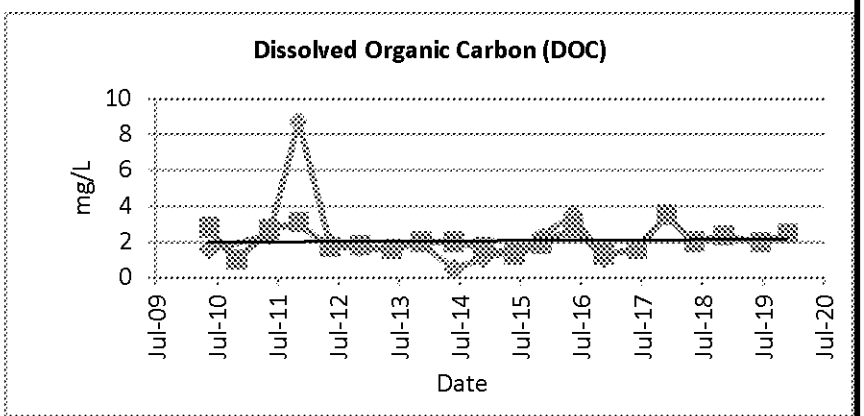
TEMPORAL PLOTS - SELECTED PARAMETERS
MW3-08
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

003863









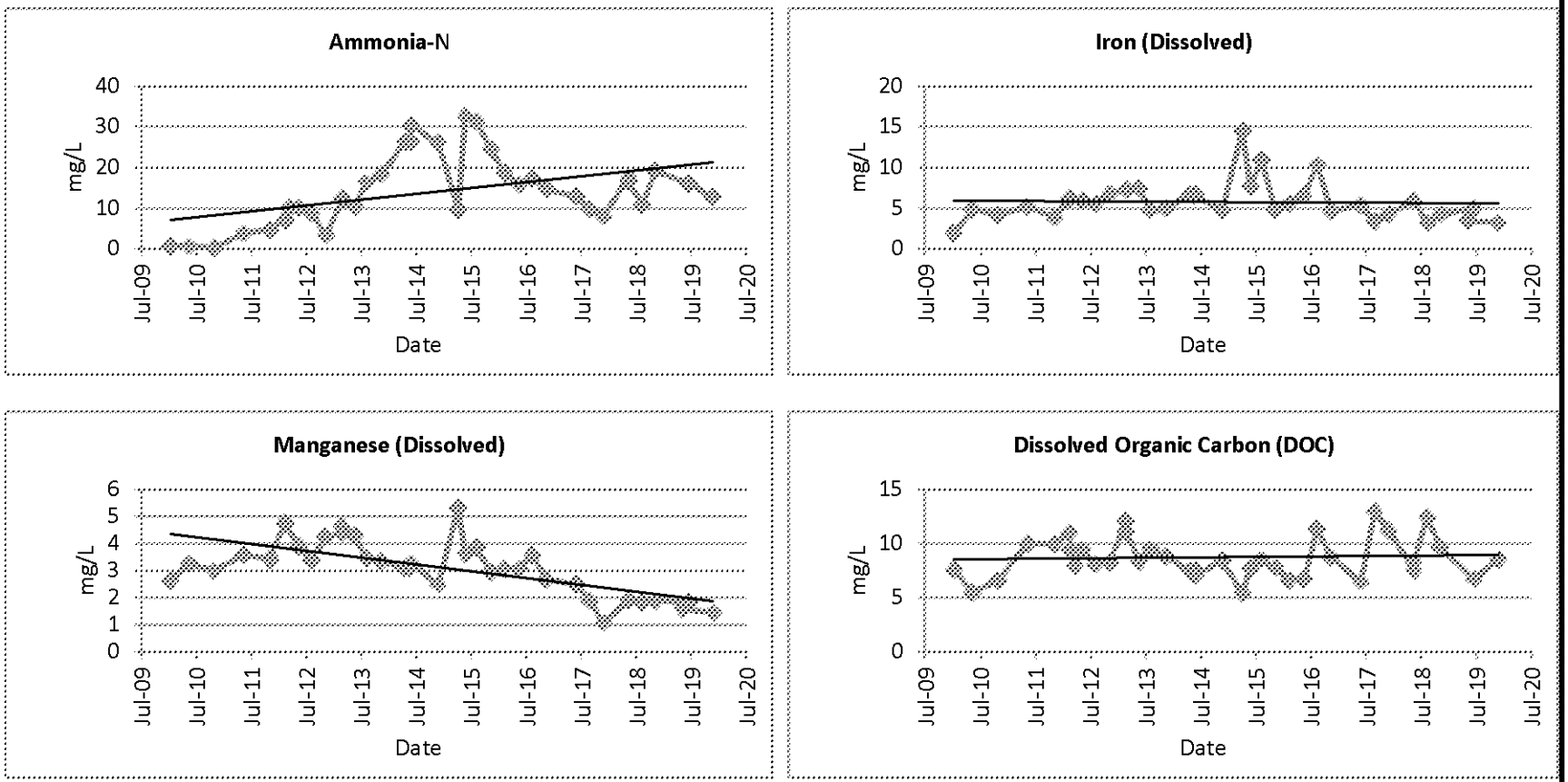
Note: ND results as 1/2 the detection limit

MW4-08
MW4-09

figure 4.9.4

TEMPORAL PLOTS - SELECTED PARAMETERS
MW4-08 & MW4-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

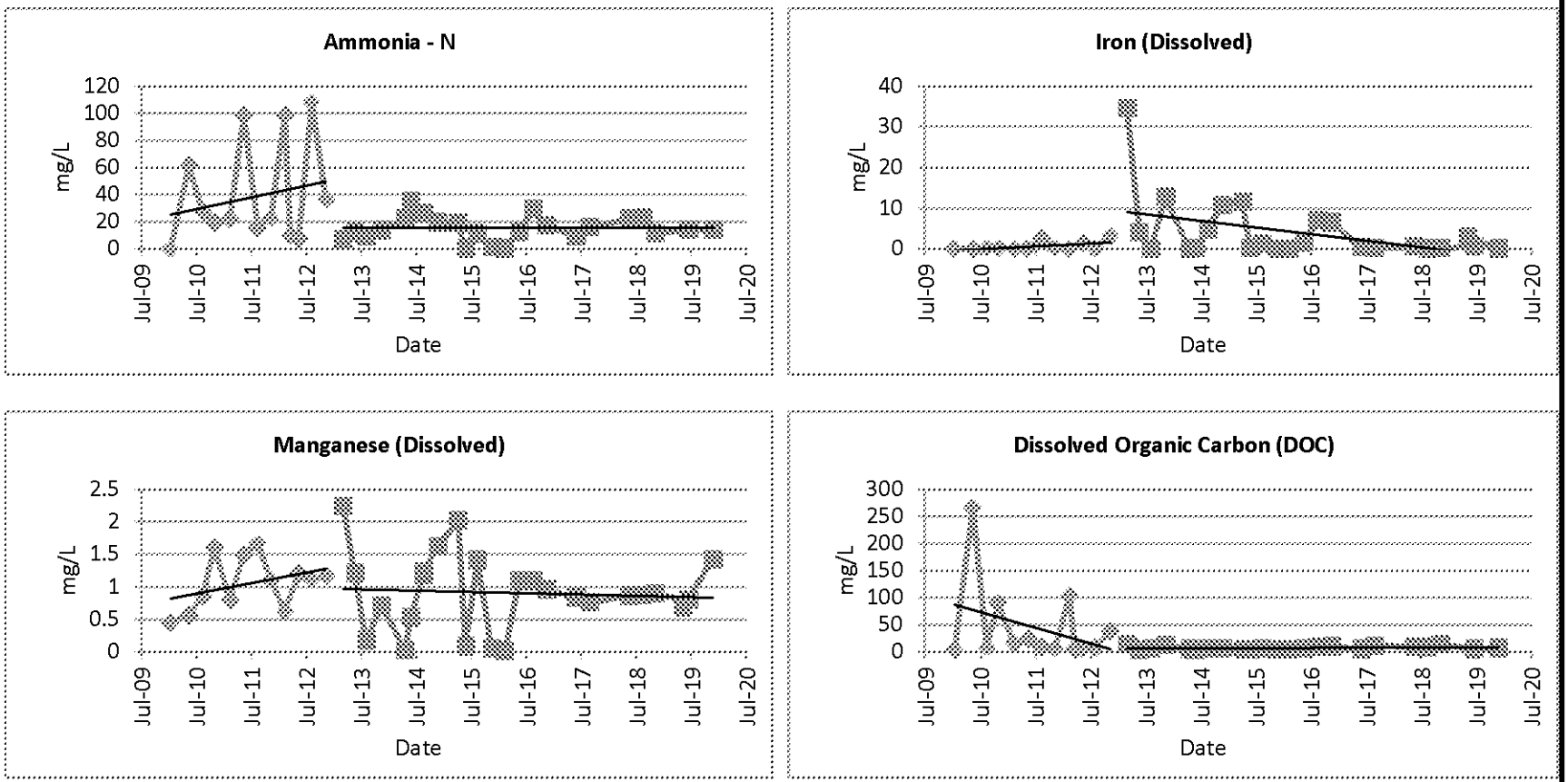
003864



Note: ND results as 1/2 the detection limit

figure 4.9.5

TEMPORAL PLOTS - SELECTED PARAMETERS
MW5-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

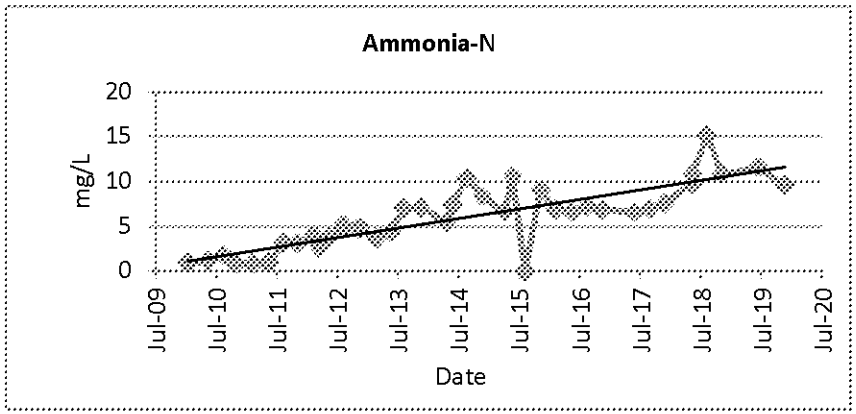


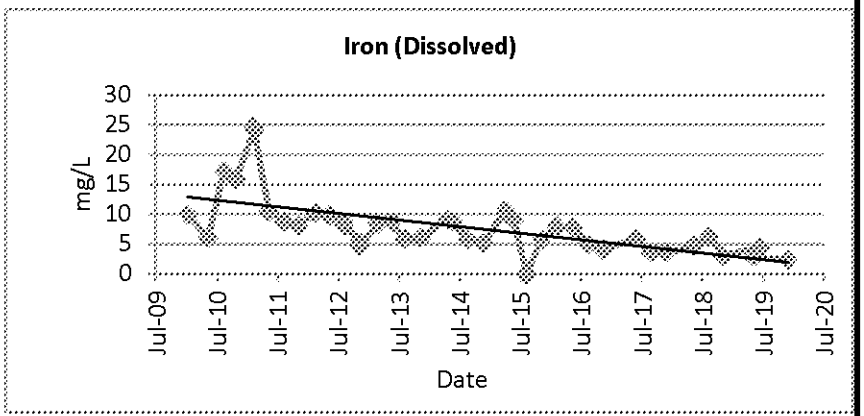
Note: ND results as 1/2 the detection limit

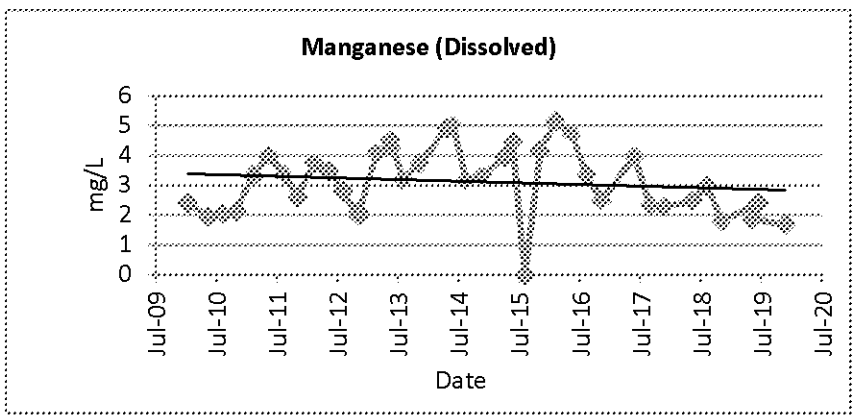
MW101-09
MW101-13

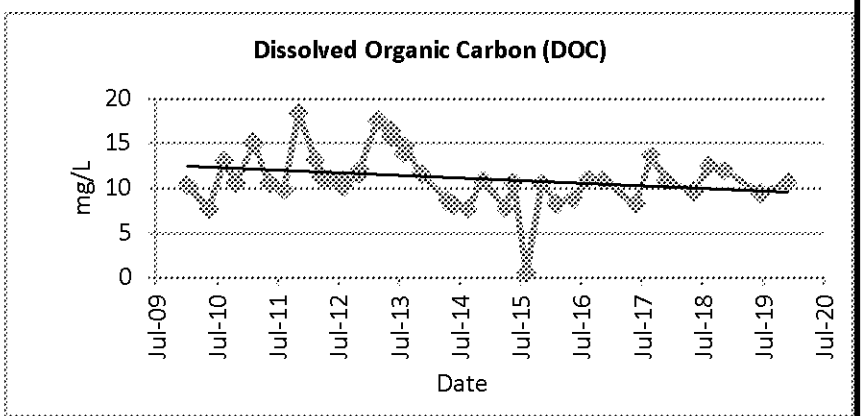
figure 4.9.6

TEMPORAL PLOTS - SELECTED PARAMETERS
MW101-09 & MW101-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





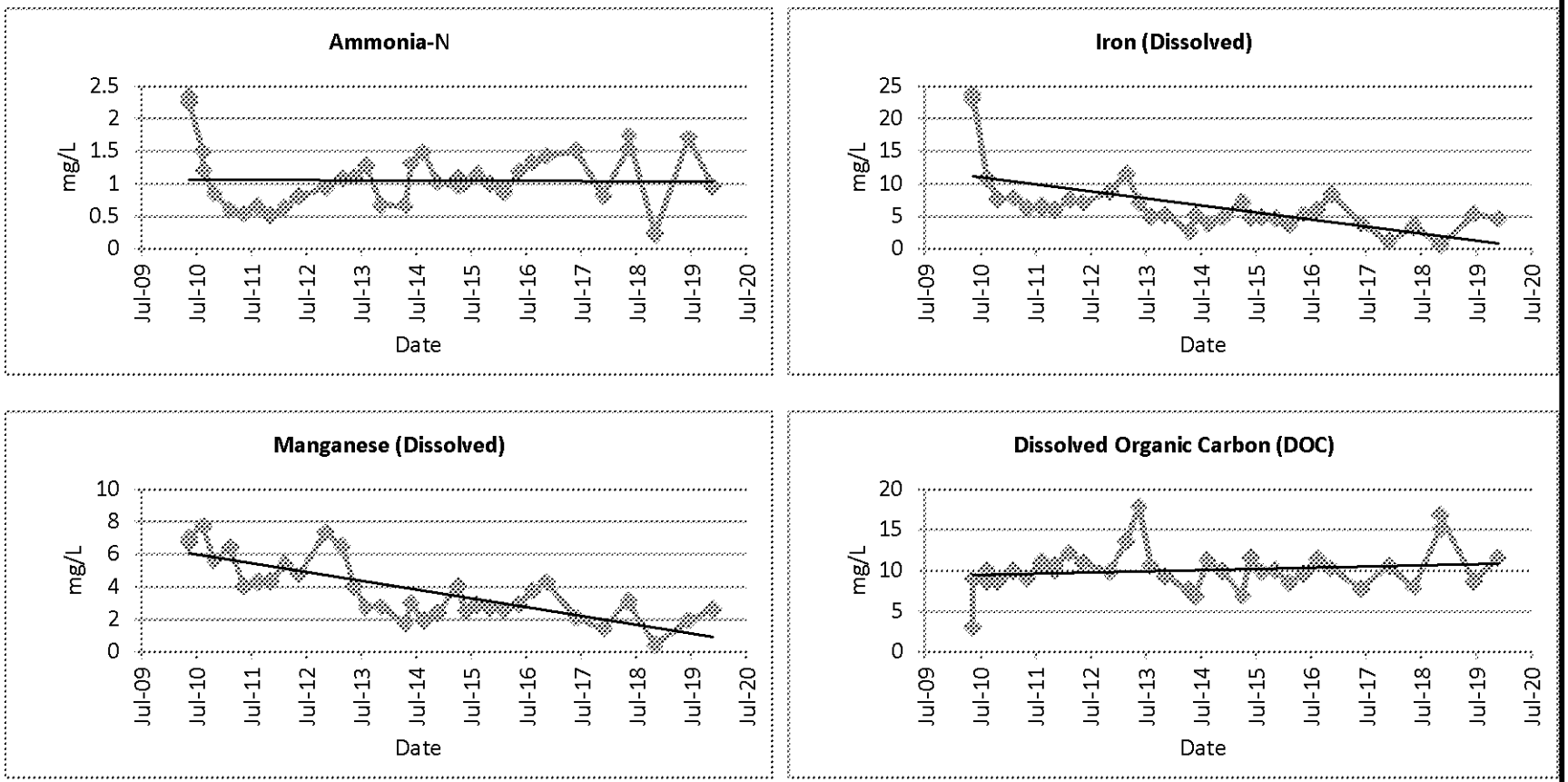




Note: ND results as 1/2 the detection limit

figure 4.9.7

TEMPORAL PLOTS - SELECTED PARAMETERS
MW102-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

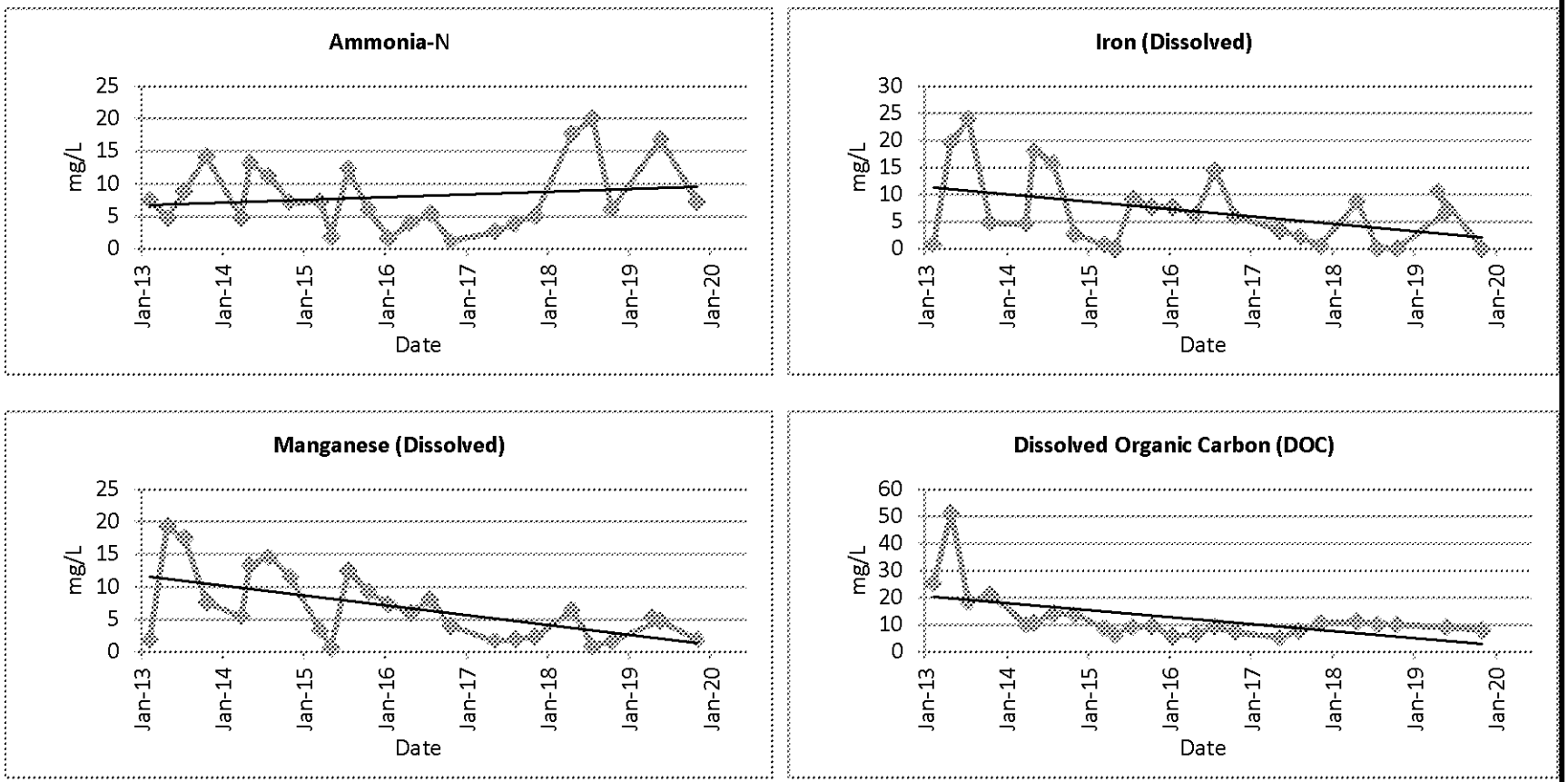


Note: ND results as 1/2 the detection limit

figure 4.9.8

TEMPORAL PLOTS - SELECTED PARAMETERS
MW103-09
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

8983300

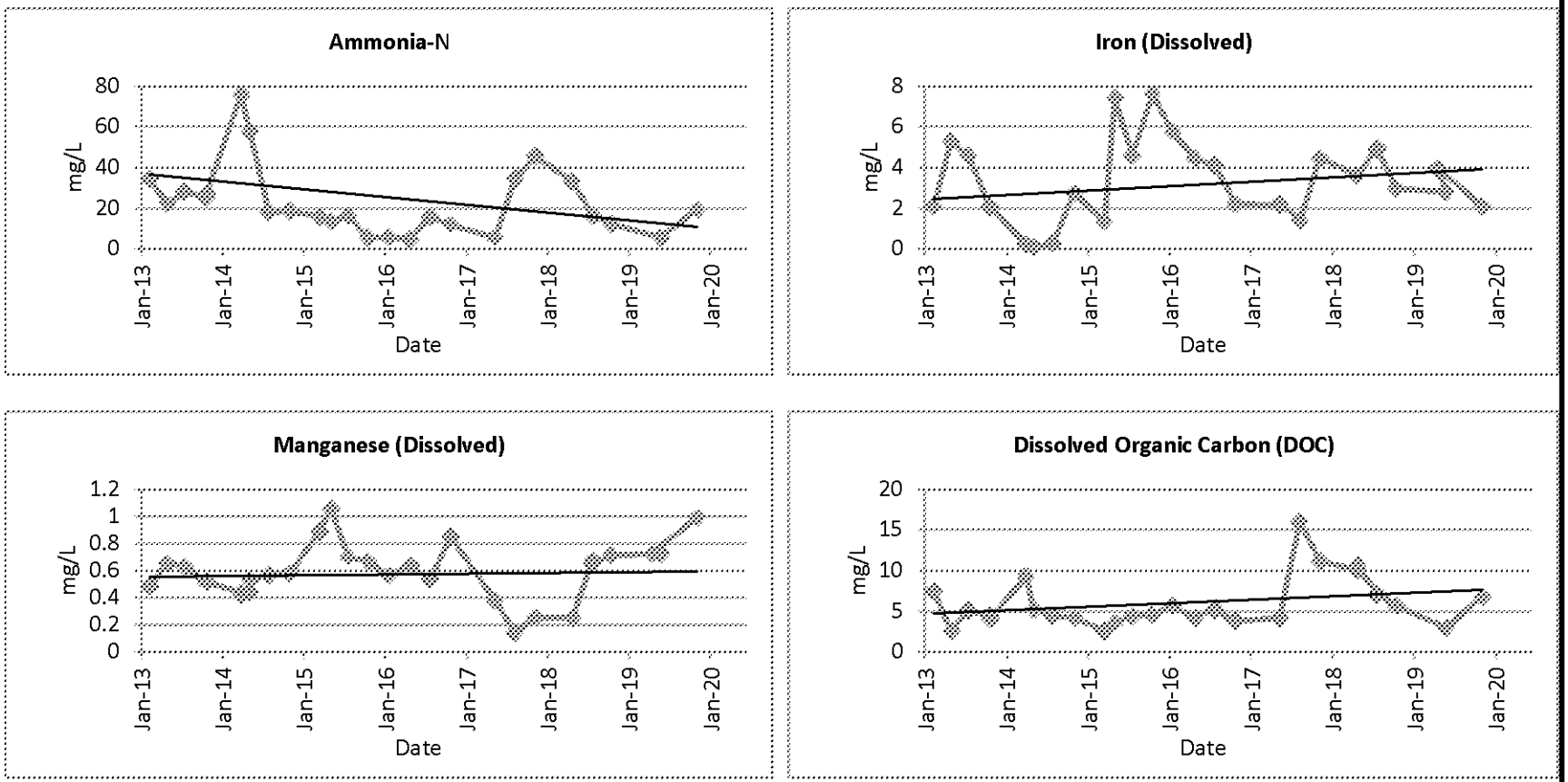


Note: ND results as 1/2 the detection limit

figure 4.9.9

TEMPORAL PLOTS - SELECTED PARAMETERS
MW104-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

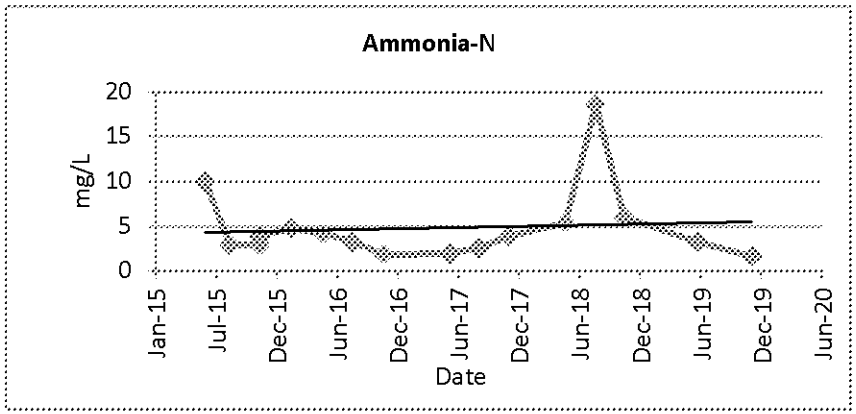
003869

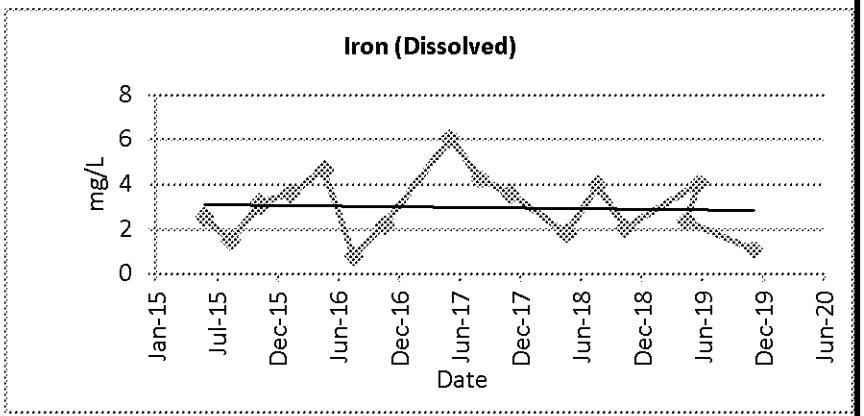


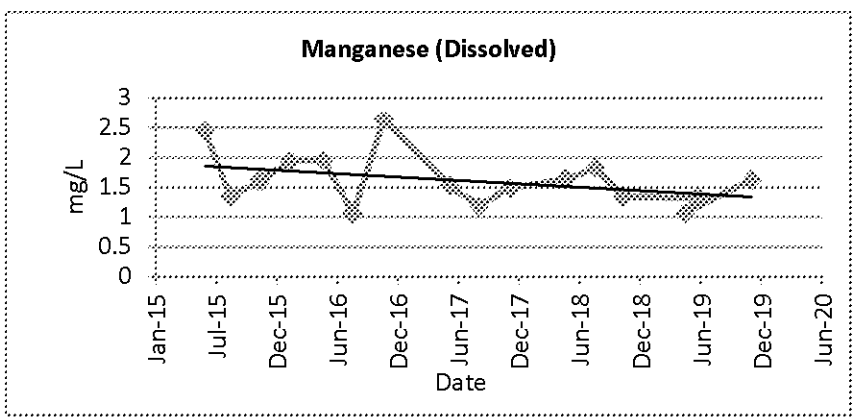
Note: ND results as 1/2 the detection limit

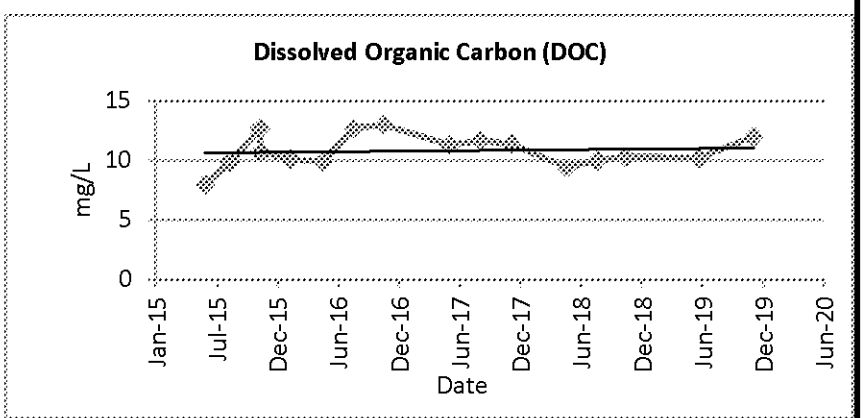
figure 4.9.10

TEMPORAL PLOTS - SELECTED PARAMETERS
MW105-13
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





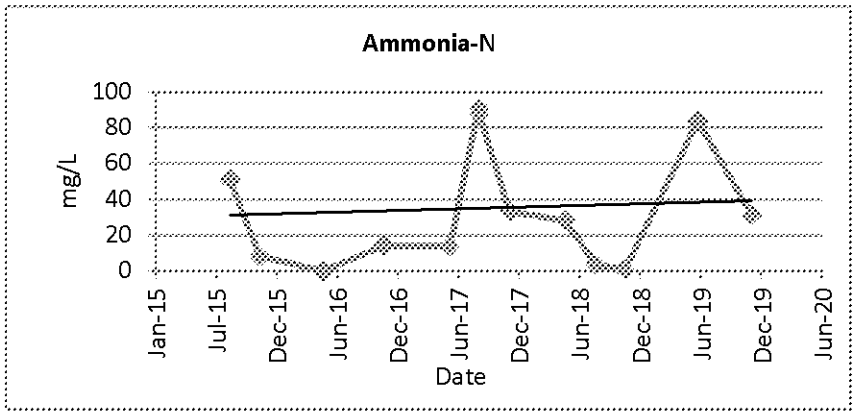


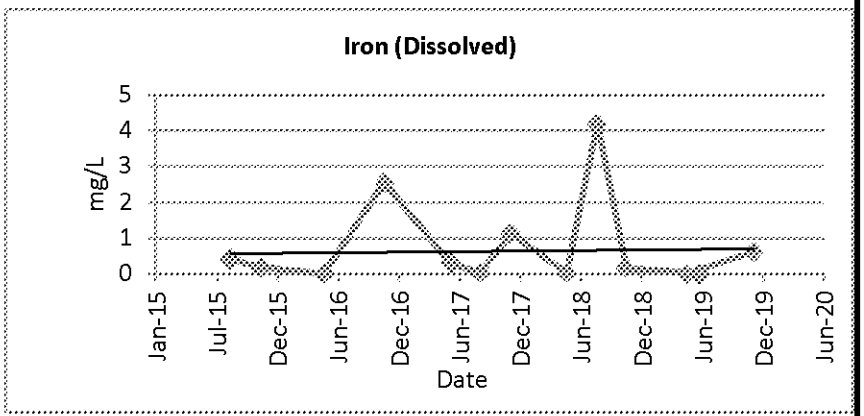


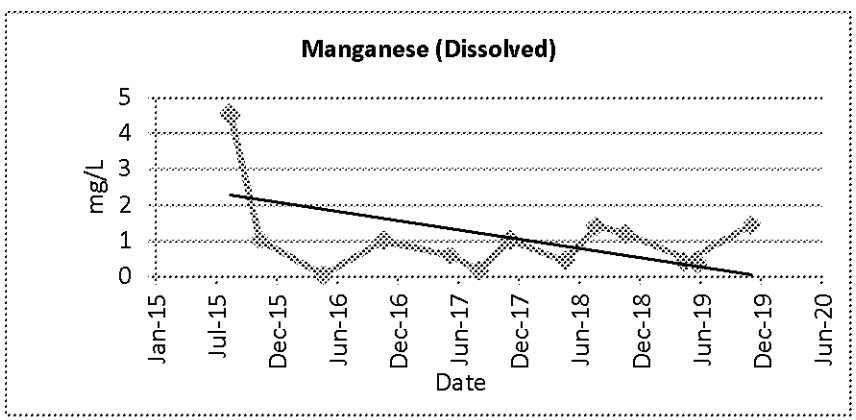
Note: ND results as 1/2 the detection limit

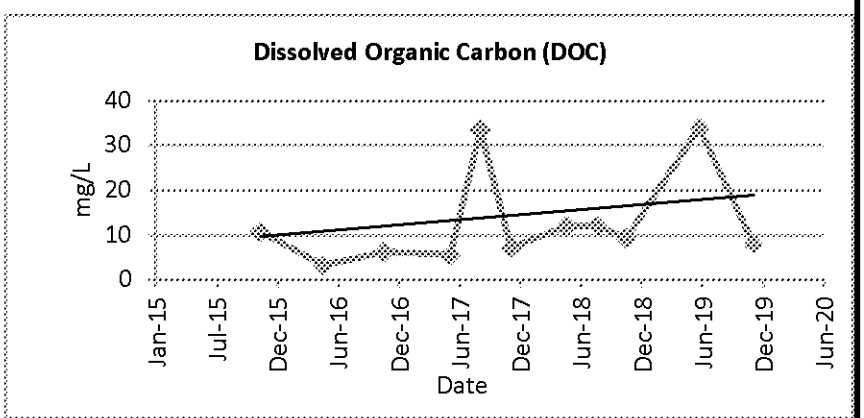
figure 4.9.11

TEMPORAL PLOTS - SELECTED PARAMETERS
MW106-15
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





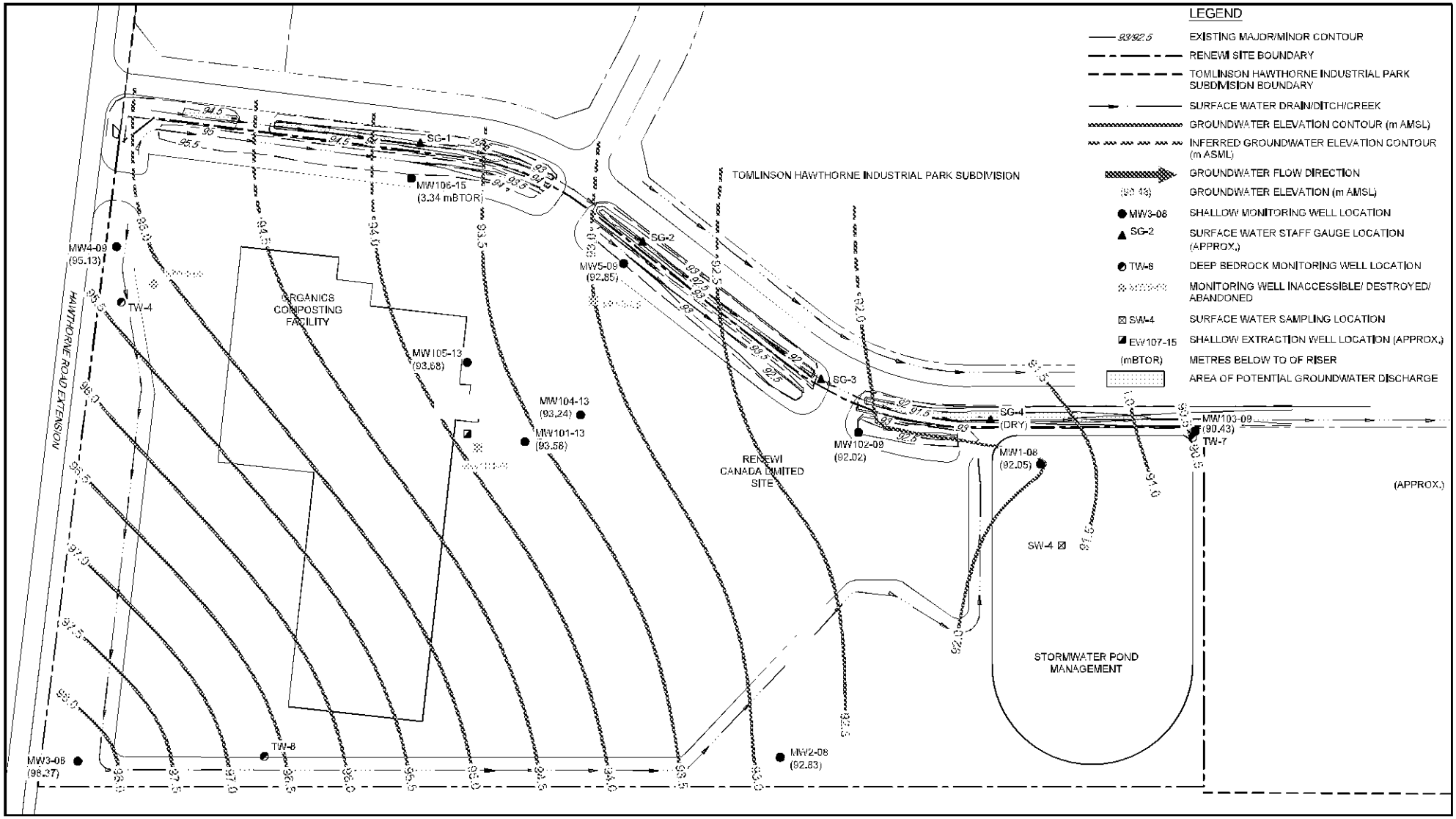




Note: ND results as 1/2 the detection limit
DOC plot omits August 2015 results (965/1030 mg/L)

figure 4.9.12

TEMPORAL PLOTS - SELECTED PARAMETERS
EW107-15
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY



0 15 30 45m

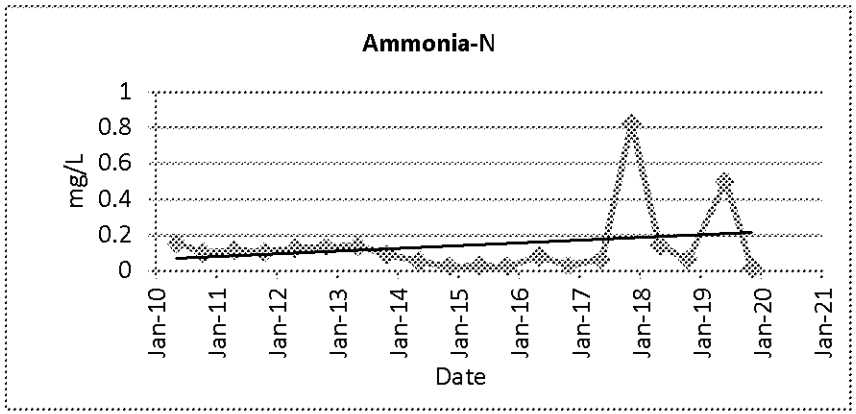
RENEWI CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT

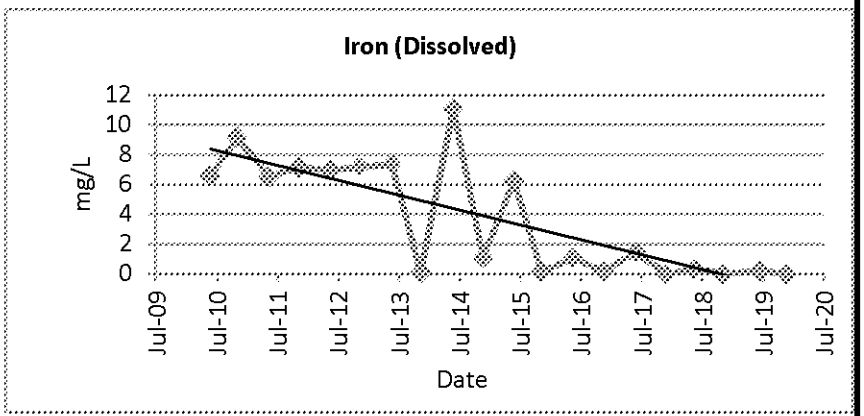
NORTHERN DITCH TOPOGRAPHY WITH JUNE 17 & 18, 2019 GROUNDWATER CONTOURS

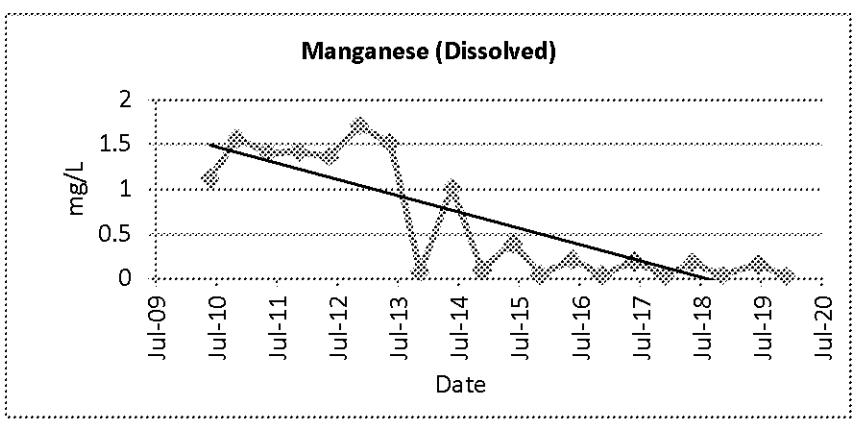
45804-58
Feb 25, 2020

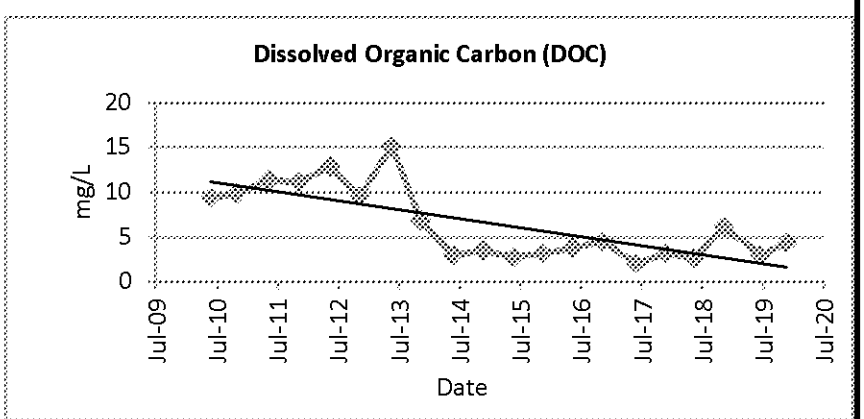
figure 4.10

003873







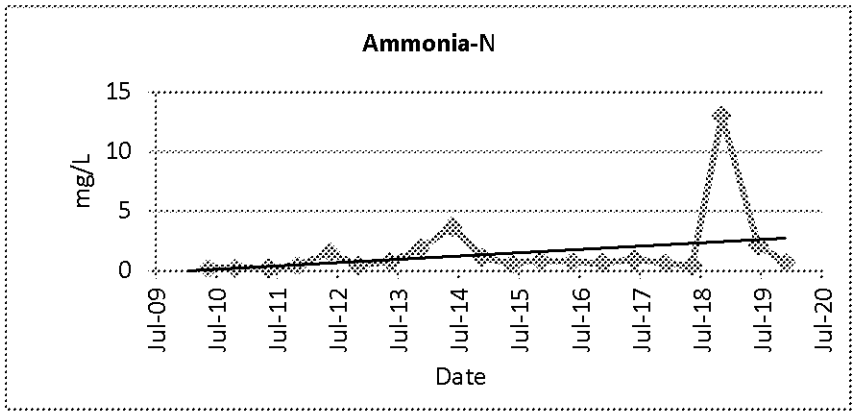


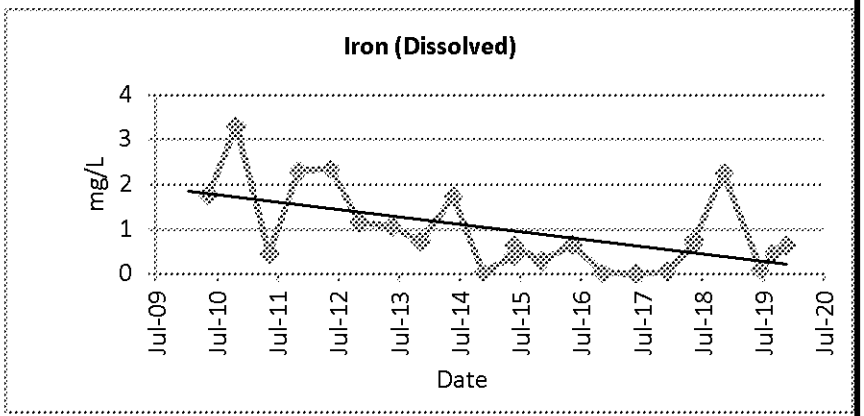
Note: ND results as 1/2 the detection limit

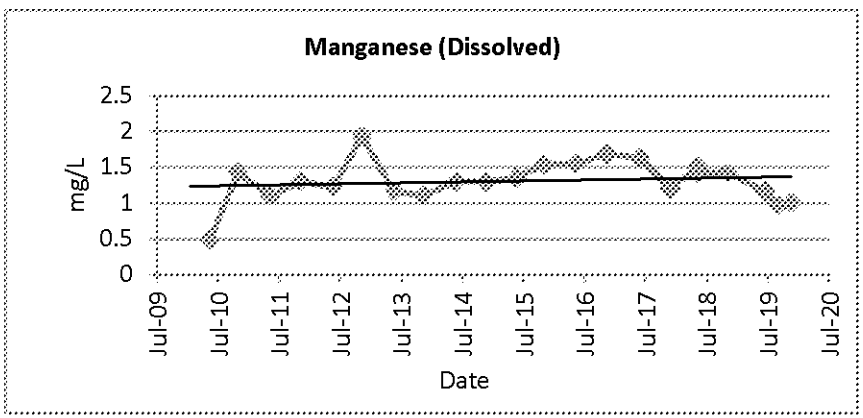
figure 4.11.1

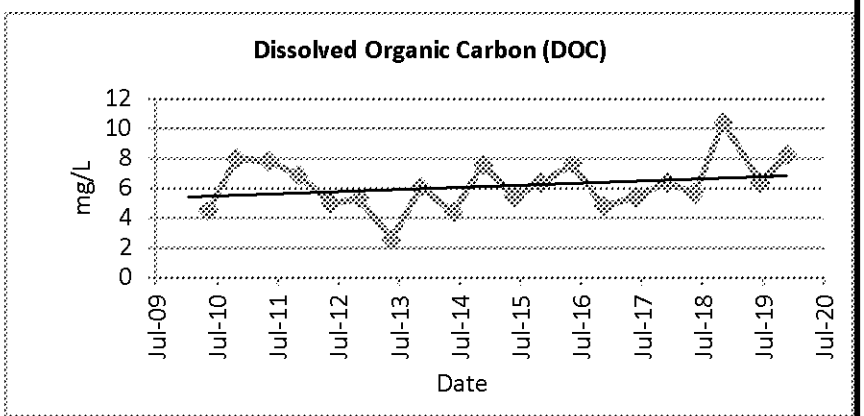
TEMPORAL PLOTS - SELECTED PARAMETERS
TW-7
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

003874





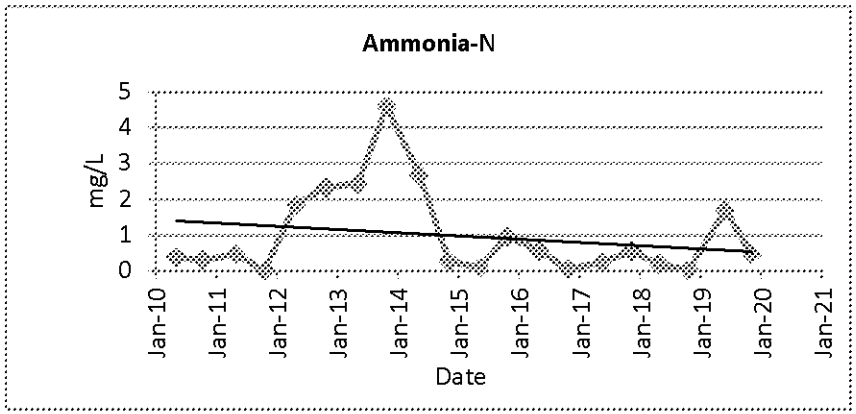


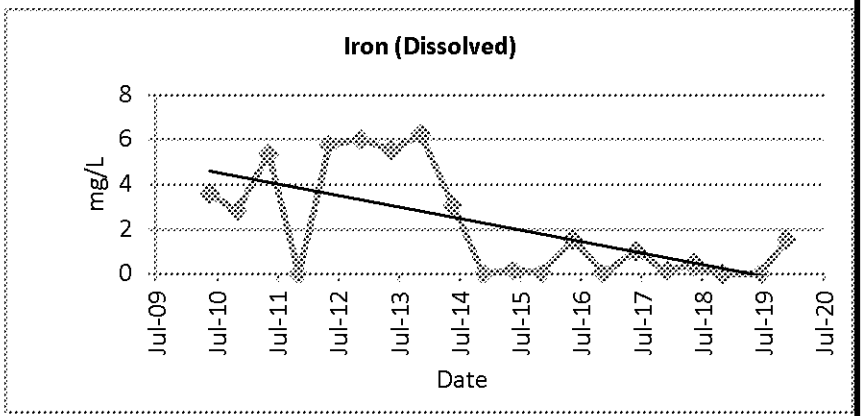


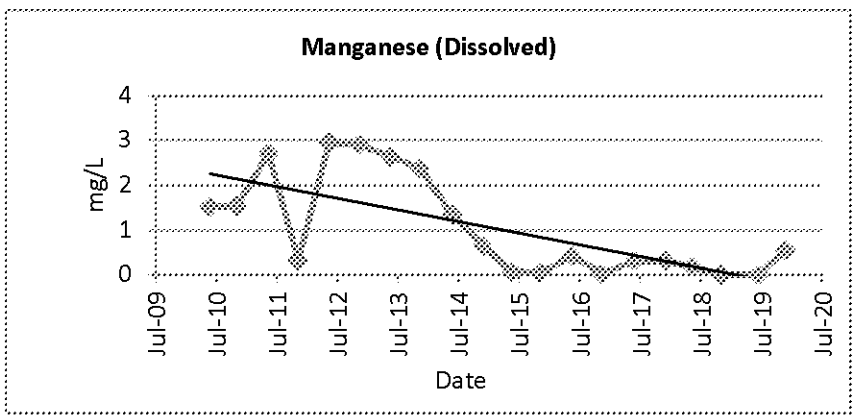
Note: ND results as 1/2 the detection limit

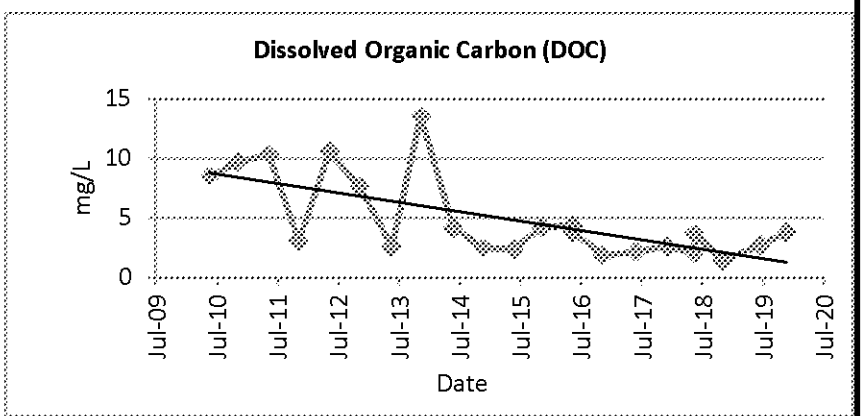
figure 4.11.2

TEMPORAL PLOTS - SELECTED PARAMETERS
TW-4
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY





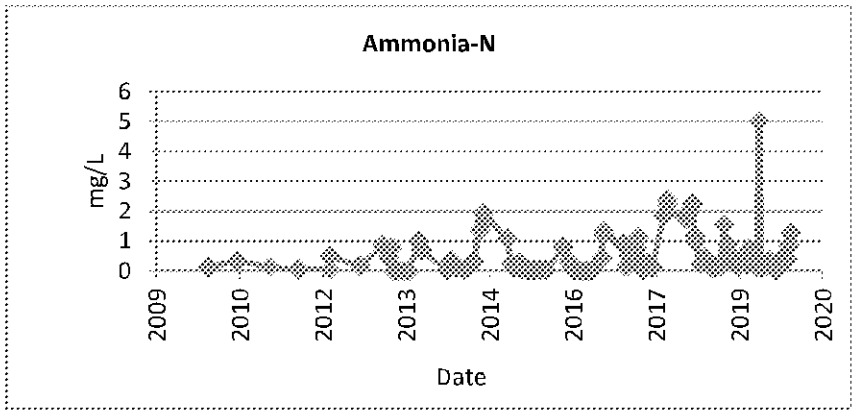


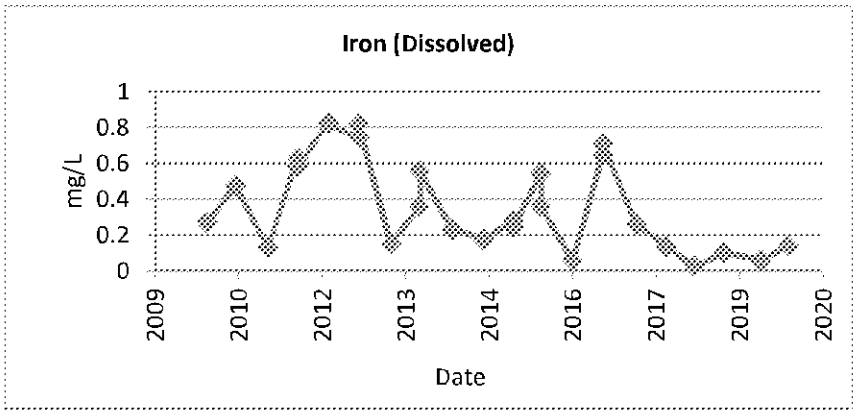


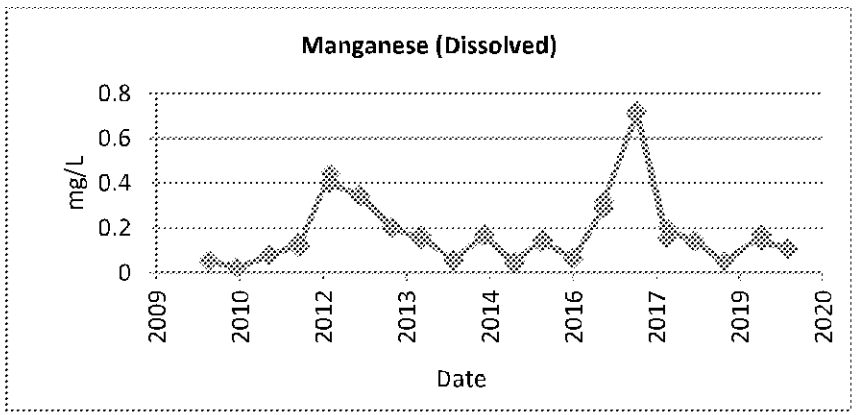
Note: ND results as 1/2 the detection limit

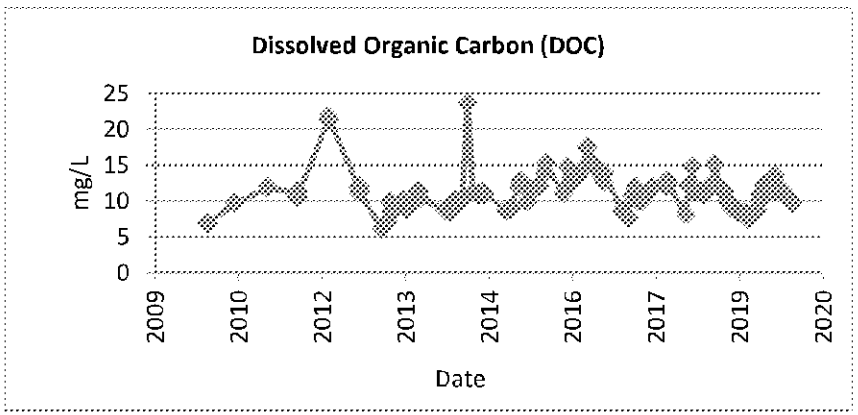
figure 4.11.3

TEMPORAL PLOTS - SELECTED PARAMETERS
TW-8
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY









Note: ND results as 1/2 the detection limit

figure 4.12

TEMPORAL PLOTS - SELECTED PARAMETERS
SW-4
2019 GROUNDWATER AND SURFACE WATER MONITORING REPORT
RENEWI CANADA LTD - OTTAWA ORGANICS FACILITY

Table 2.1

Monitoring Location Details
2019 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Shallow Water Table Wells								
MW1-08	91.89	93.00	1.45	2.97	90.44	88.92	Fill	
MW2-08	93.17	93.78	0.63	2.77	92.54	90.40	Bedrock (fractured)	
MW3-08	103.55	104.22	2.13	17.37	101.42	86.18	Bedrock (outcropping)	
MW4-08	95.06	96.36	1.63	2.84	93.43	92.22	Bedrock (fractured)	
MW4-09	96.58	97.45	2.59	4.11	93.99	92.47	Fine Sand	
MW5-08[3]	94.36	94.08	1.24	2.77	93.12	91.59	Fill	Decommissioned, replaced by MW05-09
MW5-09	93.36	94.50	2.90	4.42	90.46	88.94	Silty Sand	
MW6-08[4]	93.83	94.98	3.05	6.10	90.78	87.73	Fill/Sand Interface	
MW7-08[4]	93.81	94.82	3.05	6.10	90.76	87.71	Fill/Till Interface	No access
MW8-08[4]	90.69	91.69	1.22	4.27	89.47	86.42	Fill	No access
MW9-08[4]	82.94	83.96	1.47	3.00	81.47	79.94	Silty Clay	No access
MW10-08[4]	83.10	84.00	1.37	2.90	81.73	80.20	Silty Sand	No access
MW101-09[5]	95.67	96.15	2.13	3.66	93.54	92.01	Fill	Decommissioned, replaced by MW101-13
MW102-09	92.99	93.79	2.13	3.66	90.86	89.33	Silty Clay	
MW103-09	92.38	93.33	1.52	3.05	90.86	89.33	Silty Sand	
MW101-13	94.96	94.88	2.13	3.66	92.83	91.31	Silty Sand/Sand and Gravel	
MW104-13	94.63	94.55	2.13	3.66	92.50	90.97	Silty Sand/Sand and Gravel	
MW105-13	95.06	94.95	2.13	3.66	92.92	91.40	Sand/Gravel	
MW106-15	NS	NS	3.33	6.38	NS	NS	Fill and silty sand till	
EW107-15	NS	NS	2.44	5.49	NS	NS	Fill, Bedrock (fractured)	
Bedrock Wells								
TW-1 (1993)[4]	NI	NI	NI	41.15	NI	NI	Competent Bedrock	No access
TW-2 (1993)[4]	90.93	91.83	NI	30.48	NI	60.45	Competent Bedrock	No access
TW-3 (1993)[4]	NI	NI	NI	30.48	NI	NI	Competent Bedrock	No access
TW-4 (2008)	96.38	96.90	13.10	29.86	83.28	66.52	Competent Bedrock	
TW-5 (2008)[4]	89.63	90.14	12.80	29.86	76.83	59.77	Competent Bedrock	No access
TW-6 (2008)[4]	83.08	83.73	17.67	25.36	65.41	57.72	Competent Bedrock	No access
TW-7 (2010)	92.46	92.98	6.40	29.86	86.06	62.60	Competent Bedrock	
TW-8 (2010)	94.46	94.88	6.40	29.86	88.06	64.60	Competent Bedrock	

003878

Table 2.1

Monitoring Location Details
2019 Groundwater and Surface Water Monitoring Report
Orgaworld Canada Ltd.
5123 Hawthorne Road, Ottawa, Ontario

Monitoring Location	Ground Surface Elevation[1] (m AMSL)	Reference Elevation[1] (m AMSL)	Screened Interval (m bgs)		Screened Interval[2] (m AMSL)		Geologic Material	Status
			Top	Bottom	Top	Bottom		
Surface Water Staff Guages								
SG-1	NS	NS	-	-	-	-	North Drainage Ditch	
SG-2	NS	NS	-	-	-	-	North Drainage Ditch	
SG-3	NS	NS	-	-	-	-	North Drainage Ditch	
SG-4	NS	NS	-	-	-	-	North Drainage Ditch	

Notes:

m AMSL metres above mean sea level.
m bgs metres below ground surface.
NI No Information.
NS Not Surveyed.
(1) The ground surface and reference elevations are based on ground surface next to well and the top of the riser pipe. respectively. MW6-08 to MW10-08 were surveyed in December 2009 and all remaining wells were resurveyed in June 2010.
The 2015-series wells have not yet been surveyed.
(2) Bedrock wells are open to the rock.
(3) Decommissioned, replaced by MW05-09
(4) Located on Tomlinson property; no longer accessible.
(5) Decommissioned, replaced by MW101-13

003879

Table 3.1

Monitoring Program Schedule
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd
5123 Hawthorne Road, Ottawa, Ontario

	Field Test Parameters			Laboratory Test Parameters				
Location	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry[1]	SW General Chemistry[2]	Metals[3/4]	Bacteriological Components[5]	Collection Method
Surface Water Monitoring Locations (4 locations)								
SW-1		√	√	\		√	\	grab
SW-2		√	√	\		√	\	grab
SW-3		√	√	\		√	\	grab
SW-4[6]		√	√	\	√	√	\	composite
Surface Water Northern Ditch Staff Guages (4 locations)								
SG-1	X							
SG-2	X							
SG-3	X							
SG-4	X							
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	√	√	√	\		√	\	low-flow (peristaltic pump)
MW2-08	√	√	√	\		√	\	low-flow (peristaltic pump)
MW3-08	√	√	√	\		√	\	low-flow (peristaltic pump)
MW4-09	√	√	√	\		√	\	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	√	√	√	\		√	\	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	√	√	√	\		√	\	low-flow (peristaltic pump)
TW-7	√	√	√	\		√	\	low-flow (peristaltic pump)
TW-8	√	√	√	\		√	\	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

(1) General chemistry parameters - alkalinity, ammonia, DOC, nitrate, phosphorus turbidity, and un-ionized ammonia
(2) Additional Surface Water General Chemistry parameters analyzed at SW-4 during monthly sampling - BOD, COD, TKN, nitrite, total phenols, TSS, oil & grease, pH, arsenic, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, zinc
(3) Metals - iron and manganese
(4) Surface water metals are total while groundwater metals are dissolved.
(5) 5 Escherichia coli (e.coli)
(6) SW-4 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)
X Samples to be collected tri-annually (spring, summer, and fall)
\ Samples to be collected semi-annually (spring and fall)

003880

Groundwater Elevations
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Location	Reference Elevation [1] [2] (m AMSL)	June 17-18, 2019		September 4-5, 2019		November 26-28, 2019	
		Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)	Depth to Water From Reference (m)	Groundwater Elevation (m AMSL)
Unconfined Shallow Groundwater Elevations							
MW1-08	93.00	0.95	92.05	-	-	1.12	91.88
MW2-08	93.78	0.95	92.83	-	-	0.83	92.96
MW3-08	104.22	5.85	98.37	-	-	5.84	98.39
MW4-09	97.45	2.32	95.13	-	-	2.36	95.09
MW5-09	94.50	1.65	92.85	2.44	92.06	1.90	92.60
MW101-13	94.88	1.30	93.58	2.18	92.70	1.52	93.37
MW102-09	93.79	1.77	92.02	2.26	91.53	1.94	91.85
MW103-09	93.33	2.90	90.43	-	-	2.97	90.37
MW104-13	94.55	1.31	93.24	2.18	92.37	1.43	93.12
MW105-13	94.95	1.27	93.68	1.83	93.13	1.50	93.45
MW106-15	NS	3.34	NS	4.14	NS	3.70	NS
Deep Groundwater Elevations							
TW-4	96.90	12.79	84.11	12.16	84.75	12.66	84.24
TW-7	92.98	2.25	90.74	-	-	3.59	89.39
TW-8	94.88	11.14	83.74	-	-	11.70	83.18
Extraction Well							
EW107-15	NS	2.38	NS	3.00	NS	2.56	NS
Surface Water Staff Gauge Locations							
SG-1	93.51	dry	dry	dry	dry	dry	dry
SG-2	92.37	dry	dry	dry	dry	dry	dry
SG-3	91.76	dry	dry	dry	dry	dry	dry
SG-4	90.97	dry	dry	dry	dry	0.42	90.55

Notes:

(1)	Top of Riser for MW
(2)	Top of Cap for TW and EW
m AMSL	meters above mean sea level.
NA	No access.
NS	Not surveyed.
-	Not measured (not part of monitoring program).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-061819-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-019
Sample Date:			6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:						Original
Parameters	**Units**	**TLP [1]**				
Metals						
Arsenic (dissolved)	mg/L		-	-	0.0014	-
Boron (dissolved)	mg/L		-	-	ND(0.10)	-
Cadmium (dissolved)	mg/L		-	-	ND(0.000050)	-
Chromium (dissolved)	mg/L		-	-	ND(0.0050)	-
Cobalt (dissolved)	mg/L		-	-	ND(0.0010)	-
Copper (dissolved)	mg/L		-	-	ND(0.0020)	-
Iron (dissolved)	mg/L	48.3	ND(0.10)	-	ND(0.10)	0.63
Lead (dissolved)	mg/L		-	-	ND(0.00050)	-
Manganese (dissolved)	mg/L	17.1	0.388	-	0.424	1.45
Mercury (dissolved)	mg/L		-	-	ND(0.000050)	-
Nickel (dissolved)	mg/L		-	-	ND(0.0050)	-
Zinc (dissolved)	mg/L		-	-	ND(0.010)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	1130	-	-	380
Ammonia-N	mg/L	4.0	33.2	-	-	21.4
Biochemical oxygen demand (BOD)	mg/L		-	40	-	-
Chemical oxygen demand (COD)	mg/L		-	247	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	34	-	-	7.88
Escherichia coli	cfu/100mL	25.6	-	5	-	7
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-	-
Oil and grease	mg/L		-	15.9	-	-
Orthophosphate (dissolved)	mg/L		1.67	-	-	-
pH, lab	s.u.		-	7.72	-	-
Phenolics (total)	mg/L		-	0.056	-	-
Phosphorus	mg/L	7.2	2.24	-	-	0.450
Total kjeldahl nitrogen (TKN)	mg/L		-	116	-	-
Total suspended solids (TSS)	mg/L		-	148	-	-
Turbidity	NTU		-	-	-	55.0
Un-ionized ammonia	mg/L		-	-	-	0.0538
Field Parameters						
Conductivity, field	mS/cm		2.99	-	-	2.88
Dissolved oxygen (DO), field	mg/L		0.55	-	-	1.64
Oxidation reduction potential (ORP), field	millivolts		-343	-	-	-162
pH, field	s.u.		7.08	-	-	6.6
Temperature, field	Deg C		19.5	-	-	15.71
Turbidity, field	NTU		0	-	-	1.4

Notes:

ND Not detected at the associated reporting limit.
38.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

003882

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-061719-TS-014	GW-045804-090519-JC-007	GW-045804-090519-JC-008	GW-045804-112619-JC-002	GW-045804-112619-JC-003
Sample Date:			6/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019
Sample Type:					Duplicate		Duplicate
Parameters	**Units**	**TLP [1]**					
Metals							
Arsenic (dissolved)	mg/L		-	0.00680	0.00690	-	-
Boron (dissolved)	mg/L		-	0.094	0.093	-	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	ND(0.000010)	-	-
Chromium (dissolved)	mg/L		-	0.00136	0.00168	-	-
Cobalt (dissolved)	mg/L		-	0.00022	0.00024	-	-
Copper (dissolved)	mg/L		-	0.00067	ND(0.00020)	-	-
Iron (dissolved)	mg/L	48.3	0.69	2.84	2.97	0.069	0.071
Lead (dissolved)	mg/L		-	ND(0.000050)	ND(0.000050)	-	-
Manganese (dissolved)	mg/L	17.1	0.800	0.685	0.671	1.42	1.36
Mercury (dissolved)	mg/L		-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		-	0.00114	0.00113	-	-
Zinc (dissolved)	mg/L		-	0.0032	0.0010	-	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	406	-	-	503	504
Ammonia-N	mg/L	4.0	14.1	-	-	13.9	14.0
Biochemical oxygen demand (BOD)	mg/L		-	8.3	8.8	-	-
Chemical oxygen demand (COD)	mg/L		-	27	29	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.62	-	-	6.76	7.29
Escherichia coli	cfu/100mL	25.6	0	3	3	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	-	0.10	0.11
Nitrite (as N)	mg/L		-	ND(0.050)	ND(0.050)	-	-
Oil and grease	mg/L		-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		-	7.45	7.47	7.40	7.38
Phenolics (total)	mg/L		-	ND(0.0010)	0.0090	-	-
Phosphorus	mg/L	7.2	0.121	-	-	0.0099	0.0073
Total kjeldahl nitrogen (TKN)	mg/L		-	19.6	19.9	-	-
Total suspended solids (TSS)	mg/L		-	16.0	14.6	-	-
Turbidity	NTU		-	-	-	1.26	1.42
Un-ionized ammonia	mg/L		-	-	-	0.00869	0.00873
Field Parameters							
Conductivity, field	mS/cm		1.67	1.540	1.540	2.05	2.05
Dissolved oxygen (DO), field	mg/L		6.66	0.4	-	0.01	-
Oxidation reduction potential (ORP), field	millivolts		-118	-85	-	25	-
pH, field	s.u.		7.03	6.95	6.95	6.41	6.41
Temperature, field	Deg C		20.14	23.02	23.02	10.95	10.95
Turbidity, field	NTU		1.6	16.6	-	0.4	-

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-061819-JC-008	GW-045804-090419-JC-001	GW-045804-112619-JC-007
Sample Date:			6/18/2019	9/4/2019	11/26/2019
Parameters	**Units**	**TLP [1]**			
Metals					
Arsenic (dissolved)	mg/L		-	0.00076	-
Boron (dissolved)	mg/L		-	0.114	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00159	-
Cobalt (dissolved)	mg/L		-	0.00019	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	4.53	2.87	2.41
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	2.39	1.87	1.69
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00118	-
Zinc (dissolved)	mg/L		-	ND(0.0010)	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	517	-	598
Ammonia-N	mg/L	4.0	11.8	-	9.81
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	36	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.47	-	10.7
Escherichia coli	cfu/100mL	25.6	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	ND(5.0)	-
pH, lab	s.u.		-	7.65	7.87
Phenolics (total)	mg/L		-	0.0099	-
Phosphorus	mg/L	7.2	0.114	-	0.143
Total kjeldahl nitrogen (TKN)	mg/L		-	12.0	-
Total suspended solids (TSS)	mg/L		-	2.8	-
Turbidity	NTU		-	-	33.9
Un-ionized ammonia	mg/L		-	-	0.0181
Field Parameters					
Conductivity, field	mS/cm		1.86	1.810	1.77
Dissolved oxygen (DO), field	mg/L		0.03	0.82	0
Oxidation reduction potential (ORP), field	millivolts		-181	-96	-140
pH, field	s.u.		7.22	7.01	6.86
Temperature, field	Deg C		15.51	20.31	11.86
Turbidity, field	NTU		0.7	0	27.4

Notes:

ND Not detected at the associated reporting limit.
25.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW103-09**	**MW103-09**
Sample ID:			**GW-45804-061819-JC-010**	**GW-045804-112619-JC-004**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP [1]**		
Metals				
Iron (dissolved)	mg/L	48.3	5.46	4.67
Manganese (dissolved)	mg/L	17.1	1.96	2.65
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	300	296
Ammonia-N	mg/L	4.0	1.7	0.95
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.60	11.6
Escherichia coli	cfu/100mL	25.6	-	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	ND(0.10)
pH, lab	s.u.		-	7.63
Phosphorus	mg/L	7.2	0.0207	0.0230
Turbidity	NTU		-	58.4
Un-ionized ammonia	mg/L		-	0.000602
Field Parameters				
Conductivity, field	mS/cm		1.07	1.45
Dissolved oxygen (DO), field	mg/L		0.35	0.01
Oxidation reduction potential (ORP), field	millivolts		-166	-96
pH, field	s.u.		7.31	6.42
Temperature, field	Deg C		13.66	10.9
Turbidity, field	NTU		8.3	14.2

Notes:

ND Not detected at the associated reporting limit.
38.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

003885

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-061819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:			6/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:					Duplicate		Duplicate
Parameters	**Units**	**TLP [1]**					
Metals							
Arsenic (dissolved)	mg/L		-	0.00417	0.00438	-	-
Boron (dissolved)	mg/L		-	0.077	0.073	-	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	ND(0.000010)	-	-
Chromium (dissolved)	mg/L		-	0.00193	0.00131	-	-
Cobalt (dissolved)	mg/L		-	0.00118	0.00120	-	-
Copper (dissolved)	mg/L		-	0.00058	0.00033	-	-
Iron (dissolved)	mg/L	48.3	6.83	9.96	10.6	0.051	0.052
Lead (dissolved)	mg/L		-	ND(0.000050)	ND(0.000050)	-	-
Manganese (dissolved)	mg/L	17.1	4.85	5.33	5.46	1.98	1.95
Mercury (dissolved)	mg/L		-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		-	0.00241	0.00231	-	-
Zinc (dissolved)	mg/L		-	0.0020	0.0010	-	-
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	633	491	-	-	413	415
Ammonia-N	mg/L	4.0	16.8	-	-	7.3	6.36
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	ND(3.0)	-	-
Chemical oxygen demand (COD)	mg/L		-	33	35	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	9.23	-	-	7.70	8.19
Escherichia coli	cfu/100mL	25.6	0	3	1	4	3
Nitrate (as N)	mg/L	1.3	0.15	-	-	9.44	10.1
Nitrite (as N)	mg/L		-	ND(0.050)	0.053	-	-
Oil and grease	mg/L		-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		-	7.45	7.44	-	-
Phenolics (total)	mg/L		-	ND(0.0010)	ND(0.0010)	-	-
Phosphorus	mg/L	7.2	0.0108	-	-	0.0186	0.0198
Total kjeldahl nitrogen (TKN)	mg/L		-	12.9	13.9	-	-
Total suspended solids (TSS)	mg/L		-	67	41	-	-
Turbidity	NTU		-	-	-	17.1	15.2
Un-ionized ammonia	mg/L		-	-	-	0.00567	0.00490
Field Parameters							
Conductivity, field	mS/cm		1.44	1.640	1.640	1.63	1.63
Dissolved oxygen (DO), field	mg/L		1.08	0.29	-	1.8	-
Oxidation reduction potential (ORP), field	millivolts		-137	-89	-	16	-
pH, field	s.u.		7.14	6.87	6.87	6.46	6.46
Temperature, field	Deg C		19.79	20.97	20.97	12.3	12.3
Turbidity, field	NTU		35.2	650	-	58.4	-

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-061719-JC-001	GW-045804-090419-JC-003	GW-045804-112719-JC-008
Sample Date:			6/17/2019	9/4/2019	11/27/2019
Parameters	**Units**	**TLP [1]**			
Metals					
Arsenic (dissolved)	mg/L		-	0.00041	-
Boron (dissolved)	mg/L		-	0.075	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00126	-
Cobalt (dissolved)	mg/L		-	ND(0.00010)	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	2.80	3.95	2.10
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	0.722	0.726	0.990
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00085	-
Zinc (dissolved)	mg/L		-	0.0017	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	296	-	489
Ammonia-N	mg/L	4.0	5.6	-	19.3
Biochemical oxygen demand (BOD)	mg/L		-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	66	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	3.02	-	6.75
Escherichia coli	cfu/100mL	25.6	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.020)	-	ND(0.10)
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	11.1	-
pH, lab	s.u.		-	7.28	-
Phenolics (total)	mg/L		-	0.0020	-
Phosphorus	mg/L	7.2	0.0422	-	0.0519
Total kjeldahl nitrogen (TKN)	mg/L		-	11.5	-
Total suspended solids (TSS)	mg/L		-	10.4	-
Turbidity	NTU		-	-	19.2
Un-ionized ammonia	mg/L		-	-	0.0213
Field Parameters					
Conductivity, field	mS/cm		1.4	1.690	2.28
Dissolved oxygen (DO), field	mg/L		0.77	1.26	0.21
Oxidation reduction potential (ORP), field	millivolts		-112	-51	-116
pH, field	s.u.		6.53	6.89	6.46
Temperature, field	Deg C		21.06	20.88	16.92
Turbidity, field	NTU		5	0	0.5

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW106-15	MW106-15	MW106-15
Sample ID:			GW-45804-061819-JC-016	GW-045804-090419-JC-002	GW-045804-112719-JC-013
Sample Date:			6/18/2019	9/4/2019	11/27/2019
Parameters	**Units**	**TLP [1]**			
Metals					
Arsenic (dissolved)	mg/L		-	0.00155	-
Boron (dissolved)	mg/L		-	0.152	-
Cadmium (dissolved)	mg/L		-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	0.00110	-
Cobalt (dissolved)	mg/L		-	0.00017	-
Copper (dissolved)	mg/L		-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	4.03	2.36	1.08
Lead (dissolved)	mg/L		-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	1.33	1.07	1.63
Mercury (dissolved)	mg/L		-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	0.00080	-
Zinc (dissolved)	mg/L		-	ND(0.0010)	-
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	633	493	-	503
Ammonia-N	mg/L	4.0	3.3	-	1.68
Biochemical oxygen demand (BOD)	mg/L		-	3.8	-
Chemical oxygen demand (COD)	mg/L		-	36	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	10.2	-	12.0
Escherichia coli	cfu/100mL	25.6	0	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	-	0.24
Nitrite (as N)	mg/L		-	ND(0.050)	-
Oil and grease	mg/L		-	6.2	-
pH, lab	s.u.		-	7.57	-
Phenolics (total)	mg/L		-	0.0018	-
Phosphorus	mg/L	7.2	0.0639	-	0.0156
Total kjeldahl nitrogen (TKN)	mg/L		-	4.04	-
Total suspended solids (TSS)	mg/L		-	2.8	-
Turbidity	NTU		-	-	18.6
Un-ionized ammonia	mg/L		-	-	0.00241
Field Parameters					
Conductivity, field	mS/cm		1.51	1.720	1.95
Dissolved oxygen (DO), field	mg/L		0.23	0.33	0
Oxidation reduction potential (ORP), field	millivolts		-147	-91	-54
pH, field	s.u.		7.29	6.98	6.8
Temperature, field	Deg C		17.59	18.85	10.12
Turbidity, field	NTU		24.4	0	7.5

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW1-08**	**MW1-08**
Sample ID:			**GW-45804-061819-TS-012**	**GW-045804-112719-JC-011**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [1]		
Metals				
Iron (dissolved)	mg/L	48.3	2.00	0.260
Manganese (dissolved)	mg/L	17.1	0.729	0.453
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	352	289
Ammonia-N	mg/L	4.0	3.0	3.16
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	8.07	9.55
Escherichia coli	cfu/100mL	25.6	0	0
Nitrate (as N)	mg/L	1.3	0.036	ND(0.020)
Phosphorus	mg/L	7.2	0.220	0.282
Turbidity	NTU		-	6.34
Un-ionized ammonia	mg/L		-	0.0116
Field Parameters				
Conductivity, field	mS/cm		0.951	0.962
Dissolved oxygen (DO), field	mg/L		0	0
Oxidation reduction potential (ORP), field	millivolts		-175	-142
pH, field	s.u.		7.02	7.32
Temperature, field	Deg C		15.35	6.83
Turbidity, field	NTU		0	3.9

Notes:

ND	Not detected at the associated reporting limit.
28.2	Exceeded Trigger Level Program Concentration.
(1)	TLP- Trigger Level Program Concentration (CRA 2015).

Table 4.2

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW2-08**	**MW2-08**
Sample ID:			**GW-45804-061719-JC-015**	**GW-045804-112619-JC-001**
Sample Date:			**6/17/2019**	**11/26/2019**
Parameters	**Units**	**TLP** [(1)]		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.00566	0.00068
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	250	197
Ammonia-N	mg/L	4.0	ND(1.0)	ND(0.010)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	5.28	9.21
Escherichia coli	cfu/100mL	25.6	0	ND(2)
Nitrate (as N)	mg/L	1.3	0.038	ND(0.020)
Phosphorus	mg/L	7.2	0.0111	0.106
Turbidity	NTU		-	72.1
Un-ionized ammonia	mg/L		-	ND(0.000018)
Field Parameters				
Conductivity, field	mS/cm		1.05	0.385
Dissolved oxygen (DO), field	mg/L		5.09	3.39
Oxidation reduction potential (ORP), field	millivolts		-93	161
pH, field	s.u.		7.16	6.94
Temperature, field	Deg C		15.97	8.7
Turbidity, field	NTU		220	32.7

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

003890

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW3-08**	**MW3-08**
Sample ID:			**GW-45804-061819-JC-017**	**GW-045804-112719-JC-016**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [1]		
Metals				
Iron (dissolved)	mg/L	48.3	ND(0.010)	ND(0.010)
Manganese (dissolved)	mg/L	17.1	0.0226	0.00074
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	240	255
Ammonia-N	mg/L	4.0	ND(0.020)	ND(0.020)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	2.35	3.04
Escherichia coli	cfu/100mL	25.6	0	1
Nitrate (as N)	mg/L	1.3	0.054	ND(0.10)
Phosphorus	mg/L	7.2	0.0143	0.0223
Turbidity	NTU		-	20.1
Un-ionized ammonia	mg/L		-	ND(0.000055)
Field Parameters				
Conductivity, field	mS/cm		0.898	1.45
Dissolved oxygen (DO), field	mg/L		0	0.33
Oxidation reduction potential (ORP), field	millivolts		5	99
pH, field	s.u.		7.2	7.21
Temperature, field	Deg C		19.29	6.4
Turbidity, field	NTU		15.5	8.3

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			**MW4-09**	**MW4-09**
Sample ID:			**GW-45804-061819-JC-003**	**GW-045804-112719-JC-015**
Sample Date:			**6/18/2019**	**11/27/2019**
Parameters	**Units**	**TLP** [(1)]		
Metals				
Iron (dissolved)	mg/L	48.3	0.15	ND(0.10)
Manganese (dissolved)	mg/L	17.1	0.240	0.0582
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L	633	316	307
Ammonia-N	mg/L	4.0	1.3	ND(0.020)
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	1.97	2.46
Escherichia coli	cfu/100mL	25.6	-	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.10)
Phosphorus	mg/L	7.2	0.0086	0.0214
Turbidity	NTU		-	7.96
Un-ionized ammonia	mg/L		-	ND(0.000029)
Field Parameters				
Conductivity, field	mS/cm		1.68	1.89
Dissolved oxygen (DO), field	mg/L		0	1.08
Oxidation reduction potential (ORP), field	millivolts		-64	16
pH, field	s.u.		6.93	6.84
Temperature, field	Deg C		15.85	8.85
Turbidity, field	NTU		22.1	12.5

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

Shallow Unconfined Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-45804-061819-TS-005	GW-45804-061819-JC-006	GW-045804-090519-JC-009	GW-045804-112719-JC-012
Sample Date:			6/18/2019	6/18/2019	9/5/2019	11/27/2019
Sample Type:				Duplicate		
Parameters	**Units**	**TLP [1]**				
Metals						
Arsenic (dissolved)	mg/L		-	-	0.00020	-
Boron (dissolved)	mg/L		-	-	0.114	-
Cadmium (dissolved)	mg/L		-	-	ND(0.000010)	-
Chromium (dissolved)	mg/L		-	-	0.00103	-
Cobalt (dissolved)	mg/L		-	-	ND(0.00010)	-
Copper (dissolved)	mg/L		-	-	ND(0.00020)	-
Iron (dissolved)	mg/L	48.3	5.05	5.01	3.51	3.22
Lead (dissolved)	mg/L		-	-	ND(0.000050)	-
Manganese (dissolved)	mg/L	17.1	1.86	1.85	1.59	1.45
Mercury (dissolved)	mg/L		-	-	ND(0.0000050)	-
Nickel (dissolved)	mg/L		-	-	0.00085	-
Zinc (dissolved)	mg/L		-	-	ND(0.0010)	-
General Chemistry						
Alkalinity, total (as CaCO3)	mg/L	633	489	487	-	574
Ammonia-N	mg/L	4.0	16.1	14.4	-	12.3
Biochemical oxygen demand (BOD)	mg/L		-	-	ND(3.0)	-
Chemical oxygen demand (COD)	mg/L		-	-	21	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	34.6	6.33	6.74	-	8.53
Escherichia coli	cfu/100mL	25.6	-	-	0	0
Nitrate (as N)	mg/L	1.3	ND(0.10)	ND(0.020)	-	ND(0.10)
Nitrite (as N)	mg/L		-	-	ND(0.050)	-
Oil and grease	mg/L		-	-	ND(5.0)	-
pH, lab	s.u.		-	-	7.44	-
Phenolics (total)	mg/L		-	-	0.0034	-
Phosphorus	mg/L	7.2	0.136	0.133	-	0.206
Total kjeldahl nitrogen (TKN)	mg/L		-	-	14.2	-
Total suspended solids (TSS)	mg/L		-	-	4.8	-
Turbidity	NTU		-	-	-	40.2
Un-ionized ammonia	mg/L		-	-	-	0.0132
Field Parameters						
Conductivity, field	mS/cm		1.83	1.83	1.680	1.87
Dissolved oxygen (DO), field	mg/L		0.43	-	2.45	0
Oxidation reduction potential (ORP), field	millivolts		-132	-	-	-141
pH, field	s.u.		7.13	7.13	6.83	6.81
Temperature, field	Deg C		6.81	6.81	18.57	8.46
Turbidity, field	NTU		0	-	1.5	0.6

Notes:

ND Not detected at the associated reporting limit.
28.2 Exceeded Trigger Level Program Concentration.
(1) TLP- Trigger Level Program Concentration (CRA 2015).

MW103-09 Analytical Results - PWQO Comparison
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:			MW103-09	MW103-09
Sample ID:			GW-45804-061819-JC-010	GW-045804-112619-JC-004
Sample Date:			6/18/2019	11/26/2019
Parameters	**Units**	**PWQO [1]**		
Metals				
Iron (dissolved)	mg/L	0.3	5.46	4.67
Manganese (dissolved)	mg/L		1.96	2.65
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		300	296
Ammonia-N	mg/L		1.7	0.95
Dissolved organic carbon (DOC) (dissolved)	mg/L		8.60	11.6
Escherichia coli	cfu/100mL	100	-	0
Nitrate (as N)	mg/L		ND(0.020)	ND(0.10)
pH, lab	s.u.	6.5-8.5	-	7.63
Phosphorus	mg/L	0.01	0.0267	0.0230
Turbidity	NTU		-	58.4
Un-ionized ammonia	mg/L	0.02	-	0.000602
Field Parameters				
Conductivity, field	mS/cm		1.07	1.45
Dissolved oxygen (DO), field	mg/L	>4	0.35	0.01
Oxidation reduction potential (ORP), field	millivolts		-166	-96
pH, field	s.u.	6.5-8.5	7.31	8.42
Temperature, field	Deg C		13.66	10.9
Turbidity, field	NTU		8.3	14.2

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.

ND Not detected at the associated reporting limit.

16.7 Exceeded PWQO

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:				GW-45804-061819-TS-004	GW-045804-090519-JC-005	GW-045804-090519-JC-006	GW-045804-112819-JC-017	GW-045804-112819-JC-018
Sample Date:				6/18/2019	9/5/2019	9/5/2019	11/28/2019	11/28/2019
Sample Type:						Duplicate		Duplicate
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**					
Metals								
Arsenic (dissolved)	mg/L		0.010	-	ND(0.0010)	ND(0.0010)	-	-
Boron (dissolved)	mg/L		5.0	-	0.13	0.12	-	-
Cadmium (dissolved)	mg/L		0.005	-	ND(0.000050)	ND(0.000050)	-	-
Chromium (dissolved)	mg/L		0.05	-	ND(0.0050)	ND(0.0050)	-	-
Cobalt (dissolved)	mg/L		/	-	ND(0.0010)	ND(0.0010)	-	-
Copper (dissolved)	mg/L		1.0	-	0.0738	0.0759	-	-
Iron (dissolved)	mg/L	10.6	0.30	0.11	0.82[b]	0.88[b]	0.44[b]	0.84[b]
Lead (dissolved)	mg/L		0.01	-	ND(0.00050)	ND(0.00050)	-	-
Manganese (dissolved)	mg/L	2.1	0.05	1.17[b]	0.875[b]	0.888[b]	1.06[b]	1.01[b]
Mercury (dissolved)	mg/L		0.001	-	ND(0.0000050)	ND(0.0000050)	-	-
Nickel (dissolved)	mg/L		/	-	0.0052	0.0054	-	-
Zinc (dissolved)	mg/L		5.0	-	0.077	0.062	-	-
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	996	30-500	638[b]	-	-	595[b]	615[b]
Ammonia-N	mg/L	0.2	/	3.1[a]	-	-	0.746[a]	0.746[a]
Biochemical oxygen demand (BOD)	mg/L		/	-	ND(3.0)	ND(3.0)	-	-
Chemical oxygen demand (COD)	mg/L		/	-	21	22	-	-
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	8.28[b]	-	-	8.26[b]	7.49[b]
Escherichia coli	none	5	0	-	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	0.24	-	-	0.85[a]	0.85[a]
Nitrite (as N)	mg/L		1.0	-	ND(0.050)	ND(0.050)	-	-
Oil and grease	mg/L		/	-	ND(5.0)	ND(5.0)	-	-
pH, lab	s.u.		6.5-8.5	-	7.26	7.23	-	-
Phenolics (total)	mg/L		/	-	0.0013	0.0033	-	-
Phosphorus	mg/L	0.5	/	0.0038	-	-	ND(0.0030)	ND(0.0030)
Total kjeldahl nitrogen (TKN)	mg/L		/	-	0.75	0.78	-	-
Total suspended solids (TSS)	mg/L		/	-	15.4	5.4	-	-
Turbidity	NTU		5.0	-	-	-	28.1[b]	27.3[b]
Un-ionized ammonia	mg/L		/	-	-	-	0.00122	0.00122
Field Parameters								
Conductivity, field	mS/cm		/	2.5	2.270	2.270	2.44	2.44
Dissolved oxygen (DO), field	mg/L		/	6.76	6.7	-	3.13	-
Oxidation reduction potential (ORP), field	millivolts		/	96	26	-	-41	-
pH, field	s.u.		6.5-8.5	6.88	7	7	6.75	6.75
Temperature, field	Deg C		15	18.68[b]	18.55[b]	18.55[b]	13.4	13.4
Turbidity, field	NTU		5.0	8.1[b]	2.04	-	32.8[b]	-

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).
(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.
8.88[a] Exceedance of the ODWQS.
8.87[b] Exceedance of the Tier I Trigger Level.

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-7**	**TW-7**
Sample ID:				**GW-45804-061819-JC-011**	**GW-045804-112619-JC-006**
Sample Date:				**6/18/2019**	**11/26/2019**
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.222	ND(0.010)
Manganese (dissolved)	mg/L	2.1	0.05	0.181[b]	0.0322
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	159	94
Ammonia-N	mg/L	0.2	/	ND(1.0)	0.019
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	3.02	4.37
Escherichia coli	none	5	0	-	0
Nitrate (as N)	mg/L	0.5	10.0	ND(0.020)	ND(0.020)
pH, lab	s.u		6.5-8.5	-	8.97[b]
Phosphorus	mg/L	0.5	/	0.0030	0.0282
Turbidity	NTU		5.0	-	41.1[b]
Un-ionized ammonia			/	-	0.00127
Field Parameters					
Conductivity, field	mS/cm		/	1.521	0.445
Dissolved oxygen (DO), field	mg/L		/	0.2	0
Oxidation reduction potential (ORP), field	millivolts		/	-245	-86
pH, field	s.u.		6.5-8.5	8.82[b]	8.42
Temperature, field	Deg C		15	12.8	12.04
Turbidity, field	NTU		5.0	3.8	32.1[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).
(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.
9.861[a] Exceedance of the ODWQS.
567[b] Exceedance of the Tier I Trigger Level.

968300

Table 4.3

Deep Bedrock Aquifer Groundwater Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Sample Location:				**TW-8**	**TW-8**
Sample ID:				**GW-45804-061719-TS-002**	**GW-045804-112719-JC-014**
Sample Date:				**6/17/2019**	**11/27/2019**
Parameters	**Units**	**TLP[1] a**	**ODWQS[2] b**		
Metals					
Iron (dissolved)	mg/L	10.6	0.30	0.011	1.66[b]
Manganese (dissolved)	mg/L	2.1	0.05	0.00252	0.856[b]
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L	996	30-500	308	381
Ammonia-N	mg/L	0.2	/	1.7[a]	0.479[a]
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	2.77	3.81
Escherichia coli	none	5	0	-	0
Nitrate (as N)	mg/L	0.5	10.0	1.68[a]	0.57[a]
Phosphorus	mg/L	0.5	/	0.0458	0.0180
Turbidity	NTU		5.0	-	31.3[b]
Un-ionized ammonia			/	-	0.00263
Field Parameters					
Conductivity, field	mS/cm		/	0.842	1.08
Dissolved oxygen (DO), field	mg/L		/	5.86	7.78
Oxidation reduction potential (ORP), field	millivolts		/	84	68
pH, field	s.u.		6.5-8.5	7	7.45
Temperature, field	Deg C		15	17.35[b]	8.19
Turbidity, field	NTU		5.0	3.5[b]	26.3[b]

Notes:

(1) TLP- Trigger Level Program Concentration (CRA 2015).

(2) ODWQS - Ontario Drinking Water Quality Standards Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, June 2003, revised June 2006 and July 2017).

ND Not detected at the associated reporting limit.

0.961[a] Exceedance of the ODWQS.

687[b] Exceedance of the Tier I Trigger Level.

003897

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**SW1-09**	**SW1-09**
Sample ID:			**SW-45804-061719-JC-005**	**SW-045804-112819-JC-004**
Sample Date:			**6/17/2019**	**11/28/2019**
Parameters	**Units**	**PWQO** [1]		
Metals				
Iron	mg/L	0.3	0.324	0.368
Manganese	mg/L		0.127	0.113
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		238	164
Ammonia-N	mg/L		0.020	0.316
Dissolved organic carbon (DOC) (dissolved)	mg/L		4.23	5.92
Escherichia coli	cfu/100mL	100	52	280
Nitrate (as N)	mg/L		0.62	0.98
Phosphorus	mg/L	0.01	0.0171	0.0628
Turbidity	NTU		-	23.3
Un-ionized ammonia	mg/L	0.02	-	0.000524
Field Parameters				
Conductivity, field	mS/cm		2.08	1.5
Dissolved oxygen (DO), field	mg/L	>4	7.6	11.64
Oxidation reduction potential (ORP), field	millivolts		111	32
pH, field	s.u.	6.5-8.5	7.28	7.11
Temperature, field	Deg C		9.41	3.02
Turbidity, field	NTU		3.3	31.2

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

003898

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			**SW2-09**	**SW2-09**
Sample ID:			**SW-45804-061719-JC-003**	**SW-045804-112819-JC-001**
Sample Date:			**6/17/2019**	**11/28/2019**
Parameters	**Units**	**PWQO** [1]		
Metals				
Iron	mg/L	0.3	0.576	1.22
Manganese	mg/L		0.0861	0.134
General Chemistry				
Alkalinity, total (as CaCO3)	mg/L		259	160
Ammonia-N	mg/L		0.028	0.096
Dissolved organic carbon (DOC) (dissolved)	mg/L		9.60	10.0
Escherichia coli	cfu/100mL	100	68	480
Nitrate (as N)	mg/L		0.088	0.38
Phosphorus	mg/L	0.01	0.0332	0.0620
Turbidity	NTU		-	36.8
Un-ionized ammonia	mg/L	0.02	-	0.0000205
Field Parameters				
Conductivity, field	mS/cm		0.887	1.2
Dissolved oxygen (DO), field	mg/L	>4	9.67	11.51
Oxidation reduction potential (ORP), field	millivolts		85	194
pH, field	s.u.	6.5-8.5	7.61	5.24
Temperature, field	Deg C		21.13	2.44
Turbidity, field	NTU		10.2	53

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

003899

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW3-09	SW3-09	SW3-09
Sample ID:			SW-45804-061719-JC-004	SW-045804-112819-JC-002	SW-045804-112819-JC-003
Sample Date:			6/17/2019	11/28/2019	11/28/2019
Sample Type:					Duplicate
Parameters	**Units**	**PWQO [1]**			
Metals					
Iron	mg/L	0.3	0.481	1.13	1.19
Manganese	mg/L		0.0842	0.120	0.121
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L		260	152	153
Ammonia-N	mg/L		0.052	0.073	0.073
Dissolved organic carbon (DOC) (dissolved)	mg/L		9.27	10.7	11.1
Escherichia coli	cfu/100mL	100	170	480	400
Nitrate (as N)	mg/L		0.169	0.25	0.27
Phosphorus	mg/L	0.01	0.0228	0.0523	0.0503
Turbidity	NTU		-	27.8	30.2
Un-ionized ammonia	mg/L	0.02	-	0.0000475	0.0000472
Field Parameters					
Conductivity, field	mS/cm		0.957	1.08	1.08
Dissolved oxygen (DO), field	mg/L	>4	11.84	-	-
Oxidation reduction potential (ORP), field	millivolts		102	-	-
pH, field	s.u.	6.5-8.5	7.49	6.73	6.73
Temperature, field	Deg C		20.65	2.24	2.24
Turbidity, field	NTU		9.6	46.2	-

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

003900

Table 4.4

Surface Water Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			SW4-09	SW4-09	SW4-09
Sample ID:			SW-45804-061719-JC-001	SW-45804-061719-JC-002	SW-045804-112819-JC-007
Sample Date:			6/17/2019	6/17/2019	11/28/2019
Sample Type:				Duplicate	
Parameters	**Units**	**PWQO [1]**			
Metals					
Arsenic	mg/L	0.005	-	-	0.00052
Boron	mg/L	0.2	-	-	0.042
Cadmium	mg/L	0.0002	-	-	0.0000075
Chromium	mg/L	0.001	-	-	ND(0.00050)
Cobalt	mg/L	0.0009	-	-	0.00024
Copper	mg/L	0.005	-	-	0.0013
Iron	mg/L	0.3	0.066	0.060	0.141
Lead	mg/L	0.005	-	-	0.000129
Manganese	mg/L		0.169	0.142	0.109
Mercury	mg/L	0.0002	-	-	ND(0.0000050)
Nickel	mg/L	0.025	-	-	0.00166
Zinc	mg/L	0.03	-	-	0.0045
General Chemistry					
Alkalinity, total (as CaCO3)	mg/L		172	165	175
Ammonia-N	mg/L		0.079	0.067	0.862
Biochemical oxygen demand (BOD)	mg/L		-	-	ND(3.0)
Chemical oxygen demand (COD)	mg/L		-	-	29
Dissolved organic carbon (DOC) (dissolved)	mg/L		10.6	10.8	10.4
Escherichia coli	cfu/100mL	100	16	4	800
Nitrate (as N)	mg/L		ND(0.020)	ND(0.020)	0.374
Nitrite (as N)	mg/L		-	-	0.010
Nitrite/Nitrate	mg/L		-	-	0.384
Oil and grease	mg/L		-	-	ND(5.0)
pH, lab	s.u.	6.5-8.5	-	-	7.82
Phenolics (total)	mg/L	0.001	-	-	0.0054
Phosphorus	mg/L	0.01	0.177	0.219	0.119
Total kjeldahl nitrogen (TKN)	mg/L		-	-	2.53
Total suspended solids (TSS)	mg/L		-	-	4.6
Turbidity	NTU		-	-	6.05
Un-ionized ammonia	mg/L	0.02	-	-	0.00203
Field Parameters					
Conductivity, field	mS/cm		0.874	0.874	1.02
Dissolved oxygen (DO), field	mg/L	>4	5.44	-	7.86
Oxidation reduction potential (ORP), field	millivolts		33	-	124
pH, field	s.u.	6.5-8.5	7.39	7.39	7.29
Temperature, field	Deg C		22.65	22.65	2.26
Turbidity, field	NTU		456	-	10.1

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO). July 1994. reprinted February 1999.
ND Not detected at the associated reporting limit.
5.44 Concentrations is in excess of the PWQO.
* PWQO for dissolved oxygen is temperature dependent.

003901

Table 4.5

SW-4 Monthly Sampling Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:				STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	SW-45804-061719-JC-001	SW-45804-061719-JC-002	STORM WATER POND
Sample Type:											Duplicate	
Sample Date:				1/29/2019	2/11/2019	3/14/2019	4/3/2019	5/22/2019	6/6/2019	6/17/2019	6/17/2019	7/9/2019
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria [2]**									
Metals		a	b									
Aluminum	mg/L	0.075		0.112*	0.106*	0.204*	–	–	–	–	–	–
Iron	mg/L	0.3		0.189	0.180	0.271	–	–	–	0.066	0.060	–
Lead	mg/L	0.005		0.000159	0.000135	0.000189	0.000209	ND(0.000050)	ND(0.000050)	–	–	ND(0.000050)
Magnesium	mg/L			33.5	35.2	37.6	–	–	–	–	–	–
Manganese	mg/L			0.0382	0.110	0.138	–	–	–	0.169	0.142	–
Mercury	mg/L	0.0002		ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	–	–	ND(0.000010)
Molybdenum	mg/L	0.04		0.0106	0.0104	0.0104	–	–	–	–	–	–
Nickel	mg/L	0.025		0.00210	0.00213	0.00236	0.00255	0.00231	0.00203	–	–	0.00154
Sodium	mg/L			59.5	64.6	73.0	–	–	–	–	–	–
Arsenic	mg/L	0.005		0.00061	0.00061	0.00065	0.00054	0.00074	0.00079	–	–	0.00100
Boron	mg/L	0.2		0.035	0.036	0.038	0.026	0.037	0.038	–	–	0.047
Cadmium	mg/L	0.0002		ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000011	ND(0.000010)	0.0000066	–	–	ND(0.0000050)
Chromium	mg/L	0.001		0.00060	ND(0.00050)	0.00068	ND(0.00050)	ND(0.00050)	ND(0.00050)	–	–	ND(0.00050)
Cobalt	mg/L	0.0009		0.00024	0.00026	0.00031	0.00064	0.00028	0.00031	–	–	0.00016
Copper	mg/L	0.005		0.0010	ND(0.0010)	0.0010	0.0012	ND(0.0010)	ND(0.0010)	–	–	ND(0.0010)
Zinc	mg/L	0.03		0.0092	0.0102	0.0098	0.0142	0.0037	ND(0.0030)	–	–	ND(0.0030)
Bismuth	mg/L			ND(0.000050)	ND(0.000050)	ND(0.000050)	–	–	–	–	–	–
Calcium	mg/L			124	128	126	–	–	–	–	–	–
Selenium	mg/L	0.1		0.000054	ND(0.000050)	0.000057	–	–	–	–	–	–
General Chemistry												
Nitrate (as N)	mg/L		2.93	1.49	1.47	1.23	0.70	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L			0.011	0.011	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.010)	–	–	ND(0.050)
Ammonia-N	mg/L			0.187	0.329	0.220	0.73	0.150	ND(10)	0.079	0.067	0.13
Phosphorus	mg/L	0.01	0.4	0.0209*	0.0204*	0.0204*	0.0205*	0.0204*	0.0204*	0.0178*	0.0195*	0.0224*
Alkalinity, total (as CaCO3)	mg/L			–	–	–	–	–	–	172	165	–
Biochemical oxygen demand (BOD)	mg/L			ND(3.0)	ND(2.0)	ND(3.0)	ND(2.0)	2.4	3.5	–	–	ND(2.0)
Biochemical oxygen demand (carbonaceous)	mg/L		15	ND(3.0)	ND(2.0)	ND(3.0)	ND(2.0)	2.0	2.6	–	–	ND(3.0)
Chemical oxygen demand (COD)	mg/L			27	17	26	32	33	39	–	–	35
Conductivity	umhos/cm			1120	1210	1230	874	1010	1020	–	–	662
Dissolved organic carbon (DOC) [dissolved]	mg/L			8.56	8.53	8.29	7.56	8.76	10.5	10.6	10.8	12.2
Dissolved oxygen (DO) [dissolved]	mg/L			9.49	12.2	11.3	9.29	8.17	8.00	–	–	8.81
Escherichia coli	cfu/100mL	100	100	6	0	15	1	1	0	16	4	81
Nitrite/Nitrate	mg/L			–	–	–	–	–	ND(0.022)	–	–	ND(0.11)
Oil and grease, animal and vegetable	mg/L			ND(5.0)	ND(2.0)	–	–	–	–	–	–	–
Phenolics (total)	mg/L	0.001		0.0016*	ND(0.0010)	0.0015*	0.0010	0.0013*	0.0022*	–	–	0.0025*
pH, lab	s.u.	6.5-8.5	6.5-8.5	8.15	8.04	8.07	7.84	8.26	8.33	–	–	8.21
Temperature, field	Deg C			1.0	1.0	2.0	2.0	11.0	19.0	–	–	16.0
Total kjeldahl nitrogen (TKN)	mg/L			1.42	1.47	1.12	1.63	1.57	1.20	–	–	1.38
Total nitrogen	mg/L			2.92	2.95	2.35	2.33	1.57	1.20	–	–	1.38
Total suspended solids (TSS)	mg/L		15	3.6	3.5	3.1	3.7	3.8	4.7	–	–	3.2
Turbidity	NTU			–	–	–	–	–	–	–	–	–
Un-ionized ammonia	mg/L	0.02	0.05	0.00264	0.00389	0.00302	0.00590	0.00642	ND(0.70)[3]	–	–	0.0082
Field Parameters												
Conductivity, field	mS/cm			–	–	–	–	–	–	0.874	0.874	–
Dissolved oxygen (DO), field	mg/L	>4		–	–	–	–	–	–	5.26*	–	–
Oxidation reduction potential (ORP), field	millivolts			–	–	–	–	–	–	33	–	–
pH, field	s.u.	6.5-8.5	6.5-8.5	–	–	–	–	–	–	7.39	7.39	–
Temperature, field	Deg C		23	–	–	–	–	–	–	22.65	22.65	–
Turbidity, field	NTU			–	–	–	–	–	–	456	–	–
Misc												
Oil and grease	mg/L			ND(5.0)	ND(2.0)	–	ND(2.0)	ND(2.0)	ND(2.0)	–	–	ND(2.0)
Oil and grease, animal and vegetable	mg/L			–	–	ND(1.0)	–	–	–	–	–	–
Mineral oil and grease	mg/L			ND(2.5)	ND(1.0)	–	–	–	–	–	–	–

Notes:

(1) Ministry of the Environment and Energy (MOEE) Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2) ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND Not detected at the associated reporting limit.
Value Exceedance of the PWQO
Value Exceedance of the ECA Discharge Criteria
J Estimated concentration.
* The PWQO for dissolved oxygen is temperature dependent

Table 4.5

SW-4 Monthly Sampling Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				SW-4	SW-4	SW-4	SW-4	SW-4	SW-4
Sample ID:				STORM WATER POND	STORM WATER POND	STORM WATER POND	STORM WATER POND	SW-4-45804-112819-JC-007	STORM WATER POND
Sample Type:									
Sample Date:				8/7/2019	9/10/2019	10/21/2019	11/22/2019	11/28/2019	12/16/2019
Parameters	**Units**	**PWQO[1]**	**ECA Discharge Criteria[2]**						
Metals		a	b						
Aluminum	mg/L	0.075		–	–	–	–	–	–
Iron	mg/L	0.3		–	–	–	–	0.141	–
Lead	mg/L	0.005		ND(0.000050)	0.000083	0.000068	0.000073	0.000129	0.000092
Magnesium	mg/L			–	–	–	–	–	–
Manganese	mg/L			–	–	–	–	0.109	–
Mercury	mg/L	0.0002		ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)
Molybdenum	mg/L	0.04		–	–	–	–	–	–
Nickel	mg/L	0.025		0.00180	0.00154	0.00176	0.00191	0.00166	0.00204
Sodium	mg/L			–	–	–	–	–	–
Arsenic	mg/L	0.005		0.00096	0.00104	0.00081	0.00053	0.00052	0.00067
Boron	mg/L	0.2		0.054	0.060	0.065	0.047	0.042	0.054
Cadmium	mg/L	0.0002		ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	ND(0.0000050)	0.0000075	0.0000054
Chromium	mg/L	0.001		0.00055	[redacted]	[redacted]	[redacted]	ND(0.00050)	0.00060
Cobalt	mg/L	0.0009		0.00017	0.00026	0.00015	0.00023	0.00024	0.00030
Copper	mg/L	0.005		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0013	0.0014
Zinc	mg/L	0.03		ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0045	0.0058
Bismuth	mg/L			–	–	–	–	–	–
Calcium	mg/L			–	–	–	–	–	–
Selenium	mg/L	0.1		–	–	–	–	–	–
General Chemistry									
Nitrate (as N)	mg/L		2.93	ND(0.10)	ND(0.020)	0.169	0.353	0.374	0.30
Nitrite (as N)	mg/L			ND(0.050)	ND(0.010)	0.014	ND(0.010)	0.010	ND(0.050)
Ammonia-N	mg/L			0.359	0.021	0.166	0.360	0.862	1.27
Phosphorus	mg/L	0.01	0.4	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Alkalinity, total (as CaCO3)	mg/L			–	–	–	–	175	–
Biochemical oxygen demand (BOD)	mg/L			2.3	2.3	ND(2.0)	3.8	ND(3.0)	ND(3.0)
Biochemical oxygen demand (carbonaceous)	mg/L		15	ND(2.0)	2.3	ND(2.0)	4.0	–	ND(3.0)
Chemical oxygen demand (COD)	mg/L			40	52	36	32	28	27
Conductivity	umhos/cm			910	915	823	961	–	1060
Dissolved organic carbon (DOC) (dissolved)	mg/L			11.7	13.5	11.6	10.2	10.4	9.78
Dissolved oxygen (DO) (dissolved)	mg/L			7.70	7.86	8.67	10.8	–	9.28
Escherichia coli	cfu/100mL	100	100	16	9	[redacted]	6	[redacted]	[redacted]
Nitrite/Nitrate	mg/L			ND(0.11)	ND(0.022)	0.183	0.353	0.384	0.3
Oil and grease, animal and vegetable	mg/L			–	–	–	–	–	–
Phenolics (total)	mg/L	0.001		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
pH, lab	s.u.	6.5-8.5	6.5-8.5	7.86	[redacted]	7.96	7.89	7.82	7.99
Temperature, field	Deg C			25.0	19.0	9.0	1.2	–	1.0
Total kjeldahl nitrogen (TKN)	mg/L			1.62	1.87	1.37	1.81	2.53	2.27
Total nitrogen	mg/L			1.62	1.87	1.55	2.16	–	2.57
Total suspended solids (TSS)	mg/L		15	5.9	6.7	3.9	5.1	4.6	2.4
Turbidity	NTU			--	–	–	–	6.05	–
Un-ionized ammonia	mg/L	0.02	0.05	0.0177	0.0028	0.00303	0.00333	0.00203	0.0134
Field Parameters									
Conductivity, field	mS/cm			--	–	–	–	1.02	–
Dissolved oxygen (DO), field	mg/L	>4		--	–	–	–	[redacted]	–
Oxidation reduction potential (ORP), field	millivolts			–	–	–	–	124	–
pH, field	s.u.	6.5-8.5	6.5-8.5	–	–	–	–	7.29	–
Temperature, field	Deg C		23	–	–	–	–	2.26	–
Turbidity, field	NTU			–	–	–	–	10.1	–
Misc									
Oil and grease	mg/L			ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(5.0)	ND(5.0)
Oil and grease, animal and vegetable	mg/L			–	–	–	–	–	–
Mineral oil and grease	mg/L			–	–	–	–	–	–

Notes:

(1)	Ministry of the Environment and Energy (MOEE), Provincial Water Quality Objectives (PWQO), July 1994, reprinted February 1999
(2)	ECA 2844-9YNGZC Section 5.5 Table 2 Trigger Parameters
ND	Not detected at the associated reporting limit.
[redacted]	Exceedance of the PWQO
[redacted]	Exceedance of the ECA Discharge Criteria
J	Estimated concentration.
-	The PWQO for dissolved oxygen is temperature dependent

Table 5.1

EW107-15 Daily Pumping Log
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Period Start (PUMP ON)	Period End (PUMP OFF)	Pumping Day #	Duration (hrs)	Flow Rate (m^3/hr)	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
9-Mar-19	9-Mar-19	1	2.72	0.2	540.0	0.540	540.0	0.540	540.0	0.540
15-May-19	15-May-19	2	0.08	2.5	210.0	0.210	750.0	0.750	375.0	0.375
30-May-19	30-May-19	3	0.03	2.5	80.0	0.080	830.0	0.830	276.7	0.277
31-May-19	31-May-19	4	2.33	2.55	5950.0	5.950	6,780.0	6.780	1,695.0	1.695
31-May-19	31-May-19	4	0.28	1.9	540.0	0.540	7,320.0	7.320	1,830.0	1.830
31-May-19	31-May-19	4	0.7	0.77	540.0	0.540	7,860.0	7.860	1,965.0	1.965
1-Jun-19	1-Jun-19	5	1	1.88	1880.0	1.880	9,740.0	9.740	1,948.0	1.948
10-Jul-19	10-Jul-19	6	5.42	2.5	13540.0	13.540	23,280.0	23.280	3,880.0	3.880
18-Jul-19	18-Jul-19	7	0.08	2.5	210.0	0.210	23,490.0	23.490	3,355.7	3.356
19-Jul-19	19-Jul-19	8	1.45	0.63	910.0	0.910	24,400.0	24.400	3,050.0	3.050
23-Jul-19	23-Jul-19	9	0.45	0.57	260.0	0.260	24,660.0	24.660	2,740.0	2.740
23-Jul-19	23-Jul-19	9	0.85	0.56	480.0	0.480	25,140.0	25.140	2,793.3	2.793
23-Jul-19	23-Jul-19	9	8.27	2.5	20670.0	20.670	45,810.0	45.810	5,090.0	5.090
23-Jul-19	23-Jul-19	9	0.98	1.26	1240.0	1.240	47,050.0	47.050	5,227.8	5.228
23-Jul-19	24-Jul-19	9	10.75	2	21500.0	21.500	68,550.0	68.550	7,616.7	7.617
24-Jul-19	24-Jul-19	10	1.52	1.98	3000.0	3.000	71,550.0	71.550	7,155.0	7.155
29-Jul-19	29-Jul-19	10	0.33	2.21	740.0	0.740	72,290.0	72.290	7,229.0	7.229
29-Jul-19	29-Jul-19	10	0.2	1.63	330.0	0.330	72,620.0	72.620	7,262.0	7.262
30-Jul-19	30-Jul-19	11	6.65	2.08	13830.0	13.830	86,450.0	86.450	7,859.1	7.859
7-Aug-19	7-Aug-19	12	5.77	2.12	12230.0	12.230	98,680.0	98.680	8,223.3	8.223
9-Aug-19	9-Aug-19	13	6.45	2.11	13610.0	13.610	112,290.0	112.290	8,637.7	8.638
13-Aug-19	13-Aug-19	14	7.03	2	14070.0	14.070	126,360.0	126.360	9,025.7	9.026
19-Aug-19	19-Aug-19	15	12.47	1.85	23060.0	23.060	149,420.0	149.420	9,961.3	9.961
21-Aug-19	21-Aug-19	16	0.17	1.85	310.0	0.310	149,730.0	149.730	9,358.1	9.358
22-Aug-19	22-Aug-19	17	0.32	1.95	620.0	0.620	150,350.0	150.350	8,844.1	8.844
22-Aug-19	22-Aug-19	16	0.15	1	150.0	0.150	150,500.0	150.500	9,406.3	9.406
28-Aug-19	29-Aug-19	18	16.93	1.5	25400.0	25.400	175,900.0	175.900	9,772.2	9.772
30-Aug-19	30-Aug-19	19	0.22	1.88	410.0	0.410	176,310.0	176.310	9,279.5	9.279
3-Sep-19	3-Sep-19	20	0.15	1.91	290.0	0.290	176,600.0	176.600	8,830.0	8.830
3-Sep-19	3-Sep-19	19	0.35	2.15	750.0	0.750	177,350.0	177.350	9,334.2	9.334
6-Sep-19	6-Sep-19	21	0.17	1.46	240.0	0.240	177,590.0	177.590	8,456.7	8.457
6-Sep-19	7-Sep-19	21	18.52	1.9	35180.0	35.180	212,770.0	212.770	10,131.9	10.132
10-Sep-19	10-Sep-19	22	0.12	1.81	210.0	0.210	212,980.0	212.980	9,680.9	9.681
10-Sep-19	11-Sep-19	23	18.48	2.05	37890.0	37.890	250,870.0	250.870	10,907.4	10.907
11-Sep-19	11-Sep-19	24	0.15	2.08	310.0	0.310	251,180.0	251.180	10,465.8	10.466
11-Sep-19	11-Sep-19	24	0.3	2.08	620.0	0.620	251,800.0	251.800	10,491.7	10.492
16-Sep-19	16-Sep-19	24	0.23	2.08	490.0	0.490	252,290.0	252.290	10,512.1	10.512
19-Sep-19	19-Sep-19	25	5.55	2.15	11930.0	11.930	264,220.0	264.220	10,568.8	10.569
20-Sep-19	20-Sep-19	26	0.03	2.11	70.0	0.070	264,290.0	264.290	10,165.0	10.165
23-Sep-19	23-Sep-19	27	0.18	2.11	390.0	0.390	264,680.0	264.680	9,803.0	9.803
23-Sep-19	23-Sep-19	28	0.28	2.11	600.0	0.600	265,280.0	265.280	9,474.3	9.474
25-Sep-19	25-Sep-19	27	1.82	2.11	3830.0	3.830	269,110.0	269.110	9,967.0	9.967
26-Sep-19	26-Sep-19	28	7.93	2.15	17060.0	17.060	286,170.0	286.170	10,220.4	10.220
27-Sep-19	27-Sep-19	29	3.42	2.15	7350.0	7.350	293,520.0	293.520	10,121.4	10.121
27-Sep-19	28-Sep-19	30	14.68	2.18	32010.0	32.010	325,530.0	325.530	10,851.0	10.851
28-Sep-19	28-Sep-19	31	9.92	2.15	21320.0	21.320	346,850.0	346.850	11,188.7	11.189
30-Sep-19	30-Sep-19	31	0.47	2.15	1000.0	1.000	347,850.0	347.850	11,221.0	11.221

003904

Table 5.1

EW107-15 Daily Pumping Log
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
5123 Hawthorne Road, Ottawa, ON

Period Start (PUMP ON)	Period End (PUMP OFF)	Pumping Day #	Duration (hrs)	Flow Rate (m^3/hr)	Daily Volume Pumped (L)	Daily Volume Pumped (m^3)	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
1-Oct-19	1-Oct-19	32	5.02	2.15	10790.0	10.790	358,640.0	358.640	11,207.5	11.208
8-Oct-19	8-Oct-19	33	5.98	2.15	12860.0	12.860	371,500.0	371.500	11,257.6	11.258
10-Oct-19	10-Oct-19	34	0.42	2.15	900.0	0.900	372,400.0	372.400	10,952.9	10.953
11-Oct-19	11-Oct-19	35	0.2	2.15	430.0	0.430	372,830.0	372.830	10,652.3	10.652
16-Oct-19	16-Oct-19	36	0.2	2.2	440.0	0.440	373,270.0	373.270	10,368.6	10.369
21-Oct-19	21-Oct-19	37	0.23	2.2	510.0	0.510	373,780.0	373.780	10,102.2	10.102
23-Oct-19	23-Oct-19	38	0.42	2.25	940.0	0.940	374,720.0	374.720	9,861.1	9.861
23-Oct-19	23-Oct-19	38	5.97	2.25	13420.0	13.420	388,140.0	388.140	10,214.2	10.214
1-Nov-19	1-Nov-19	39	0.25	2.25	560.0	0.560	388,700.0	388.700	9,966.7	9.967
1-Nov-19	1-Nov-19	39	3.22	2.25	7240.0	7.240	395,940.0	395.940	10,152.3	10.152
7-Nov-19	7-Nov-19	40	2.88	2.25	6490.0	6.490	402,430.0	402.430	10,060.8	10.061
8-Nov-19	8-Nov-19	41	8.48	2.25	19090.0	19.090	421,520.0	421.520	10,281.0	10.281
14-Nov-19	14-Nov-19	42	0.25	2.25	560.0	0.560	422,080.0	422.080	10,049.5	10.050
18-Nov-19	18-Nov-19	43	0.32	2.25	710.0	0.710	422,790.0	422.790	9,832.3	9.832
20-Nov-19	20-Nov-19	44	0.28	2.35	670.0	0.670	423,460.0	423.460	9,624.1	9.624
21-Nov-19	21-Nov-19	45	10.93	2.35	25690.0	25.690	449,150.0	449.150	9,981.1	9.981
25-Nov-19	25-Nov-19	46	0.3	2.35	710.0	0.710	449,860.0	449.860	9,779.6	9.780
28-Nov-19	28-Nov-19	47	0.43	2.3	1000.0	1.000	450,860.0	450.860	9,592.8	9.593
28-Nov-19	28-Nov-19	47	0.12	2.3	270.0	0.270	451,130.0	451.130	9,598.5	9.599
2-Dec-19	2-Dec-19	48	0.33	2.3	770.0	0.770	451,900.0	451.900	9,414.6	9.415
3-Dec-19	3-Dec-19	49	0.38	2.3	880.0	0.880	452,780.0	452.780	9,240.4	9.240
4-Dec-19	4-Dec-19	50	5.05	2.3	11610.0	11.610	464,390.0	464.390	9,287.8	9.288
5-Dec-19	5-Dec-19	51	0.28	2.3	650.0	0.650	465,040.0	465.040	9,118.4	9.118
10-Dec-19	10-Dec-19	52	0.27	2.3	610.0	0.610	465,650.0	465.650	8,954.8	8.955
11-Dec-19	11-Dec-19	53	0.28	2.3	650.0	0.650	466,300.0	466.300	8,798.1	8.798
12-Dec-19	12-Dec-19	54	0.1	2.3	230.0	0.230	466,530.0	466.530	8,639.4	8.639
12-Dec-19	13-Dec-19	52	9.62	2.3	22120.0	22.120	488,650.0	488.650	9,397.1	9.397
13-Dec-19	13-Dec-19	55	0.33	2.3	770.0	0.770	489,420.0	489.420	8,898.5	8.899
17-Dec-19	17-Dec-19	56	0.1	2.3	230.0	0.230	489,650.0	489.650	8,743.8	8.744
18-Dec-19	18-Dec-19	57	0.22	2.3	500.0	0.500	490,150.0	490.150	8,599.1	8.599
19-Dec-19	19-Dec-19	58	0.82	2.33	1900.0	1.900	492,050.0	492.050	8,483.6	8.484
24-Dec-19	24-Dec-19	59	0.1	2.3	230.0	0.230	492,280.0	492.280	8,343.7	8.344
30-Dec-19	30-Dec-19	60	0.08	2.2	180.0	0.180	492,460.0	492.460	8,207.7	8.208

	Total Available Pumping Days	Total Days Pumping	Percent of Days with pumping	Total Volume Pumped (L)	Total Volume Pumped (m^3)	Average Daily Volume Pumped (L)	Average Daily Volume Pumped (m^3)
2019 TOTALS	**60**	**60**	**100.00%**	**492,460.0**	**492.460**	**8,305.6**	**8.306**

Note:

a total volume and average daily volume based on recorded periods only

003905

Appendices

Appendix A
Environmental Compliance Approval
(No. 7251 8GKRPD and No. 2844 9YNGZC)

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 2844-9YNGZC
Issue Date: February 1, 2017

Orgaworld Canada Ltd.
150 Kent Street
London, Ontario
N6A 1L3

Site Location: Source Separated Organics Processing Facility
5123 Hawthorne Road South
Part of West Half of Lot 27, Concession 6
City of Ottawa
K1G 3Y3

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters

below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	**Elevation** (metre)	**Storage Volume** (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

    - inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

    - overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide

over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2-year	5-year	25-year	100-year
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water

and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

all in accordance with supporting documents listed in Schedule 'A'.

For the purpose of this environmental compliance approval, the following definitions apply:

"Application" means the application for an environmental compliance approval submitted to the Ministry for approval by or on behalf of the Owner and dated March 11, 2015;

"Approval" means this entire document and any schedules attached to it, and the Application;

"BOD_5"(also known as $TBOD_5$) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"$CBOD_5$"means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"COD" means Chemical Oxygen Demand;

"District Manager" means the District Manager of the Ottawa District Office of the Ministry;

"DOC" means Dissolved Organic Carbon;

"Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

"*E. coli* " refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

"EPA" means the *Environmental Protection Act, R.S.O. 1990, c.E.19* , as amended;

"Leachate Contaminated Sewage"means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

"Owner" means Orgaworld Canada Ltd., and its successors and assignees;

"OWRA" means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

"Substantial Completion" has the same meaning as "substantial performance" in the *Construction Lien Act* ; and

"Works" means the sewage works described in the Owner's application, and this Approval.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL CONDITION

(1) The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these terms and conditions, the Owner shall design, build, install, operate and maintain the Works in accordance with this Approval.

(3) Where there is a conflict between a provision of this environmental compliance approval and any document submitted by the Owner, the conditions in this environmental compliance approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Owner, the Application shall take precedence unless it is clear that the purpose of the document was to amend the Application

(4) Where there is a conflict between the documents listed in the Schedule A, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The terms and conditions of this Approval are severable. If any term and condition of this environmental compliance approval, or the application of any requirement of this environmental compliance approval to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this Approval shall not be affected thereby.

(6) The issuance of, and compliance with the conditions of, this Approval does not:

(a) relieve any person of any obligation to comply with any provision of any applicable statute, regulation or other legal requirement, including, but not limited to, the obligation

to obtain approval from the local conservation authority necessary to construct or operate the sewage Works; or

(b) limit in any way the authority of the Ministry to require certain steps be taken to require the Owner to furnish any further information related to compliance with this Approval.

2. CHANGE OF OWNER

(1) The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of address of Owner or operating authority;

(b) change of Owner or operating authority or both, including address of new Owner or operating authority, or both;

(c) change of partners where the Owner or operating authority is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act, R.S.O. 1990, c. B.17* ; and

(d) change of name of the corporation where the Owner or operator is or at any time becomes a corporation, and a copy of the "Initial Return" or "Notice of Change" filed under the *Corporations Information Act, R.S.O. 1990, c. C.39* , shall be included in the notification to the District Manager.

(2) In the event of any change in ownership of the Works, the Owner shall notify in writing the succeeding owner of the existence of this Approval, and a copy of such notice shall be forwarded to the District Manager.

(3) The Owner shall ensure that all communications made pursuant to this condition refer to the number at the top of this environmental compliance approval.

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the Substantial Completion of the Works,a set of as-built drawings showing the Works as "constructed" shall be completed and submitted by the Owner to the District Manager.These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the Works or at operational office of the Owner for the operational life of the Works.

(2) The Owner shall inform in writing to the District Manager when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The Owner shall inform the District Manager of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after **two (2) years** of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The Owner shall retain for a minimum of **five (5) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

5. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

(4) The Owner shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the Owner shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 4.(2). The Owner shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the Owner shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 5.(2) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the Owner shall ensure that the contents of the SWM Pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner.

(8) The Owner shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to.

(9) Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage.

(10) The Owner shall notify the District Manager orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The Owner shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation.

(13) The Owner shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or Owner's operational headquarters for inspection by the Ministry.The logbook shall include the following:

(a) the name of the Works;

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The Owner shall not store any end-product, including leaves and yard waste outdoors until the Owner prepares a Conditions Assessment and implementation plan approved by the District Manager. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

6. OPERATION AND MAINTENANCE

(1) The Owner shall exercise due diligence in ensuring that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this Approval, the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

(2) The Owner shall prepare an operations manual prior to the commencement of operation of the sewage works, that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the Works;

(b) inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the Works;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a **Spill Prevention Control and Countermeasures Plan**, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the District Manager; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The Owner shall maintain the operations manual current and retain a copy at the location of the Works for the operational life of the Works. Upon request, the Owner shall make the manual available to Ministry staff.

PART IV - GENERAL

7. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the Works, the Owner shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall

include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the Owner.

9. GROUNDWATER MONITORING

Groundwater Monitoring Program

(1) The Owner shall, upon the issuance of this Approval, carry out the following groundwater monitoring program. Samples shall be collected from the specified groundwater monitoring wells at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded:

Table 3 - Groundwater Monitoring

Unconfined Shallow Aquifer

MW1-08*, MW2-08*, MW3-08*, MW4-09*, & MW103-09*.

MW5-09**, MW101-13**, MW102-09**, MW104-13**, MW105-13**, MW106-15** & EW107-15**.

Deep Bedrock Aquifer

TW-4*, TW-7* & TW-8*.

Frequency	*Semi Annual (i.e. two times in a year) ** Tri-Annual (i.e. three time in a year)
Sample Type	Grab
Parameters	Alkalinity, Total Ammonia Nitrogen, Dissolved Organic Carbon, *E-coli* , Iron, Manganese, Nitrate-N, and Total Phosphorous.

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (August 1994), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(b) the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition) as amended from time to time by more recently published editions; and

(c) in respect of any parameters not mentioned in (a) - (b), the written approval of the District Manager,which approval shall be obtained prior to sampling.

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after three (3) years of operation of the Works in accordance with this Condition, be modified by the Director in writing from time to time.

(4) The Owner shall compare analytical monitoring results obtained pursuant to Subsection (1) Table 3 - Groundwater Monitoring with the trigger level concentrations for the trigger parameter listed in Tables 4 and 5.

Table 4
Trigger Level Concentrations
Unconfined Shallow Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	633
Total Ammonia Nitrogen	4.0
Dissolved Organic Carbon	34.6
E-coli	25.6 CFU/100 mL
Iron	48.3
Manganese	17.1
Nitrate-N	1.3
Total Phosphorous	7.2

Table 5
Trigger Parameters
Deep Bedrock Aquifer

Parameter	Trigger Level (milligram per litre if not specified)
Alkalinity	996
Total Ammonia Nitrogen	0.2
Dissolved Organic Carbon	18.4
E-coli	5.0 CFU/100 mL
Iron	10.6
Manganese	2.1
Nitrate-N	0.5
Total Phosphorous	0.5

(5) The trigger level program shall be implemented using the following three (3) Tiers to verify the results and direct potential contingency implementation:

Tier I (Routine Monitoring Program)

Tier I Routine Monitoring Program (RMP) involves the sampling of all on-site groundwater monitoring wells at the frequency specified in Table 3. All groundwater monitoring activities completed at the site will be considered Tier I RMP unless two (2) or more trigger parameters exceed there respective trigger levels in a simple sample.

Tier II (Confirmation Monitoring Program)

If during a single monitoring event, two (2) or more trigger parameters exceed the established (see Tables 4 and 5) Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring Program (CMP) shall be implemented.

The Tier II CMP consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next schedule monitoring event in order to confirm the Tier I exceedance of the two (2) or more trigger parameters.

If the concentrations reported in the duplicate sample return to below their respective trigger levels, then Tier I RMP will resume.

If the Tier I exceedance is confirmed, then the next step shall be a re-evaluation of the degree, nature, and potential source(s) of the trigger level impact(s) identified in Tier I including the implication of the exceedance in terms of the potential for impacts to down-gradient off-site water users.

If the Tier II CMP and the subsequent evaluation indicate that the facility operations are having a detrimental effect on water quality migrating off-site, then Tier III Contingency Measures and Compliance Monitoring Program shall be implemented.

Tier III (Contingency Measures and Compliance Monitoring Program)

Tier III Contingency Measures and Compliance Monitoring Program (CMCMP) involves assessment and implementation of contingency measures in the event of imminent off-site groundwater quality impairment.

Contingency measures to be evaluated should include extraction of impacted groundwater and/or surface water for on-site treatment or off-site disposal, or acquisition of groundwater rights and registration of a contaminated attenuation zone (CAZ) on title of adjacent lands.

Tier III CMCMP should also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented.

The Tier III CMCMP details should be determined in conjunction with the development and implementation of preferred contingency measure(s).

The compliance monitoring parameters, locations, and monitoring frequency should be determined at the time of implementation of contingency measures.

Lastly, appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed.

(6) The Owner shall notify the District Manager orally, as soon as possible, and in writing within

seven (7) days in the event a trigger exceedance occurs.

(7) The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the District Manager requires from time to time.

SCHEDULE 'A'

1. Environmental Compliance Approval Application for Industrial Sewage Works submitted by Ben Constable, Conestoga-Rovers & Associates (CRA), and signed by Mike Rooke, Compliance Officer, Orgaworld Canada Ltd., dated March 11, 2015, and all supporting documentation and information.

2. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

3. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

4. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

5. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

6. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

7. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

8. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

9. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

10. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

11. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla,

P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

12. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

13. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

14. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

15. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

16. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the Works are built and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. Condition 1.(6) is included to emphasize that the issuance of this Approval does not diminish any other statutory and regulatory obligations to which the Owner is subject in the construction, maintenance and operation of the Works. The condition specifically highlights the need to obtain any necessary conservation authority approvals. The condition also emphasizes the fact that this Approval doesn't limit the authority of the Ministry to require further information.

2. Condition 2 is included to ensure that the Ministry records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the works in compliance with it.

3. Condition 3 is included to ensure that the Works are constructed in accordance with the approval and that record drawings of the Works"as constructed" are maintained for future references.

4. Conditions 4 and 8 are included to enable the Owner to evaluate and demonstrate the performance of the Works,on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives specified in the Approval and that the Works does not cause any impairment to the receiving watercourse.

5. Conditions 5, 6 and 7 are included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the Ministry.

6. Condition 9 is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this Approval, so that the Ministry can work with the Owner in resolving any problems in a timely manner.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 7251-8GKRPD issued on May 30, 2011.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment and Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 1st day of February, 2017

Fariha Pannu.

Fariha Pannu, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

AA/
c: District Manager, MOECC Ottawa District Office
Ben Constable, Conestoga-Rovers & Associates (CRA)

CONTENT COPY OF ORIGINAL

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
INDUSTRIAL SEWAGE WORKS
NUMBER 7251-8GKRPD
Issue Date: May 30, 2011

Orgaworld Canada Ltd.
4675 Wellington Rd S
London, Ontario
N6K 0C7

Site Location: 5123 Hawthorne Road South
Lot Part of West Half of 27, Concession 6
Ottawa City,
K1G 3Y3

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.
- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.
- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part 1 Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:
    1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;
    2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.
- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;
- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.
- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside dith draining to the Findlay Creek, a tributary to Shields Creek.
- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;
- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;
- a minor drainage system of storm sewers and appurtances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.
- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II <u>Process Water Recirculation System</u>

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

All in accordance with the following submitted supporting documents:

1. Application for Approval of Industrial Sewage Works submitted by Frederick (Rick) Mosher of Orgaworld Canada Ltd., dated September 19, 2008, with supporting information prepared by J.L. Richards & Associates Limited of Ottawa.

2. Stormwater Site Management Plan, Orgaworld Ottawa Composting Facility, dated September 2008, prepared by Mark Buchanan, EIT, Derrick Upton, P.Eng., Guy Forget, P.Eng., from J.L. Richards and Associates Limited; and Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates.

3. Hydrological Investigation, Terrain Analysis and Impact Assessment, Proposed Industrial Subdivision Report. Lots 26 & 27 Concession VI, Geographic City of Gloucester, City of Ottawa, Ontario, dated December 2008, and prepared by Golder Associates.

4. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, and received on March 9, 2009, with response to MOE letter of information request dated February 4, 2009.

5. Application for a Provisional Certificate of Approval for Waste Disposal Site - Organics Composting Facility - Orgaworld Canada Ltd., dated June 2008, prepared by Conestoga-Rovers and Associates of Waterloo.

6. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated February 17, 2009, with response to MOE letter dated February 2, 2009.

7. Email from Tej Gidda, P. Eng., Ph. D., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated March 21, 2009, in agreement with Spill Contingency and Pollution Prevention Plan.

8. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated April 9, 2009, with response to MOE letter dated March 25, 2009.

9. Letter from Jennifer L. Boyer, M.Sc., B.E.S., of South Nation Consercation to Mike Schmidt of the City of Ottawa, dated May 26, 2009, with final review of the SWM Report for the Tomilson/Hawthorne Industrial Park subdivision.

10. Letter from Ron Cherkewski, P.Eng. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 1, 2009, with response to MOE letter dated May 11, 2009.

11. Letter from Francois La Forge, P.Eng., of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated June 30, 2009, with the proposed Groundwater/Surface Water Monitoring Program.

12. Letters from Tej Gidda, P. Eng., Ph. D. of Conestoga-Rovers & Associates to Edgardo Tovilla, P.Eng. of the MOE, dated July 17, 20 & 23, and August 21, 2009, with response to information requested on June 8, 2009, and final revisions to the Draft CofA.

13. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 23, 2010, with supporting information prepared by Conestoga Rovers & Associates of Waterloo.

14. Meeting minutes prepared by Conestoga Rovers & Associated, dated August 23, 2010, after meeting with the Ottawa District Office and MOE Technical Support.

15. Application for Approval of Industrial Sewage Works submitted by Henk Kaskens of Orgaworld Canada Ltd., dated March 18, 2010, with supporting information prepared by Conestoga-Rovers & Associates of Waterloo.

CONTENT COPY OF ORIGINAL

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

"*Act*" means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

"*BOD5*" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demand;

"*CBOD5*" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

"*Certificate*" means this entire certificate of approval document, issued in accordance with Section 53 of the *Act*, and includes any schedules;

"*COD*" means Chemical Oxygen Demand;

"*Director*" means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act*;

"*District Manager*" means the District Manager of the Ottawa District Office of the Ministry;

"*DOC*" means Dissolved Organic Carbon;

"*Leachate Contaminated Sewage*" means sewage collected on site that exceeds any of the the trigger parameter levels for a water quality listed in Table 2;

"*Ministry*" means the Ontario Ministry of the Environment;

"*Owner*" means Orgaworld Canada Ltd., also referred as OCL, and includes its successors and assignees;

"*Substantial Completion*" has the same meaning as "*substantial performance*" in the Construction Lien Act; and

"*Works*" means the sewage works described in the *Owner's* application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate.*

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

PART I - GENERAL

1. GENERAL PROVISIONS

(1) The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

(2) Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate.*

(3) Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate*, the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

(4) Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

(5) The requirements of this *Certificate* are severable. If any requirement of this *Certificate*, or the application of any

CONTENT COPY OF ORIGINAL

requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this certificate shall not be affected thereby.

2. EXPIRY OF APPROVAL

The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within **five (5) years** of the date of this *Certificate.*

3. CHANGE OF OWNER

(1) The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within **thirty (30) days** of the change occurring:

(a) change of *Owner;*

(b) change of address of the *Owner;*

(c) change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager;*

(d) change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager;*

(2) In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Certificate*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director.*

4. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

(1) Within **one (1) year** of the *Substantial Completion* of the *Works*, a set of as-built drawings showing the *Works* as "constructed" shall be completed and submitted by the *Owner* to the *District Manager.* These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* or at operational office of the *Owner* for the operational life of the *Works.*

(2) The *Owner* shall inform in writing to the *District Manager* when sewage from the site is transported by a licensed waste hauler for further treatment at a sewage treatment plant or to any disposal site. The *Owner* shall inform the *District Manager* of any other alternative measures for further treatment, management and disposal of sewage.

PART II - STORMWATER MANAGEMENT WORKS

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

CONTENT COPY OF ORIGINAL

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

(2) The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

(a) the Ministry's Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended from time to time by more recently published editions;

(b) the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions;

(c) the publication "Standard Methods for the Examination of Water and Wastewater" (20th edition), as amended from time to time by more recently published editions;

(3) The list of parameters and monitoring frequencies specified in subsection (1) of this Condition in respect to any parameter are minimum requirements which may, after two (2) years of operation of the *Works* in accordance with this Condition, be modified by the *District Manager* in writing from time to time.

(4) The Owner shall establish four (4) surface water stations named SW-1, SW-2, SW-3, and SW-4 as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates, and implement a long-term monitoring program for the surface water quality of Findlay Creek.

(5) The *Owner* shall retain for a minimum of **three (3) years** from the date of their creation, all records and information related to or resulting from the monitoring activities required by this *Certificate*.

6. OPERATION AND MAINTENANCE

(1) Up on commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* prepared in accordance with Condition (8) is submitted to the *District Manager* for comments and concurrance;

(2) Upon commencement of operation of the *Works*, the *Owner* shall implement all operating procedures identified in the operations manual. This manual shall include, but not necessarily be limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

(4) The *Owner* shall keep the **SWM Pond** discharge outlet sluice gate valve in **closed position** during normal operation periods.

(5) Prior to any discharge from the **SWM Pond** to the natural environment, the *Owner* shall collect grab samples from a designated sampling location at the **SWM Pond** and analyze for the parameters listed in Table 2 using the analytical protocols listed in Condition 5(2). The *Owner* shall compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed in Table 2 to identify any leachate contamination of stormwater **before allowing any discharge from the SWM Pond.**

Table 2
Trigger Parameters

Parameter	**Trigger Level** (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

(6) In the event of an exceedance of a trigger level for any trigger parameter, the *Owner* shall implement the "Spill Contingency and Pollution Prevention Plan" approved under Condition 6 (1) and identify the cause of contamination and implement remedial measures to prevent storm sewage being contaminated with leachate.

(7) After the implementation of remedial measures, the *Owner*shall ensure that the contents of the SWM pond which is still deemed to be leachate contaminated sewage is disposed of in a pre-approved manner;

(8) The *Owner*shall generate a record for each instance when leachate contaminated sewage is hauled off-site for further treatment and include in this record the date, quantity of leachate contaminated sewage, and location where it has been hauled to;

(9) Discharge of leachate contaminated sewage from the *Works*to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage;

(10) The *Owner* shall notify the *District Manager* orally, as soon as possible, and in writing within **seven (7) days** of the discharge to receiving surface water of leachate contaminated sewage. This reporting shall include but not be limited to:

(a) an assessment of the impacts – real and potential – relating to each discharge;

(b) the cause(s) of or the conditions leading to the discharge event;

(c) the analytical results of each grab sample taken prior to and during the discharge event and its comparison with the trigger parameters listed in Table 2;

(d) the estimated volume of leachate contaminated sewage discharged; and

(e) the proposed and/or completed remedial actions.

(11) The *Owner* shall maintain the water level in the detention pond at a level that ensures adequate storage is available for stormwater runoff associated with major storm events by ensuring that detained stormwater is disposed of in a timely manner to minimize the occurrence of emergency overflow during major storm events.

(12) The *Owner* shall inspect the *Works* at least once a year and, if necessary, clean and maintain the *Works* to prevent the excessive build-up of sediments and/or vegetation.

(13) The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the site and/or *Owner's* operational headquarters for inspection by the *Ministry*. The logbook shall include the following:

(a) the name of the *Works;*

(b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed;

(c) the volume of contaminated stormwater disposed off-site, the date, and the name of the receiving sewage treatment plant; and

(d) the sample monitoring results (Table 1 parameters).

(14) The *Owner* shall not store any end-product, including leaves and yard waste outdoors until the *Owner* prepares a Conditions Assessment and implementation plan approved by the *District Manager*. This Assessment and implementation plan shall include at a minimum:

(a) providing crib-bin walls or equivalent for the outdoor covered shelter structure to prevent contact between finished compost and wind-driven moisture;

(b) design of a monitoring plan with sample locations, frequency, sample type and parameters; and

(c) identification of trigger parameters and corrective actions in case of consistently exceeding these parameters.

PART III - PROCESS WATER RECIRCULATION SYSTEM

7. OPERATION AND MAINTENANCE

(1) Before the commencement of operation of the *Works*, the *Owner* shall ensure that a "Spill Contingency and Pollution Prevention Plan" for the *Works* is prepared as per Condition (8), submitted to the *District Manager;*

(2) Up on commencement of operation of the *Works*, the *Owner* shall implement all operational procedures identified in the operation manual. The operation manual shall include, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works;*

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests

CONTENT COPY OF ORIGINAL

employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works;*

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager;*and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

(3) The *Owner*shall maintain the operations manual current and retain a copy at the location of the *Works*for the operational life of the *Works.*Upon request, the *Owner*shall make the manual available to *Ministry*staff.

PART IV - GENERAL

8. SPILL CONTINGENCY AND POLLUTION PREVENTION PLAN

(1) Upon commencement of operation of the *Works,*the *Owner*shall implement a Spill Contingency and Pollution Prevention Plan that outlines procedures as to how to mitigate the impacts of a spill within the area serviced by the works and/or prevent pollution incidents. The said plan shall include as a minimum, but not limited to:

(a) the name, job title and location (address) of the owner, person in charge, management or control of the facility;

(b) the name, job title and 24-hour telephone number of the person(s) responsible for activating the spill contingency plan;

(c) a site plan drawn to scale showing the facility, nearby buildings, streets, catchbasins & manholes, drainage patterns (including direction(s) of flow in storm sewers) and any features which need to be taken into account in terms of potential impacts on access and response (including physical obstructions and location of response and clean-up equipment);

(d) steps to be taken to report, contain, clean up and dispose of contaminants following a spill;

(e) a listing of telephone numbers for: local clean-up company(ies) who may be called upon to assist in responding to spills; local emergency responders including health institution(s); and MOE Spills Action Centre 1-800-268-6060;

(f) Materials Safety Data Sheets (MSDS) for each hazardous material which may be transported or stored within the area serviced by the works;

(g) the means (internal corporate procedures) by which the spill contingency plan is activated;

(h) a description of the spill response and pollution prevention training provided to employees assigned to work in the area serviced by the works, the date(s) on which the training was provided and to whom;

(i) an inventory of response and clean-up equipment available to implement the spill contingency plan, location and, date of maintenance/replacement if warranted; and

(j) the date on which the contingency and pollution prevention plan was prepared and subsequently, amended.

(2) The Spill Contingency and Pollution Prevention Plan shall be kept in a conspicuous place inside the building and in the close vicinity of the truck loading/unloading area.

(3) The Spill Contingency and Pollution Prevention Plan will be amended from time to time as needed by changes in the

CONTENT COPY OF ORIGINAL

operation of the facility or to reflect the City of Ottawa's municipal By-Laws updates or improved Best Management Practices by the *Owner*.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

(1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

(3) Within **sixty (60) days** of the issuance of this Certificate, the *Owner* shall:

(a) complete an assessment of the groundwater quality for each stratrigraphic unit:

(b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and

(c) submit to the *District Manager* for review and concurrence.

(4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

(5) The Owner shall have the samples collected pursuant to subsection (2) filtered and analyzed for Alkalinity, Colour, Iron, Manganese, Cadmium, Molybdenum, Zinc, Petroleum Hydrocarbons fractions, Anthracene, arsenic, E.Coli, feacal coliforms, total coliforms, Total Disssolved Solids (TDS), DOC, turbidity, pH, CBOD5, temperature, using the analytical protocols listed at Condition 5 (2).

(6) The Owner shall measure the water level elevation in each of the monitoring wells identified in subsection (1) and (2) at the time of collection of water samples pursuant to subsections (4).

(7) The measurement frequencies specified in subsection (4) in respect of any parameter are minimum requirements which may, after **two (2) years** of operation of the Works, be modified by the *District Manager* in writing from time to time.

(8) After **two (2) years** of operation of the *Works*, the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

10. REPORTING

(1) **One (1) week** prior to the start up of the operation of the *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start up date.

(2) The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

(3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the

CONTENT COPY OF ORIGINAL

period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the Owners their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate.*

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to the approved works and to ensure that subsequent owners of the *Works* are made aware of the *Certificate* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

5. Conditions 5 and 9 are included to enable the *Owner* to evaluate and demonstrate the performance of the *Works,* on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Certificate* and that the *Works* does not cause any impairment to the receiving watercourse.

6. Conditions 6, 7 and 8 are included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the owner and made available to the *Ministry.*

7. Condition 10 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Certificate,* so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 7032-88XPRA issued on September 7, 2010.

CONTENT COPY OF ORIGINAL

written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 30th day of May, 2011

Sherif Hegazy, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

KD/
c: District Manager, MOE Ottawa.
Ron Cherkewski, Conestoga-Rovers & Associates.

Appendix B
Background Correspondence

Appendix B.1
Compliance and Trigger Level Program Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/28	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Recommended Compliance and Trigger Level Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline a recommended groundwater Compliance and Trigger Level Program (TLP) for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Facility) located at the 5123 Hawthorne Road, Ottawa, Ontario (Site). The TLP has been developed to satisfy Condition 9(8) of the Environmental Compliance Approval (Industrial Sewage Works No. 7251-8GKRPD) (ECA) for the Site and is being submitted in support of an application to amend the ECA. The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

The following Section discusses the results of previous assessments of groundwater compliance and trigger level assessments for the Site. A recommended TLP for the Site is presented in Section 3.0.

2.0 Background

The OCL Site is approximately 10 hectares in area and is situated in the southwest corner of the Hawthorne Industrial Park (HIP) subdivision, which covers an area of approximately 80 hectares. Since the early/mid 1990's, the HIP subdivision has historically received excess fill materials from various construction and demolition projects, which is understood to consist primarily of clean soil with some concrete debris and reclaimed asphalt pavement and aggregate materials, and has also been intermittently used for temporary storage of various construction related materials. The area surrounding the HIP subdivision has a number of mineral aggregate extraction operations in place (south-east, west, and north-west of HIP), some of which are still active. The OCL Site was also subject to mineral aggregate removals prior to Facility development by OCL. Given the historic and ongoing land uses around the subject Site, there is the potential for soil, groundwater, and surface water quality impairment related to the various past activities.

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

As part of the ECA development for this Site, the MOE requested a groundwater monitoring program be implemented to ensure that the proposed operation of the OCL Facility does not adversely affect the surrounding environment (there are concerns for downstream agricultural users of the shallow/surface water regime, and for the deeper-aquifer which supplies potable water to a number of nearby properties). The purpose of the groundwater monitoring program is to evaluate the potential impact of OCL activities on the groundwater and surface water quality; regular monitoring allows for the analysis of trends over time and ensures there is an early warning of potential problems.

Previous assessments of groundwater quality at the Site have identified pre-existing groundwater quality as an obstacle to developing a functional TLP for groundwater in the current Site context. Historical backfill material used on Site, as well as historical and surrounding land uses have resulted in highly variable groundwater quality. For this reason, typical assessments using generic water quality standards as the basis for assessing compliance at the Site boundary do not provide meaningful indications of the effects of Facility operations on groundwater quality.

Condition 9(3b) of the ECA requires the development of criteria in accordance with MOE Guideline B-7 (Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities). CRA initially completed an assessment of on-Site water quality in accordance with the Reasonable Use Concept in a memo to Tracy Hart of the MOE dated February 5, 2010. Assessments of water quality provided in Annual Monitoring Reports following submission of the February 5, 2010 memo concluded that the application of the Reasonable Use Concept at the downgradient property boundary is irrelevant due to the presence of numerous parameters elevated above generic standards in background water quality. As such, the Site-specific criteria calculated using the Reasonable Use Concept are not considered appropriate for evaluating Site compliance.

A groundwater trigger level assessment that used intra-well baseline data was provided in the 2012 Annual Monitoring Report for the Site. This type of assessment can be useful for identifying potential increases in groundwater quality impacts by comparing current data to statistically-based upper tolerance limits (UTLs) developed from historical data at individual wells. However, the use of trigger levels based on intra-well baseline UTLs is not considered appropriate for the Site for the following reasons:

1. There is insufficient pre-start-up data to provide statistically valid intra-well baseline data.
2. The intra-well baseline method does not account for the movement of pre-start-up water quality impacts from one portion of the Site to another. Based on the highly variable water quality on-Site prior to start-up of Facility operations, this could yield false triggers in downgradient on-Site monitoring wells.

3.0 Recommended Compliance and Trigger Level Program

For the purposes of assessing potential groundwater quality impairments related to the activities approved under the ECA, comparison of post-start-up data to pre-start-up data provides a useful comparison. Water quality data from pre-start-up monitoring demonstrated considerable variability within the shallow unconfined aquifer across the Site. This pattern is consistent with variable pre-existing sources of water

quality impacts upgradient and/or on-Site. Some sources of water quality impacts un-related to the Facility operations include: current and historical quarrying operations located upgradient of the Site, historical backfill materials used for grading at the Site, and various other current and historical industrial and agricultural activities in the vicinity.

Therefore, in consideration of the variable water quality pre-existing Facility operations, it is recommended that the aggregate Site-wide pre-start-up water quality data be used as the basis for establishing groundwater trigger levels for the shallow unconfined aquifer. The pre-start-up data is all data collected from shallow unconfined aquifer monitoring wells between July 2008 and January 2010. By using an appropriate statistical representation of the overall pre-existing water quality, the trigger levels will provide indications of new water quality impairments, not related to historical activities. This method will reduce the potential for trigger levels being exceeded at specific on-Site monitoring locations due to the migration of pre-existing water quality impairments within the Site boundaries.

It is recommended that the groundwater trigger level program focus on a reduced set of parameters that reflect the sources of potential impact from on-Site activities. These parameters will thus act as surrogates for Site-related water quality impacts. Based on a review of water quality data for the Site and the known sources of impact associated with organic waste processing, the trigger level program should include the following trigger parameters: ammonia, phosphorus, dissolved organic carbon, nitrate, iron, manganese, alkalinity and E. coli.

Ammonia, phosphorus, dissolved organic carbon; nitrate and E.coli are all direct indicators of groundwater quality impacts associated with the discharge of organic waste-related contaminants to the subsurface.

Alkalinity is a suitable indicator as it will increase in groundwater where biological consumption of dissolved organic carbon results in an increase in dissolved carbon dioxide. The increase in dissolved carbon dioxide results in the dissolution of carbonate from natural geologic materials within the aquifer and a corresponding increase in total alkalinity.

Iron and manganese concentrations typically increase in groundwater impacted by organic waste due to the alteration of redox conditions within the groundwater. The biological breakdown of dissolved organic matter consumes dissolved oxygen and related oxygen sources in groundwater and creates reducing conditions. Where conditions are reducing, naturally-occurring iron and manganese oxides within the geologic material are reduced to more soluble forms, which results in an increase in dissolved iron and manganese concentrations.

Shallow Unconfined Aquifer

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the shallow unconfined aquifer. The trigger levels are based on the 95% UTLs for aggregate pre-start-up groundwater data in the shallow unconfined aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	4.0 mg/L
Phosphorus	7.2 mg/L
Dissolved Organic Carbon	34.6 mg/L
Nitrate	1.3 mg/L
Iron	48.3 mg/L
Manganese	17.1 mg/L
Alkalinity	633 mg/L
E. coli	25.6 CFU/100mL

Deep Bedrock Unit

Insufficient pre-start-up water quality data is available to calculate UTLs on this basis for the bedrock aquifer. As an alternative, 95% UTLs have been calculated for the available data for TW-7, as this well is located in an upgradient position relative to Facility operations.

The following table provides the recommended trigger levels for the above-referenced trigger parameters for the bedrock aquifer. The trigger levels are based on the 95% (UTL) for upgradient (TW-7) groundwater data in the bedrock aquifer. The UTLs were calculated using methods that were appropriate for the observed parameter-specific data distribution (e.g. parametric-gamma, non-parametric, etc.).

Parameter	*Trigger Level*
Ammonia	0.2 mg/L
Phosphorus	0.5 mg/L
Dissolved Organic Carbon	18.4 mg/L
Nitrate	0.5 mg/L
Iron	10.6 mg/L
Manganese	2.1 mg/L
Alkalinity	996 mg/L
E. coli	5.0 CFU/100mL

A pumping test completed in 2008 within the deep bedrock unit as part of the Phase II ESA confirmed that the shallow unconfined aquifer and the deep bedrock unit are not hydraulically connected. For this reason, any exceedances of the above-referenced trigger levels for the deep bedrock unit should be reviewed in conjunction with other monitoring data to assess whether or not the exceedances are related to Facility operations. It is unlikely that Facility operations will affect deep bedrock unit water quality.

Trigger level program - Tiers

The TLP should be implemented using a series of three Tiers to verify the results and direct potential contingency implementation. The following paragraphs describe the three Tiers recommended to be included as part of the TLP.

Tier I – Routine Monitoring and Trigger Locations

Tier I monitoring involves the sampling of all on-Site groundwater monitoring wells at the frequency prescribed in the Site environmental monitoring program. All groundwater monitoring activities completed at the Site will be considered Tier I monitoring unless two or more trigger parameters exceed their respective trigger levels in a single sample.

Groundwater monitoring will be conducted at the Site, as follows:

- Tri-annually (three times per year) at MW101-13, MW102-09, MW104-13, MW105-09, MW5-09, MW106-15*
- Semi-annually (twice per year) at all remaining overburden and bedrock monitoring wells, respectively MW1-08, MW2-08, MW3-08, MW4-09, and MW103-09

*-Not yet installed

Tier II – Confirmation Monitoring

If during a single monitoring event, two or more trigger parameter concentrations exceed the established Tier I trigger concentrations at a single trigger location, the Tier II Confirmation Monitoring program will be implemented. The Tier II Confirmation Monitoring program consists of collecting water quality samples in duplicate from the location exhibiting the Tier I exceedance during the next scheduled monitoring event in order to confirm the Tier I exceedance of the two or more trigger parameters. If the concentrations reported in the duplicate samples return to below their respective trigger levels, then Tier I monitoring will resume.

If the Tier I exceedance is confirmed, then the next step in the Tier II Confirmation Monitoring program will be to re-evaluate the degree, nature, and potential source(s) of trigger level impact(s) identified in Tier I. The implications of the exceedances in terms of the potential for impacts to downgradient off-Site water users should be given consideration in the evaluation.

The comparison of the observed water quality to generic criteria, the applicable regulatory compliance framework, the pre-existing water quality, and downgradient use of groundwater will dictate the timing and urgency of response. The comparison should also include parameter trend analyses over time and the contributions of sources of impact other than the Facility. If the Tier II Confirmation Monitoring program and subsequent evaluation indicate that Facility operations are having a detrimental effect on water quality migrating off-Site, then Tier III - Contingency Measures will be implemented.

Tier III – Contingency Measures and Compliance Monitoring

The Tier III portion of the TLP involves assessment and implementation of contingency measures in the event of imminent off-Site groundwater quality impairment. Contingency measures to be evaluated would include extraction of impacted groundwater and/or surface water for on-Site treatment or off-Site disposal, or acquisition of groundwater rights and registration of a contaminant attenuation zone on title of adjacent lands.

Tier III also includes ongoing monitoring to continually assess the effectiveness of any contingency measures that have been implemented. The Tier III compliance monitoring program details would be determined in conjunction with the development and implementation of preferred contingency measure(s). The compliance monitoring parameters, locations and monitoring frequency would be determined at the time of implementation of contingency measures.

Appropriate remedial alternatives should be evaluated in detail after exceedances are confirmed. As the nature of potential future water quality issues cannot be known in advance, it is not practical to develop remediation plans that will necessarily best suit the particular situation in the event of water quality impairment.

4.0 Closing

It is recognized that using pre-existing water quality data as the basis for the groundwater trigger level program will not necessarily provide an effective measure of the potential for off-Site migration of adverse water quality, as it relates to adjacent water uses. For this reason, it is necessary that evaluations of water quality included within the Annual Monitoring Reports take into consideration the potential for impairment of downgradient water quality uses, regardless of the nature of the source of the impact (off-Site sources, Facility operations, historical impacts, etc.).

As such, evaluations of the shallow unconfined aquifer should compare water quality adjacent to surface water courses to the Provincial Water Quality Objectives (PWQOs) to assess the potential effects of shallow groundwater discharging to surface. Evaluations of deep bedrock groundwater should compare water quality to the Ontario Drinking Water Quality Standards (ODWQSs).

Ministry of the Environment
and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action
en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

MEMORANDUM

January 3, 2017

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

MINISTRY OF THE ENVIRONMENT
JAN 11 2017
OTTAWA

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
2015 Groundwater and Surface Water Monitoring Report
Trigger Level Program
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the above noted report signed by Conestoga Rovers & Associates March 31, 2016 describing groundwater impacts related to the Orgaworld Organics Facility in Ottawa. The report also provides the Trigger Level Program (TLP) to protect groundwater from the impact of this new facility.

The consultant provides an assessment of the physical hydrogeology of the site. A shallow aquifer exists at the bedrock overburden interface. Water level monitoring has confirmed the inferred groundwater flow direction in the upper unconfined aquifer is to the east with some level of limited discharge to ditches located along the north site boundary. The Surface Water Unit should review this report as groundwater that does not meet Provincial Water Quality Objectives for ammonia may at times discharge to these ditches.

A deep aquifer exists in sandstone. Based on in-situ hydraulic testing the consultant has deemed there is no hydraulic connection between the deep aquifer and the unconfined shallow aquifer. Inferred groundwater flow in the deep aquifer is to the west. Contaminants of concerns identified are ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater quality mapping of ammonia, DOC, iron and manganese confirm that a plume extends in the shallow aquifer northeastward, originating in and around the northeast corner of the Organic Composting Facility. Some impacts have been detected in the deep aquifer.

A TLP has been proposed recognizing that past site activities and up gradient water quality issues exist and that an alternative method has been developed to assess the net impact of this new facility, bearing in mind that groundwater impairment must not occur. I have reviewed the proposed TLP and find it is acceptable to me.

I find the monitoring program rationalization acceptable to me.

In general, I agree with the conclusion and recommendations made by the consultant. Current remediation efforts must continue to improve groundwater quality at all down gradient monitoring wells relative to facility start up and any additional work as per the TLP. If a Tier III trigger is reached I should be consulted.

Robert W. Holland, P.Geo.
RWH/dv

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

Appendix B.2
Monitoring Program Rationalization Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Oxford Street, Waterloo, Ontario, Canada N2L 1C5
Telephone: 519 884 0510 Fax: 519 884 0525
www.craworld.com

MEMORANDUM

TO:	Ministry of Environment and Climate Change	REF. NO.:	045804
FROM:	Ben Kempel/Tej Gidda/mg/27	DATE:	February 27, 2015
CC:	Ben Constable, CRA Michael Rooke, Orgaworld		
RE:	**Proposed Monitoring Program - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates has prepared this memorandum to outline the proposed groundwater and surface water monitoring programs for the Orgaworld Canada Ltd. (OCL) organic waste processing facility (Site) located at 5123 Hawthorne Road, Ottawa, Ontario. This memorandum has been prepared in support of an application to amend ECA No. 9465-7NVRWT (Industrial Sewage Works). The application is being submitted for the purpose of incorporating a groundwater TLP and revised groundwater and surface water monitoring programs into the ECA.

1.1 Current Monitoring Program

The current monitoring program for the Site is defined in the above-referenced ECA and includes hydraulic monitoring and sampling at 11 groundwater monitoring well locations within the shallow unconfined aquifer and 3 groundwater monitoring wells in the deep bedrock aquifer unit. The monitoring program also includes sampling at 4 surface water locations. The following locations are currently sampled on a semi-annual basis (twice per year):

Unconfined Shallow Aquifer	*Deep Bedrock Aquifer*	*Surface Water*
MW1-08	TW-4	SW-1
MW2-08	TW-7	SW-2
MW3-08	TW-8	SW-3
MW4-08		SW-4
MW4-09		

ISO 9001

The following locations are sampled on a quarterly basis.

Unconfined Shallow Aquifer
MW5-09
MW101-13
MW102-09
MW103-09
MW104-13
MW105-13

The current analytical parameter list for the Site, as per the Site's Environmental Compliance Approval (ECA No. 7251-8GKRPD, as amended) consists of selected general chemistry, bacteriologic components, metals, petroleum hydrocarbons (PHCs), and polycyclic aromatic hydrocarbons (PAHs).

A complete summary of the current monitoring program is provided in Table 1.

2.0 Proposed Monitoring Program

Based on the results of monitoring completed to date, there is sufficient data collected to warrant reductions in the monitoring program. The reductions in monitoring include changes in monitoring frequency at selected locations and removal of several analytical parameters from the list of analytes. The following sections discuss the proposed changes to the monitoring program.

2.1 Monitoring Frequency

A significant amount of monitoring data has been collected to date for the on-Site monitoring wells. The monitoring data has allowed for a comprehensive understanding of the spatial and temporal patterns in groundwater quality. As groundwater quality is generally well understood, it is recommended that monitoring frequency be reduced at selected locations.

During recent monitoring years, field staff has been unable to complete the winter monitoring event during February due to frozen monitoring wells. For this reason, it is recommended that the winter (February) monitoring event be removed from the monitoring program. Three monitoring events (spring, summer, and fall) should be maintained per year at locations where detailed groundwater monitoring is suitable.

The following table summarizes the recommended groundwater monitoring frequency.

Location	*Current Sampling Frequency*	*Proposed Sampling Frequency*	*Unit*	*Trigger Well*
MW101-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW102-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW103-09	Quarterly	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW1-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW2-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes
MW3-08	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW4-09	Semi-Annual	Semi-Annual	Unconfined Shallow Aquifer	Yes+
MW5-09	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW104-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW105-13	Quarterly	Tri-Annual	Unconfined Shallow Aquifer	Yes
MW106-15	NA	Tri-Annual	Unconfined Shallow Aquifer	Yes
EW107*	NA	Tri-Annual	Unconfined Shallow Aquifer	No
TW-4	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-7	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No
TW-8	Semi-Annual	Semi-Annual	Deep Bedrock Aquifer	No

*- Not yet installed
+ - Upgradient well
NA – Not applicable

As indicated in the above table, the recommended changes to the monitoring program include:

- Reduction of monitoring from quarterly to tri-annual (three times per year) at selected locations
- Reduction of monitoring from quarterly to semi-annual at MW103-09. This location is located away from verified sources of impact and semi-annual monitoring will provide adequate water quality data at this location.

It should be noted that the monitoring frequency specified above is consistent with the monitoring frequency proposed in the updated TLP.

Groundwater monitoring well (MW106) and extraction well (EW107) have not yet been installed, but are scheduled for installation prior to the spring 2015 monitoring event. These wells should be incorporated into the monitoring program at the monitoring frequency specified above, following installation.

Surface water sampling is currently conducted at two upstream locations: SW1-09 and SW2-09. The analytical results have generally been consistent between these two locations. As there are no Site-related sources of impact between SW-1 and SW-2, it is recommended that sampling at SW-1 be discontinued. As such, surface water quality monitoring should continue semi-annually at locations SW2-09 and SW3-09. SW4-09 should continue to be sampled on a monthly basis (when weather conditions permit safe sampling at this location).

2.2 Monitoring Parameters

The existing monitoring program includes sampling of groundwater and surface water for PHC and PAH parameters. The results of PHC and PAH analyses have demonstrated largely non-detect results for the majority of these parameter lists. The sporadic detections of PHCs or PAH parameters have been inconsistent and at very low concentrations often just above the detection limits. In addition, similar infrequent low-level detections have also been reported at background monitoring locations. Therefore, it is likely that any detection of PHCs or PAHs parameters are the result of background conditions and/or related to fill materials historically used in the vicinity of the Site. Thus, PHCs and PAHs are not considered useful in evaluating groundwater and surface water for potential environmental impacts related to Site operations.

It is recommended that PHCs and PAHs be removed from the current monitoring parameter list.

The recommended monitoring program for the Site is summarized in Table 2.

TABLE 1

CURRENT MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD - OTTAWA ORGANICS FACILITY
OTTAWA, ON

Location	Field Test Parameters			Laboratory Test Parameters							Collection Method
	Water Level	Field pH, Conductivity, Temperature, Turbidity	Field Dissolved Oxygen	General Chemistry [1]	SW General Chemistry [2]	Metals [3,4]	PAHs [5]	Expanded PAHs [6]	PHC (F1 - F4)	Bacteriological Components [7]	
Surface Water Monitoring Locations (4 locations)											
SW-1		√	√	√		√	√		√	√	grab
SW-2		√	√	√		√	√		√	√	grab
SW-3		√	√	√		√	√		√	√	grab
SW-4[8]		√	√	√	√	√	√		√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)											
MW1-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW103-09	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	o	X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)											
TW-4	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	o	√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	o	√	√	low-flow (bladder pump)

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] PAHs - polycyclic aromatic hydrocarbons - anthracene, benzo(a)pyrene

[6] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[7] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

[8] Expanded PAHs - collected once per year at downgradient locations. Includes:
1-methylnaphthatlene, 2-methylnapthalene, acenaphthene, acenaphthylene, acridine, benzo(a)anthracene, Benzo(b)fluoranthene
benzo(b)pyridine (quinoline), benzo(g,h,i)perylene, benzo(k)fluoranthene, carcinogenic potency equivalent, chrysene, dibenz(a,h)anthracene
fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene,and pyrene

X Samples collected quarterly (winter, spring, summer, and fall)
√ Samples to be collected semi-annually (spring and fall)
o Samples are collected annually (typically spring)

003955

TABLE 2

RECOMMENDED MONITORING PROGRAM
MONITORING PROGRAM RATIONALIZATION
ORGAWORLD CANADA LTD., OTTAWA ORGANICS FACILITY
OTTAWA, ONTARIO

	Field Test Parameters			*Laboratory Test Parameters*				
Location	*Water Level*	*Field pH, Conductivity, Temperature, Turbidity*	*Field Dissolved Oxygen*	*General Chemistry* [1]	*SW General Chemistry* [2]	*Metals* [3/4]	*Bacteriological Components* [5]	*Collection Method*
Surface Water Monitoring Locations (4 locations)								
SW-2		√	√	√		√	√	grab
SW-3		√	√	√		√	√	grab
SW-4[6]		√	√	√	√	√	√	composite
Shallow Unconfined Water Table Unit Monitoring Locations (11 locations)								
MW1-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW2-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW3-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-08	X	√	√	√		√	√	low-flow (peristaltic pump)
MW4-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW5-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW101-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW102-09	X	X	X	X		X	X	low-flow (peristaltic pump)
MW103-09	X	√	√	√		√	√	low-flow (peristaltic pump)
MW104-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW105-13	X	X	X	X		X	X	low-flow (peristaltic pump)
MW106-15	X	X	X	X		X	X	low-flow (peristaltic pump)
Deep Bedrock Water Table Unit Monitoring Locations (3 locations)								
TW-4	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-7	X	√	√	√		√	√	low-flow (peristaltic pump)
TW-8	X	√	√	√		√	√	low-flow (bladder pump)
Groundwater Extraction Well Location (1 location)								
EW107-15	X	X	X	X		X	X	sample from discharge

Notes:

[1] General chemistry parameters - colour, alkalinity, ammonia, BOD, COD, chloride, colour, DOC, nitrate, nitrite, pH, phenols, phosphorus, sulphate, TDS, TKN, TSS turbidity, and un-ionized ammonia

[2] Additional Surface Water General Chemistry parameters analyzed at SW-4 - conductivity, oil and grease (mineral/HEM/animal and vegetable)

[3] Metals - arsenic, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, and zinc

[4] Surface water metals are total while groundwater metals are dissolved.

[5] Escherichia coli (e.coli), fecal coliform bacteria, total coliform bacteria

[6] SW4-09 is sampled by CRA field staff on a bi-annual basis and monthly by Orgaworld staff (when it's safe to do so)

X Samples to be collected tri-annually (spring, summer, and fall)

√ Samples to be collected semi-annually (spring and fall)

Appendix B.3
Groundwater Assessment and Work Plan Memorandum

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Ministry of the Environment	REF. NO.:	045804-22
FROM:	Ben Kempel/Ben Constable/mg/25	DATE:	July 16, 2014
CC:	Tej Gidda, Ron Cherkewski, Mike Rooke		
RE:	**Groundwater Assessment and Work Plan - Orgaworld Canada Ltd., Ottawa, Ontario**		

1.0 Introduction

Conestoga-Rovers & Associates (CRA) has prepared this memorandum on behalf of Orgaworld Canada Ltd. (Orgaworld) to provide the Ministry of Environment (MOE) with the results of supplementary data assessment completed on groundwater monitoring data for the Orgaworld organic waste processing facility (Facility) located at 5123 Hawthorne Road, Ottawa, Ontario (Site). The assessment has been undertaken in response to identified increases in ammonia concentrations within shallow groundwater downgradient of the Facility. The assessment has focused on monitoring data for the most recent (2013) monitoring period and included the following activities:

- 2013 Data Assessment – Ammonia (Section 2.0)
- Additional Parameters of Concern (Section 3.0)
- Groundwater Discharge to Surface (Section 4.0)
- Data Gap Analysis (Section 5.0)

CRA has prepared a work plan for further investigating and characterizing groundwater at the Site. The purpose of the additional investigation is to refine the ammonia plume delineation, improve understanding of the aquifer properties on-Site, and determine the potential receptors associated with the plume.

Orgaworld currently operates under the following Environmental Compliance Approvals (ECA's) for the Site:

- Number 7021-7HQNDE (Air), September 16, 2009
- Number 9465-7NVRWT (Industrial Sewage Works), September 16, 2009
- Number 7032-88XPRA (Industrial Sewage Works), Amended September 7, 2010
- Number 7251-8GKRPD (Industrial Sewage Works), Amended May 30, 2011
- Number 2766-7HEPSZ (Waste Disposal Site), September 16, 2009, Amended under Notice No. 1, October 21, 2010

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

Condition 9 (8) of ECA Number 7251-8GKRPD requires that Orgaworld establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Level Monitoring Program is to be submitted to the MOE along with an application to amend the ECA. Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by both existing conditions at the Site, largely comprised of historical fill materials and adjacent to quarrying activities, and potentially the Facility's operations. This work plan has been specifically designed to present results and interpretation of the historical and current data and to define steps moving ahead to address groundwater quality.

The following sections discuss the results of the assessment and describe the proposed work plan.

2.0 2013 Data Assessment - Ammonia

Interpretations of pre-2013 analytical data identified the existence of an ammonia plume within shallow groundwater originating near the eastern side of the organics composting facility and migrating to the northeast towards the Site boundary. Elevated concentrations of ammonia were originally reported in historic monitoring well MW101-09 in May 2010. Elevated ammonia concentrations were detected in monitoring wells located downgradient of MW101-09 during subsequent monitoring events. Ammonia concentrations were observed to increase within the interpreted source area (MW101-09) and downgradient Site boundary monitoring wells (MW5-09, MW102-09) through 2012. Based on a review of 2013 data, elevated ammonia concentrations are persistent within the source area and concentrations continued to increase through 2013 at the downgradient monitoring wells. The Site groundwater monitoring network is illustrated on the attached Site Plan (Figure 1).

Monitoring well MW101-09 was abandoned during 2012 due to suspicions that the well integrity may have been compromised. In addition, several new monitoring wells were installed near the interpreted source area in early 2013. The analytical results from the initial year of sampling at MW101-13 and MW104-13 confirm that elevated concentrations of ammonia exist immediately downgradient of former historic monitoring well MW101-09. The analytical results from MW105-13 show that the elevated concentrations of ammonia are also present to the northeast of MW101-09.

Figures 2 through 7 illustrate ammonia concentrations versus time for the monitoring wells within the source area and downgradient along the Site boundary. As depicted in the Figures, ammonia concentrations have demonstrated increasing trends at monitoring wells MW104-13, MW5-09, MW102-09, and MW101-13.

3.0 Additional Parameters of Concern

A comparison of the 2012 through 2013 analytical data for downgradient monitoring wells (MW5-09, MW102-09, MW1-08) located along the northern Property boundary to the Ontario Drinking Water Standards (ODWS) and upgradient water quality at MW3-08 was completed to identify additional parameters of potential environmental concern within shallow groundwater. Based on this comparison,

several general chemistry and metals parameters have been reported at concentrations above their respective ODWS criteria, and significantly elevated above upgradient levels. The following additional parameters have been identified as potential parameters of concern. The maximum reported downgradient, Site boundary concentrations and respective ODWS criteria (in brackets) are as follows:

- Iron – 7.5 mg/L (0.3 mg/L)
- Manganese – 4.8 mg/L (0.05 mg/L)
- Dissolved Organic Carbon – 12.1 mg/L (10 mg/L)
- Sulfate – 872 mg/L (200 mg/L)
- Total Dissolved Solids – 2030 mg/L (500 mg/L)

It should be noted that, similar to the trend noted for ammonia, the concentrations of the above parameters have generally demonstrated increasing trends during recent years at monitoring wells immediately downgradient of the Facility.

Figures 8 through 11 provide concentration isopleths for ammonia, dissolved organic carbon (DOC), dissolved iron, and dissolved manganese based on the median sample results from 2013 monitoring in monitoring wells completed within the shallow aquifer. Each figure illustrates the presence of elevated concentrations in the interpreted source area and downgradient towards the northern Site boundary. Elevated concentrations of iron, manganese, DOC and TDS are consistent with the interpretation that the contaminant plume is related to an organic contaminant source. As indicated on these figures, there is little known about the western extent of the plume near the northern Site boundary. The proposed work plan for addressing this data gap is discussed in Section 5.3.

4.0 Groundwater Discharge to Surface

The presence of elevated ammonia concentrations within shallow groundwater is primarily a potential concern with respect to the discharge of shallow groundwater to surface water, due to the relatively low Provincial Water Quality Objective (PWQO) for un-ionized ammonia (0.02 mg/L). As such, it is recommended that the hydraulic relationship between shallow groundwater and surface water be investigated through the installation of staff gauges and measurement of static water levels in both shallow groundwater and surface water. The work plan for addressing this investigation is discussed in Section 5.3.

5.0 Data Gap-Analysis

There is sufficient evidence to confirm that a plume exists on-Site within the shallow groundwater adjacent to and downgradient of the Facility. The available groundwater quality data suggests that the plume consists of organics-related contaminants with elevated concentrations of ammonia. As part of the data assessment, CRA completed a data-gap analysis to identify areas where important information is unavailable concerning the contaminant nature, distribution or fate.

The following sections discuss the identified data gaps and outline the proposed action items for addressing the data gaps. Completing these action items forms the basis of the proposed work plan.

5.1 Surface Water Levels

As discussed previously, elevated ammonia concentrations within groundwater can be an issue of environmental concern when groundwater discharges to surface water, as the PWQO for un-ionized ammonia is low (0.02 mg/L). As such, it is important to understand whether or not shallow groundwater discharges to surface water at the Site to determine if the elevated ammonia concentrations are entering the surface water regime.

The comparison of shallow groundwater elevations with adjacent/nearby surface water elevations during quarterly monitoring events will determine whether or not groundwater is discharging to surface. As such, a series of staff gauges will be installed within the ditch along the north side of the Site (and any other on-Site surface water features, as appropriate). These staff gauges will be surveyed for geodetic reference. Surface water elevation measurements will then be incorporated into the monitoring program during each monitoring event. These measurements will be completed for a minimum of one year in order to observe the shallow groundwater - surface water relationship in different seasons.

Recommendations concerning the potential continuation of monitoring in the ditch will be made following one year of monitoring.

5.2 Complete Topographic Site Survey

It is understood that an as-built topographical survey of the site is unavailable. Accurate comparison of ground water levels to site grades is needed to verify if groundwater is discharging to the Site's surface water bodies. As such, an up to date topographical survey will be completed so this interface can be accurately assessed. The topographic survey will also be used to verify the pond levels and the outflow levels from the site into the Hawthorne Industrial Park.

5.3 Additional Monitoring Data

Groundwater

Although the current monitoring network has adequately identified the presence of an ammonia plume, the western extent of the contaminant plume along the northern Site boundary is currently unknown. Therefore, a shallow groundwater monitoring well will be installed to the west of MW5-09, as indicated on Figure 1 to better define the western extent of the plume. The proposed monitoring well will be incorporated into the regular monitoring program for quarterly sampling until sufficient data is gathered to warrant a monitoring reduction.

Surface Water

As discussed in Section 5.1, four (4) surface water staff gauges will be installed within the ditch along the north end of the Site in order to measure water levels within the ditch. The staff gauges will be geodetically surveyed so that measured water levels can be converted into static elevations. These static

elevations will be compared to the static groundwater elevations in adjacent groundwater monitoring wells to determine if shallow groundwater is discharging to this ditch. The proposed surface water staff gauge locations are illustrated on Figure 1.

5.4 Hydraulic Testing

In order to have a thorough understanding of the hydraulic characteristics of the shallow overburden and bedrock aquifers, additional testing of the aquifer properties will be completed along the northern Site boundary. This testing will be accomplished through single well response tests on the existing and proposed shallow groundwater monitoring wells in this area (MW5-09, MW102-09 and the proposed monitoring well).

The results of this testing will be used to better estimate the aquifer properties along the northern Site boundary.

6.0 Groundwater Remediation

In response to the identified groundwater plume, a single shallow groundwater extraction well will be installed near the ammonia scrubber. Based on the nature of the contaminants observed, the contaminant distribution and the interpreted source of leakage, the area immediately downgradient of the ammonia scrubber is considered the most suitable location for a remediation/extraction well.

The purpose of the extraction well will be to remove the most heavily impacted groundwater from the subsurface for use in the Facility process. Up to 15,000 L of groundwater can be used in the process daily. As such, this source removal strategy represents an ideal opportunity to control a significant portion of the plume without the need for treatment or trucking to a disposal facility.

7.0 Closing

It is anticipated that the installation of an additional monitoring well, a remediation/extraction well and establishment of surface water staff gauges will occur during the summer of 2014. The monitoring points will be incorporated into the regular monitoring program during the next regularly scheduled monitoring event.

The results of the above-described work program, including recommendations for next steps, will be provided to the MOE in a letter report following completion of the assessment.

We trust this to be complete and in order for your use. Should you have any questions, please do not hesitate to contact our office.

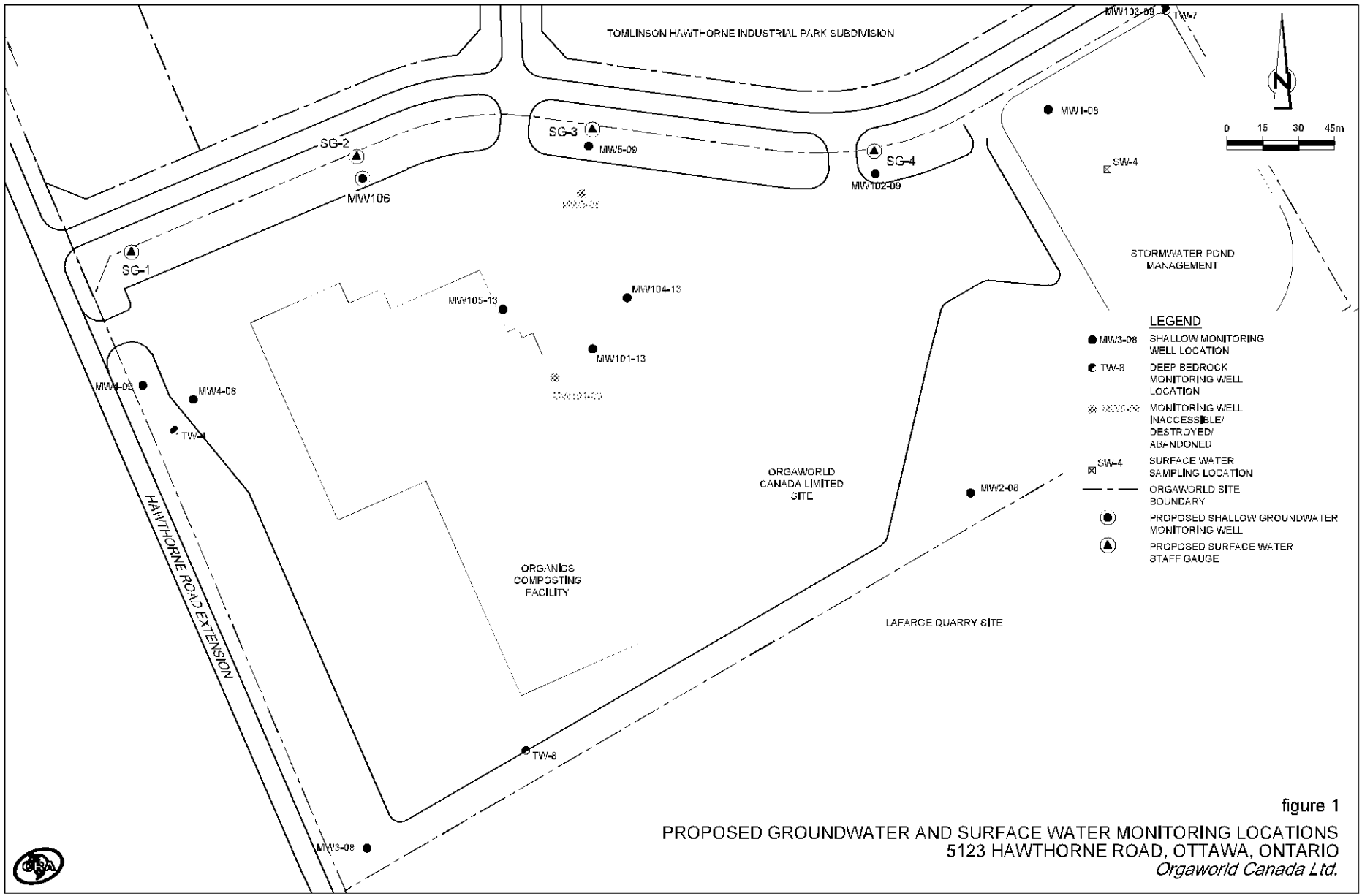


figure 1

PROPOSED GROUNDWATER AND SURFACE WATER MONITORING LOCATIONS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA005 APR 4/2014

003963

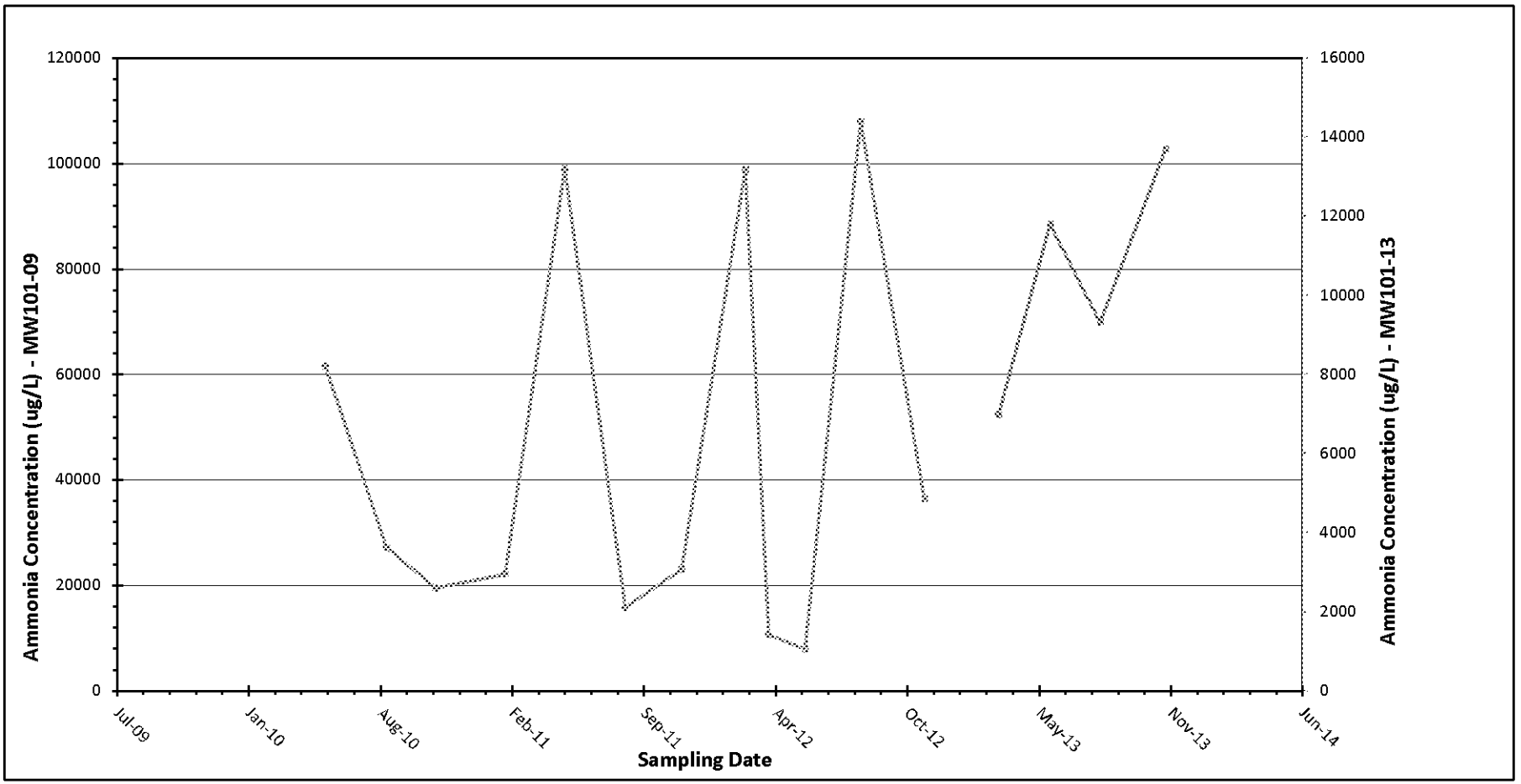


figure 2

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW101-09 AND MW101-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

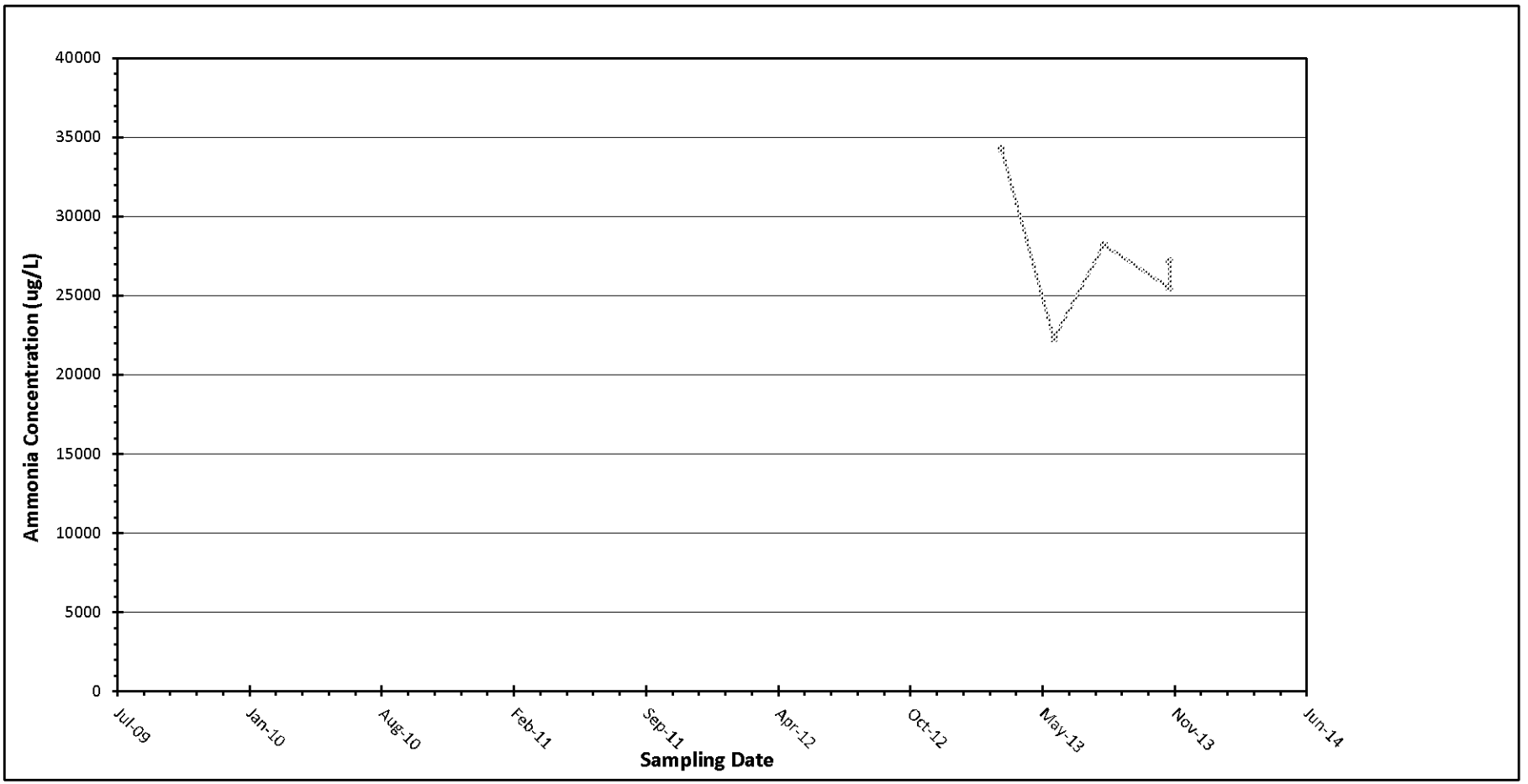


figure 3

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW105-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

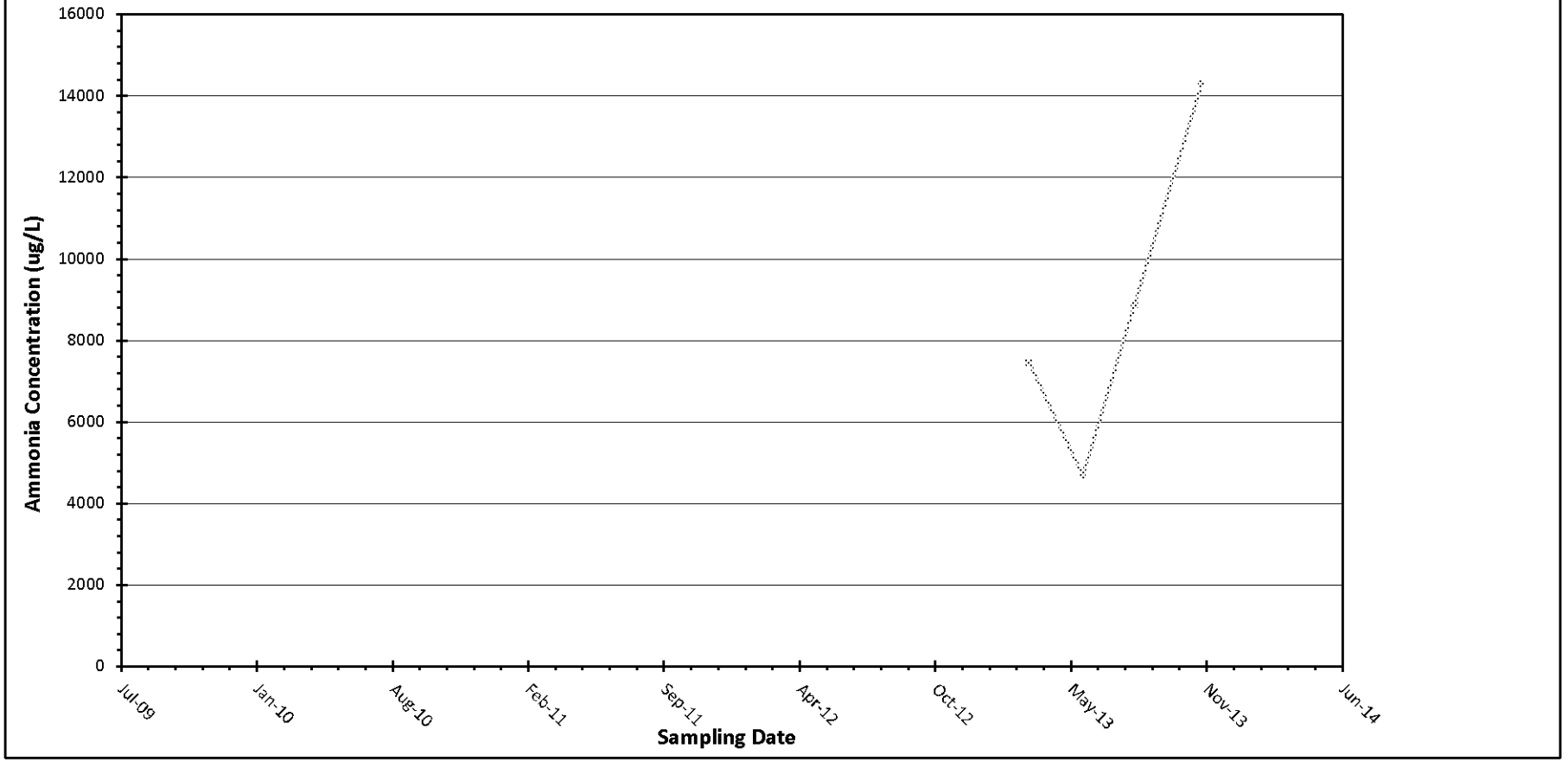


figure 4

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW104-13
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

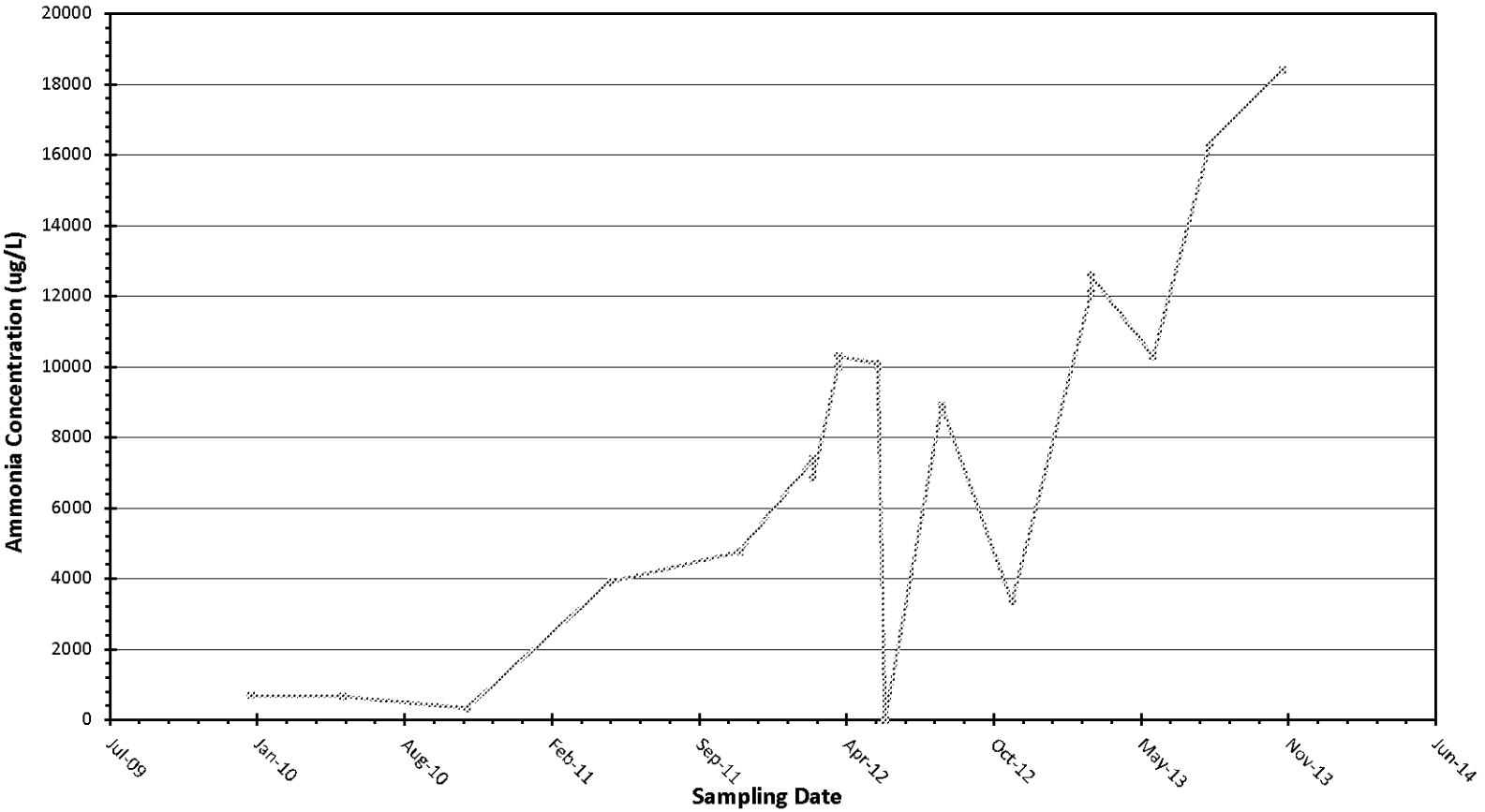


figure 5

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW5-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

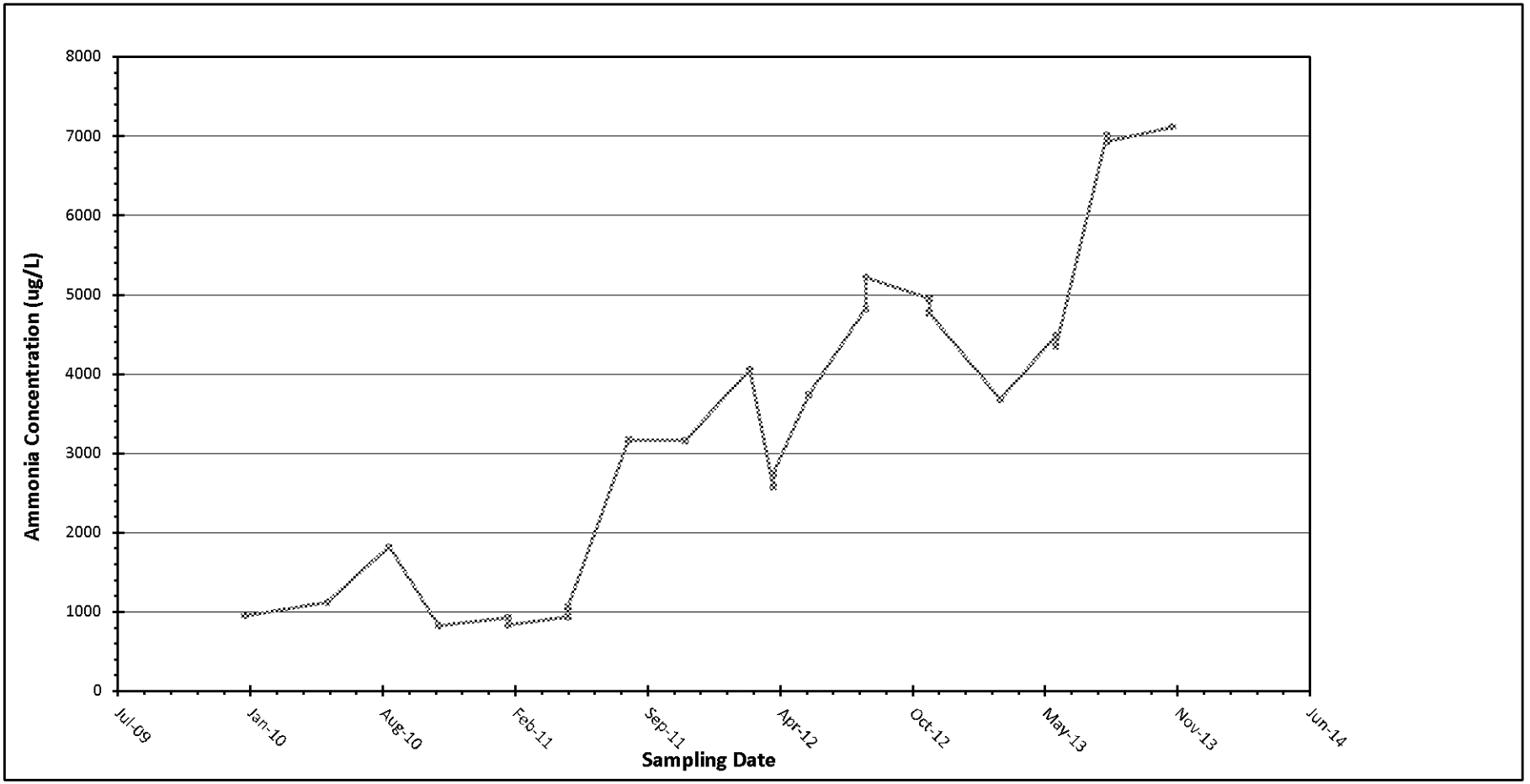


figure 6

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW102-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

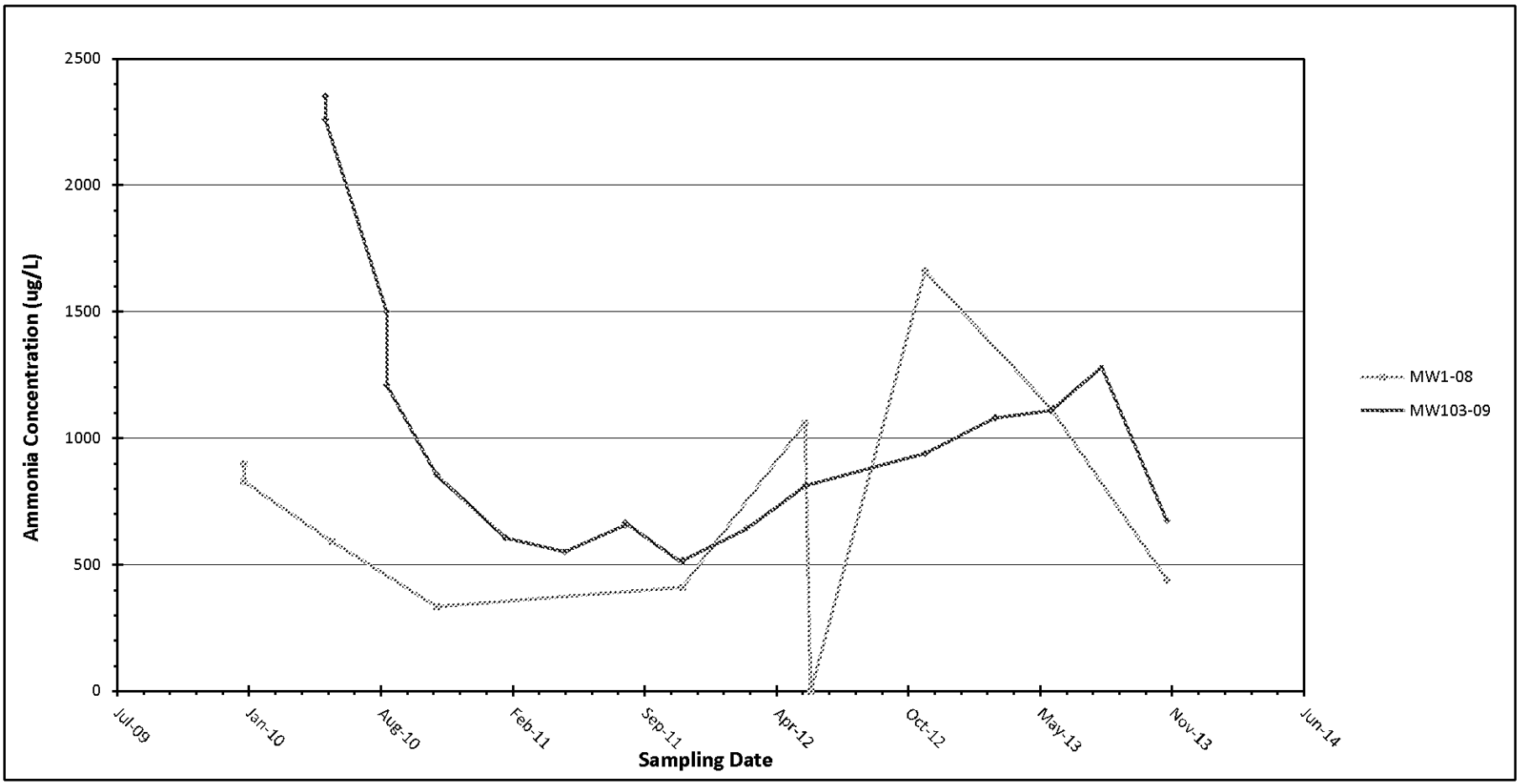


figure 7

CONESTOGA-ROVERS & ASSOCIATES

AMMONIA CONCENTRATIONS VERSUS TIME - MW1-08 AND MW103-09
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

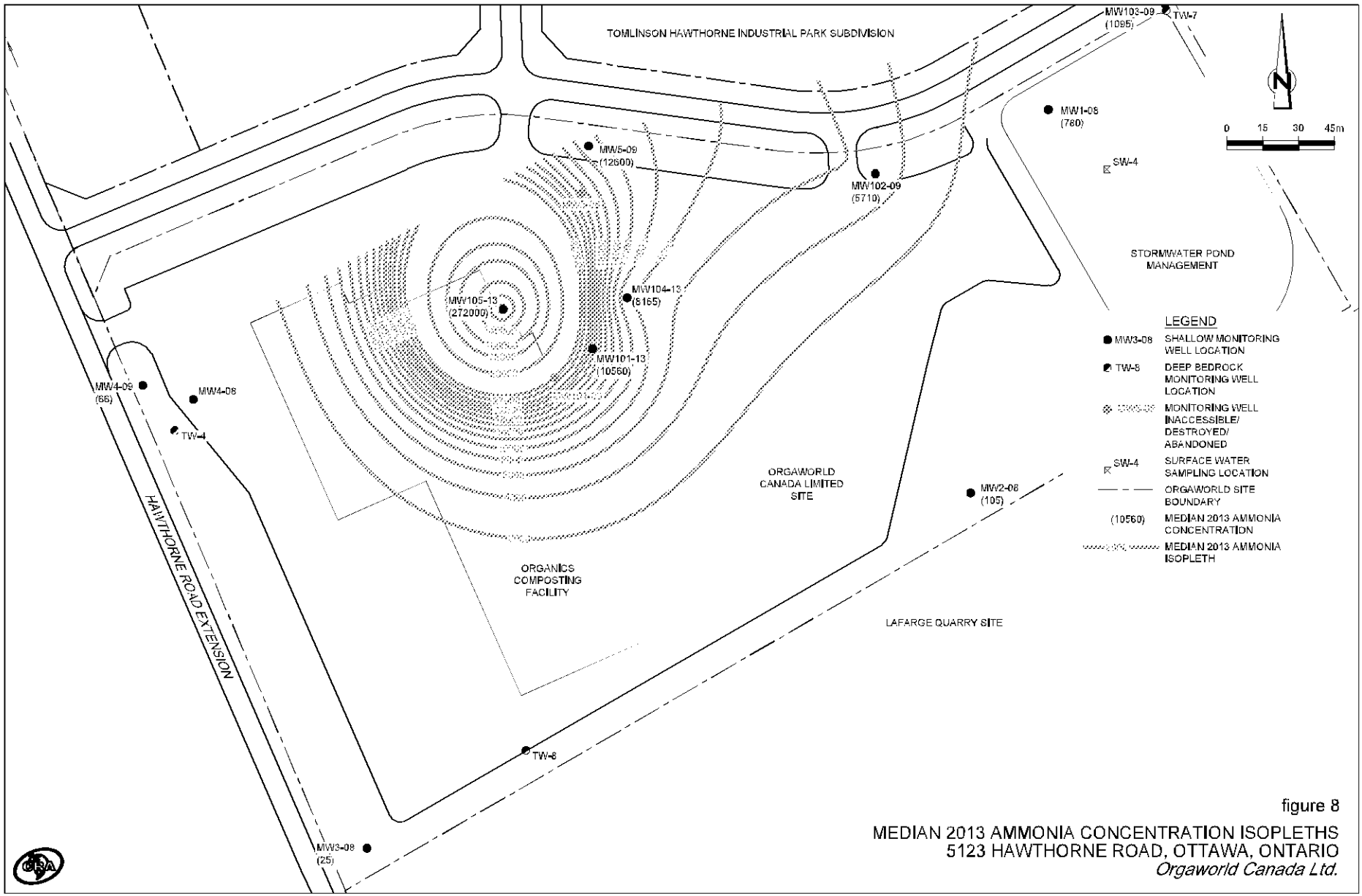


figure 8

MEDIAN 2013 AMMONIA CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA001 JULY 16/2014

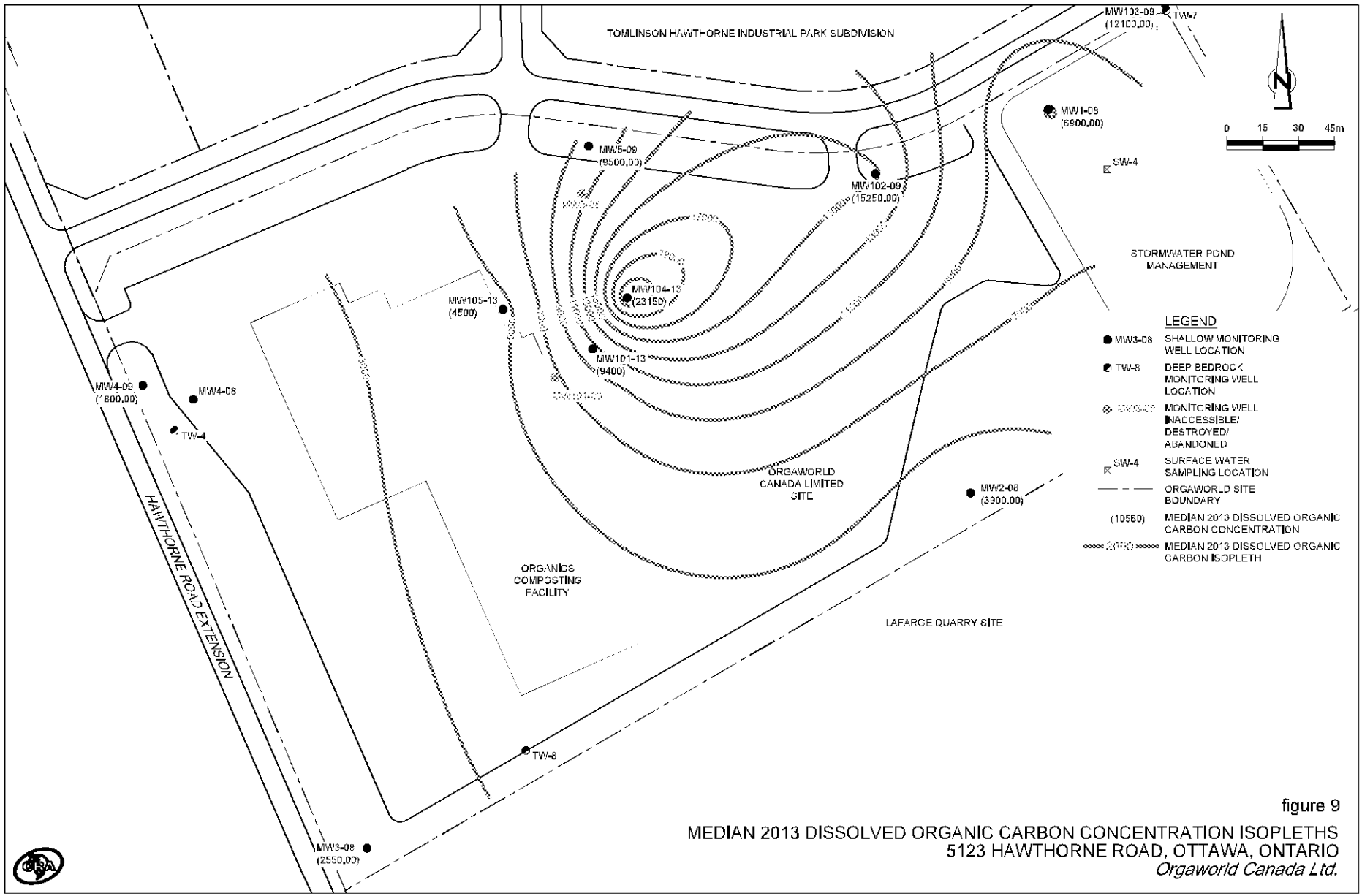


figure 9

MEDIAN 2013 DISSOLVED ORGANIC CARBON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA002 JULY 16/2014

003971

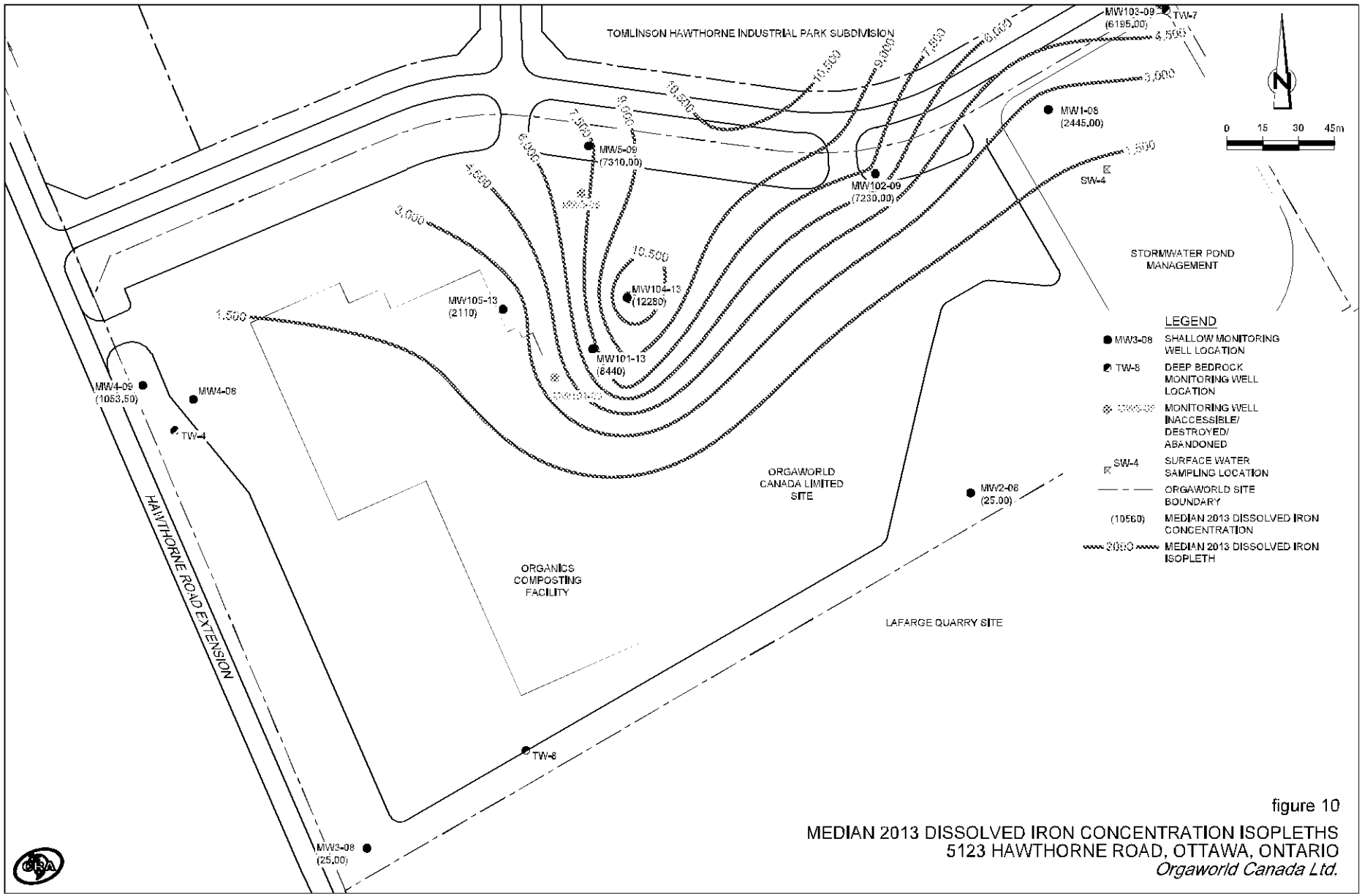


figure 10

MEDIAN 2013 DISSOLVED IRON CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA003 MAR 14/2014

003972

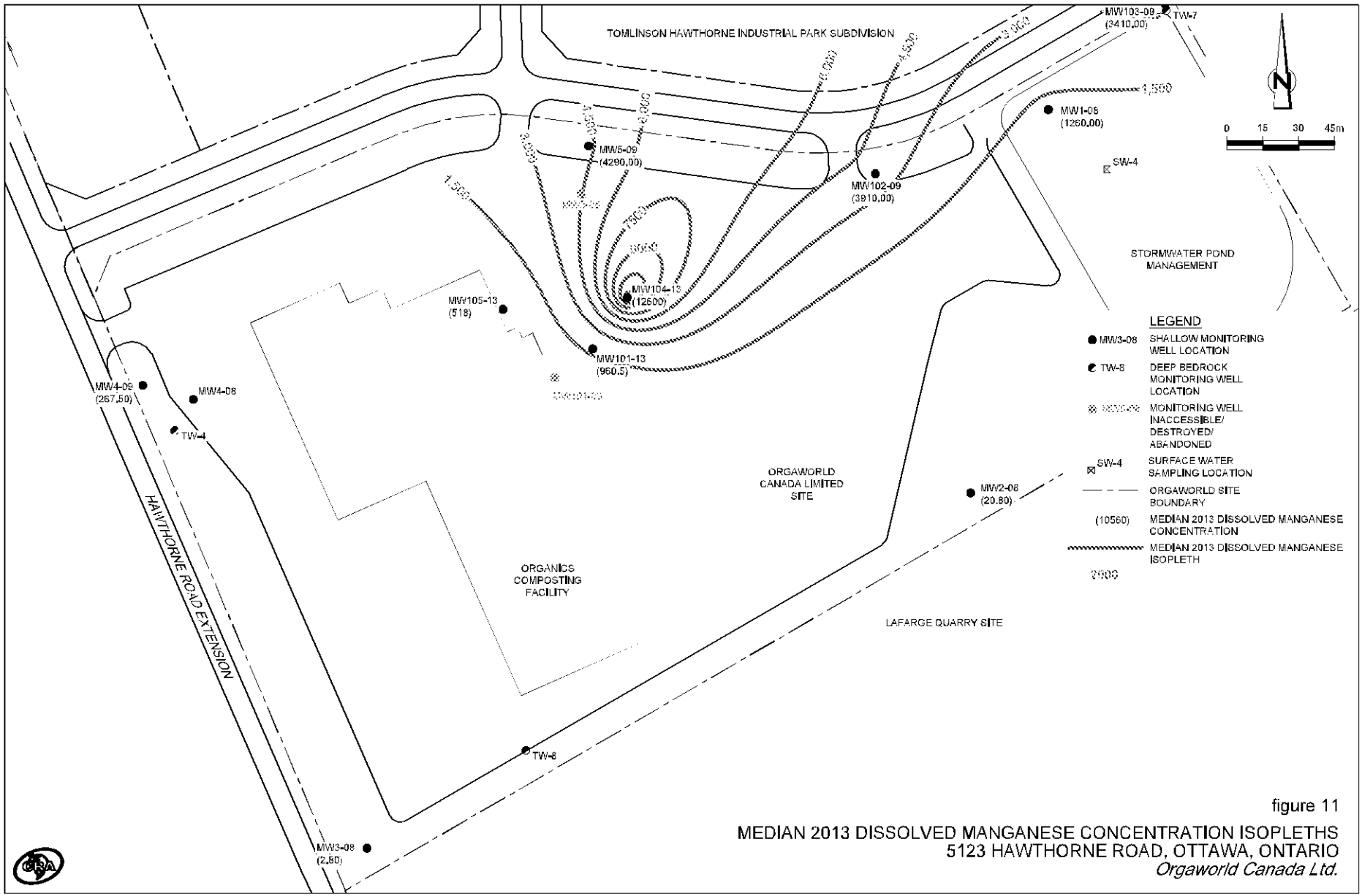


figure 11

MEDIAN 2013 DISSOLVED MANGANESE CONCENTRATION ISOPLETHS
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO
Orgaworld Canada Ltd.

45804-59(MEMO025)GN-WA004 APR 4/2014

003973

Appendix C
Stratigraphic and Instrumentation Logs

Appendix C.1
Overburden and Shallow Bedrock Stratigraphic and Instrumentation Logs

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW1-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.06 93.09 91.89						
0	OVERBURDEN - organic mat	91.74	Bentonite Hole Plug	SS1		35		0.0
1	FILL - sand and gravel with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to dense, moist		Filter Sand	SS2		27		0.0
2			Well Screen					
3	END OF BOREHOLE @ 2.97m BGS	88.92						
	Auger Refusal On Assumed Bedrock							
4								
5								
6								
7								
8								
9								
10								
11								

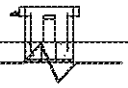
WELL DETAILS
Screened interval:
90.44 to 88.92m
1.45 to 2.97m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
91.74 to 90.75m
0.15 to 1.14m BGS
Material: Bentonite
Sand Pack:
90.75 to 88.92m
1.14 to 2.97m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	
	TOP OF CASING TOP OF RISER GROUND SURFACE	93.99 93.78 93.17						
0	OVERBURDEN - organic mat END OF OVERBURDEN HOLE @ 0.18m BGS							
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW2-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	92.93	Bentonite Hole Plug Filter Sand			
1	BEDROCK - fractured limestone, becoming sound at 0.6m BGS			RC1	94	75
2			Well Screen	RC2	100	93
3	END OF BOREHOLE @ 2.77m BGS	90.40				
4	Note: The top of the risor at MW2-08 was cut on July 29, 2008 to permit the installation of the steel protective casing. The new top of risor Elevation is 93.696m					
5						
6						
7						
8						
9						
10						

WELL DETAILS
Screened interval:
92.54 to 90.40m
0.63 to 2.77m BGS
Length: 2.13m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.02 to 92.71m
0.15 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.71 to 90.40m
0.46 to 2.77m BGS
Material: Silica Sand

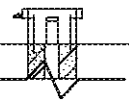
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

BEDROCK LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	104.31 104.22 103.65					
	OVERBURDEN - organic mat						
	END OF OVERBURDEN HOLE @ 0.30m BGS						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00\JULY-2008\MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	OVERBURDEN - organic mat	103.24	Bentonite Hole Plug			
	BEDROCK - fractured limestone					
1						
2						
3						
4						
5						
6						
7						
8						
9			Filter Sand			
10			Well Screen			

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW3-08
DATE COMPLETED: July 9, 2008
DRILLING METHOD: Tamroc D-1
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
12						
13						
14						
15						
16						
17						
	END OF BOREHOLE @ 17.37m BGS	86.18				
18	Borehole advanced with a Tamroc D-1 Paultera 900		WELL DETAILS Screened Interval: 101.42 to 86.18m 2.13 to 17.37m BGS Length: 15.24m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 103.24 to 102.33m 0.30 to 1.22m BGS Material: Bentonite Sand Pack: 102.33 to 86.18m 1.22 to 17.37m BGS Material: Silica Sand			
19						
20						
21						
22						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.39 96.36 95.06					
0	FILL - sand and silt with some concrete and gravel, loose, brown and moist			SS1		40	9
1	- becoming wet at 0.91m BGS			SS2			7
	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug				
2	- becoming very dense at 1.68m BGS END OF OVERBURDEN HOLE @ 1.78m BGS						
3							
4							
5							
6							
7							
8							
9							
10							
11							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (BEDROCK)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW4-08
DATE COMPLETED: July 8, 2008
DRILLING METHOD: HQ CORING
FIELD PERSONNEL: F. Laforge

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	RUN NUMBER	CORE RECOVERY %	RQD %
0	SILTY SAND TILL, with gravel, dense, brown, moist	93.84	Bentonite Hole Plug			
1	- becoming very dense at 1.68m BGS	93.28				
2	FRACTURED LIMESTONE, grey, greatest level of fracture between 1.9m to 2.4m depth		Filter Sand Well Screen	RC1	93	63
3	END OF BOREHOLE @ 2.84m BGS	92.22				
4						
5						
6						
7						
8						
9						
10						
11						
12						

WELL DETAILS
Screened interval:
93.44 to 92.22m
1.63 to 2.84m BGS
Length: 1.22m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.45 to 93.59m
0.61 to 1.47m BGS
Material: Bentonite
Sand Pack:
93.59 to 92.22m
1.47 to 2.84m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

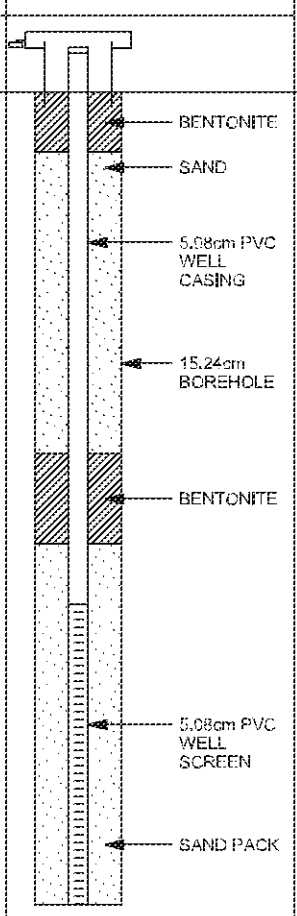
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW4-09
DATE COMPLETED: December 22, 2009
DRILLING METHOD: 10.8cm HSA / HQ
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	97.54
	TOP OF RISER	97.45
	GROUND SURFACE	96.58
0.5	FILL-SILTY SAND, with gravel, trace cobble, dense to very dense, well graded, beige to brown, moist	
1.0		
1.5	- coarse sand, wood pieces, roots at 1.12m BGS	
2.0	- wood pieces, roots at 1.75m BGS - concrete chips at 1.88m BGS	
2.5		94.29
3.0	SP-SAND, fine grained, trace silt, cobble, very dense, brown, rock shards at tip of spoon	
3.5	- REFUSAL at 3.50m BGS	93.07
4.0	BEDROCK	
4.5	END OF BOREHOLE @ 4.11m BGS	92.46
5.0		
5.5		
6.0		
6.5		

MONITORING WELL



WELL DETAILS
Screened interval.
93.99 to 92.46m
2.59 to 4.11m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.75 to 94.29m
1.83 to 2.29m BGS
Material: BENTONITE
Sand Pack.
94.29 to 92.46m
2.29 to 4.11m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		33		0.
2SS		33	11	10.0
3SS		54	86	0.1
4SS		67	55	0.2
5SS		8		0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW5-08
DATE COMPLETED: July 7, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF CASING TOP OF RISER	94.36 94.17 94.08					
0	OVERBURDEN - organic mat, wet	94.21					
	FILL - sand and silt with trace asphalt, trace concrete, trace brick, compact to dense, dark grey to black, moist		Bentonite Hole Plug	SS1		54	13
1							
			Filter Sand Well Screen	SS2		83	74
2							
				SS3		0	7
3	END OF BOREHOLE @ 2.77m BGS	91.59					
4							
5							
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
93.12 to 91.59m
1.24 to 2.77m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
94.06 to 93.42m
0.30 to 0.94m BGS
Material: Bentonite
Sand Pack:
93.42 to 91.59m
0.94 to 2.77m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

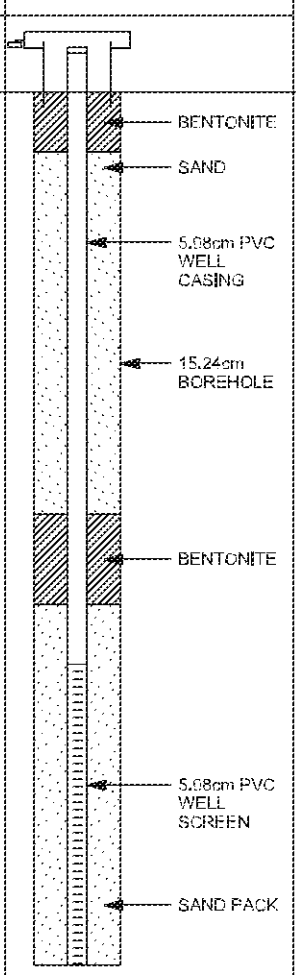
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW5-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	94.57
	TOP OF RISER	94.50
	GROUND SURFACE	93.36
0	FILL-CLAYEY SAND, with gravel, few silt, stiff, poorly graded, brown with beige laminations, moist, trace brick or red clay	
1.5	- red silty sand (or covered brick) at 1.68m BGS	
1.8	- spoon wet at 1.83m BGS	
2.5	SM-SILTY SAND, with gravel, few clay, compact, well graded, dark grey, moist, trace quartz, chert	90.92
3.5	- increasing clay, becoming wet at 3.51m BGS	
4.2	- cobble, rootmat, black at 4.24m BGS	
4.4	END OF BOREHOLE @ 4.42m BGS	88.94

MONITORING WELL



WELL DETAILS
Screened interval:
90.46 to 88.94m
2.90 to 4.42m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.28 to 90.77m
2.13 to 2.59m BGS
Material: BENTONITE
Sand Pack:
90.77 to 88.94m
2.59 to 4.42m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		54	14	0.0
2SS		54	12	0.1
3SS		29	13	0.0
4SS		71	25	0.1
5SS		25	8	0.0
6SS		29	8	0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

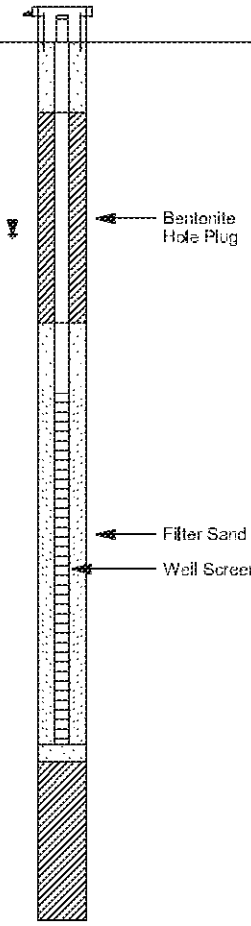
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW6-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF RISER	94.98
	GROUND SURFACE	93.83
0	FILL - (dredged sediment from adjacent settling pond), very fine sand and silt, dense, grey to brown, moist	
1	FILL - very fine sand and silt, trace clay, trace gravels, trace asphalt, trace concrete, trace organics, dense, slightly green in upper levels, brown to dark brown, black organic layer at 4.6m, moist	93.07
2		
3		
4		
5	SM - SAND with silt, very fine grained, compact, oxidized, grey to brown, moist to wet	88.26
6	SM - TILL - silty sand with some gravel, medium grained, well graded, brown, moist to wet	87.69
7		
8	END OF BOREHOLE @ 7.62m BGS	86.21
9		
10		
11		

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
90.78 to 87.73m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.22 to 91.39m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.39 to 87.58m
2.44 to 6.25m BGS
Material: Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
SS1		83	43	13.1
SS2		88		17.1
SS3		75	29	21.3
SS4		33	18	23.9
SS5		17	7	2.3
SS6		100	20	0.0
SS7		83	26	0.0
SS8		57		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

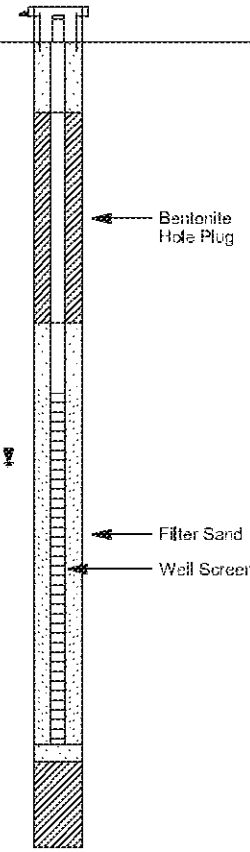
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW7-08
DATE COMPLETED: July 14, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF RISER	94.82
	GROUND SURFACE	93.81
0	FILL - silty sand with some gravel, trace asphalt, trace concrete, trace clay, compact to dense, grey to brown, moist	
4	- becoming wet at 3.65m BGS	
5	SM - TILL - silty sand with some gravel, brown, moist to wet	88.32
7	END OF BOREHOLE @ 6.98m BGS	86.83

MONITOR INSTALLATION



WELL DETAILS
Screened interval:
90.76 to 87.72m
3.05 to 6.10m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.20 to 91.37m
0.61 to 2.44m BGS
Material: Bentonite
Sand Pack:
91.37 to 87.72m
2.44 to 6.10m BGS
Material: Silica Sand

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
SS1		50	38	0.0
SS2		35		4.6
SS3		50	13	0.0
SS4		25	15	4.3
SS5		100		
SS6		42	54	0.0
SS7		50	15	0.0
SS8		100		1.5
SS9		100		0.0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS

OVERBURDEN LOG 45804-00\JULY-2008\MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW8-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER GROUND SURFACE	91.69 90.69						
0	FILL - silty sand with gravel, trace asphalt, trace concrete, compact to dense, moist		Bentonite Hole Plug	SS1		25	15	48.1
1				SS2		0		
2								
3	- trace organics, loose, black, wet at 3.05m BGS		Filter Sand Well Screen	SS3		33	39	11.7
4				SS4		17	4	4.5
				SS5		25	65	0.0
5	SM - TILL - fine sand and silt with some gravel, compact, wet	86.12 85.96		SS6		33		0.0
	END OF BOREHOLE @ 4.72m BGS							
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
86.47 to 86.42m
1.22 to 4.27m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
90.38 to 89.77m
0.30 to 0.91m BGS
Material: Bentonite
Sand Pack:
89.77 to 86.42m
0.91 to 4.27m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STATIC WATER LEVEL ▼ July 17, 2008

CHEMICAL ANALYSIS ( )

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW9-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	83.98						
	GROUND SURFACE	82.94						
0	TOPSOIL	82.79	Bentonite Hole Plug					
	SM - SILTY SAND, fine grained, loose, brown to grey, moist	82.64		SS1		75	8	0.0
1	CL - SILTY CLAY, grey, blocky, oxidized, moist, soft to very soft							
	- becoming wet, very soft and plastic at 1.52m BGS		Filter Sand	SS2		100	3	0.0
2			Well Screen					
				SS3		100		0.0
3								
	- becoming moist to dry and blocky at 3.51m BGS	79.29		SS4		100		
4	END OF BOREHOLE @ 3.66m BGS							
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.47 to 79.95m
1.47 to 3.00m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.64 to 82.08m
0.30 to 0.86m BGS
Material: Bentonite
Sand Pack:
82.08 to 79.95m
0.86 to 3.00m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS ⬭

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.3DT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 45804
CLIENT: Orgaworld Canada Real Estate Ltd.
LOCATION: Hawthorne and Rideau Road, Ottawa, Ontario

HOLE DESIGNATION: MW10-08
DATE COMPLETED: July 15, 2008
DRILLING METHOD: HSA
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF RISER	84.00						
	GROUND SURFACE	83.10						
0	TOPSOIL	82.95						
	SM - SILTY SAND, fine to medium grained, grey, compact, moist		Bentonite Hole Plug					
1	- trace clay at 0.91m BGS			SS1		83	15	0.0
	ML - SAND AND SILT, very fine grained, compact, grey, wet	81.42		SS2		50	25	0.0
2	- becoming saturated at 1.98m BGS		Filter Sand / Well Screen					
				SS3		100	27	0.0
3	END OF BOREHOLE @ 2.90m BGS	80.20						
4								
5								
6								
7								
8								
9								
10								
11								

WELL DETAILS
Screened interval:
81.73 to 80.20m
1.37 to 2.90m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
82.79 to 82.03m
0.30 to 1.07m BGS
Material: Bentonite
Sand Pack:
82.03 to 80.20m
1.07 to 2.90m BGS
Material: Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
STATIC WATER LEVEL ▼ July 17, 2008
CHEMICAL ANALYSIS

OVERBURDEN LOG 45804-00(JULY-2008)MW-OT003.GPJ CRA_CORP.GDT 3/26/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW101-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	TOP OF CASING TOP OF RISER GROUND SURFACE	96.23 96.15 95.67						
0	FILL- GRAVELLY SAND, loose, poorly graded, grey, moist	95.52	BENTONITE	1SS		58	7	0.1
0.5	FILL-GRAVELLY SAND, with silt, loose, well graded, grey, moist - pink insulation from adjacent tanks at 0.30m BGS		SAND					
1.0			5.08cm PVC WELL CASING	2SS		50	7	0.1
1.5			15.24cm BOREHOLE					
2.0			BENTONITE	3SS		25	7	0.2
2.5				4SS		29	5	0.1
3.0	- dense, becoming wet at 3.05m BGS		5.08cm PVC WELL SCREEN					
3.5			SAND PACK	5SS		25	32	0.1
	END OF BOREHOLE @ 3.66m BGS	92.01						
4.0								
4.5								
5.0								
5.5								
6.0								
6.5								

WELL DETAILS
Screened interval:
93.54 to 92.01m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
94.15 to 93.84m
1.52 to 1.83m BGS
Material: BENTONITE
Sand Pack:
93.84 to 92.01m
1.83 to 3.66m BGS
Material: #2 SAND

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW101-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE	94.96					
	TOP OF RISER	94.88					
	ASPHALT on surface	94.88					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.51					
1.0							
1.5							
2.0							
2.5	FILL - sand and gravel, compact, grey, wet	92.53	▽				
3.0							
3.5							
	SILTY SAND - trace clay, trace organic, compact, dark grey to black, moist	91.31					
4.0	END OF BOREHOLE @ 3.96m BGS	91.00					
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened Interval:
92.83 to 91.31m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
93.14 to 94.51m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
93.14 to 91.31m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 26, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-GT005.GPJ CRA_CORP.GDT 6/3/13

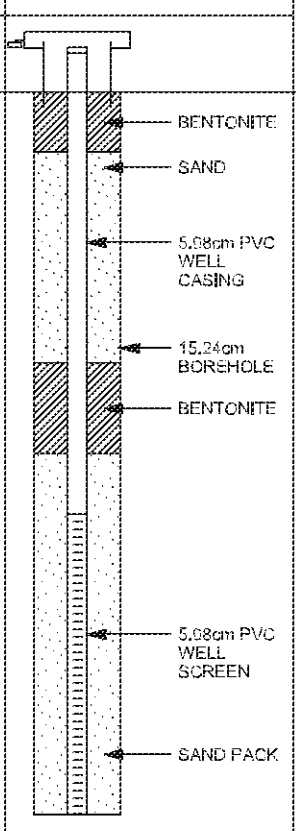
STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW102-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	93.90
	TOP OF RISER	93.79
	GROUND SURFACE	92.99
0.0	FILL-SILTY SAND, few cobble, gravel, compact, dark brown, moist, construction debris (brick)	
0.5	- increasing sand at 0.66m BGS	
1.0		
1.5		
2.0	- 0.43m coarse beige sand at 1.98m BGS	
2.5	- wet at 2.29m BGS	
	- ~2.54cm root mat at 2.74m BGS	
3.0	CL/ML-SILTY CLAY, soft, grey, wet	90.09
3.5		
	END OF BOREHOLE @ 3.66m BGS	89.33
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		

MONITORING WELL



WELL DETAILS
Screened interval:
90.85 to 89.33m
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Seal:
91.62 to 91.45m
1.37 to 1.52m BGS
Material: BENTONITE
Sand Pack:
91.16 to 89.33m
1.83 to 3.66m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		25		0.0
2SS		75	24	0.1
3SS		67	19	0.1
4SS		83	24	0.1
5SS		83	4	0.2

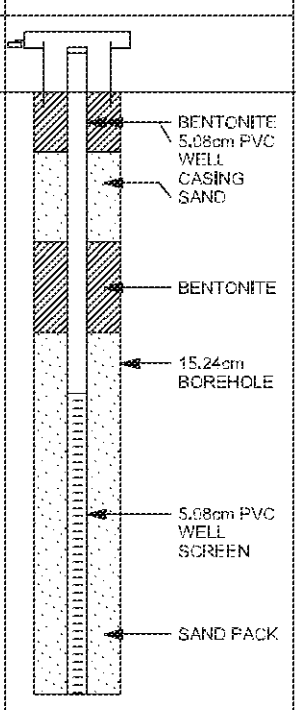
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: MW103-09
DATE COMPLETED: December 21, 2009
DRILLING METHOD: 10.8cm HSA
FIELD PERSONNEL: M. BOUCHARD

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m
	TOP OF CASING	93.42
	TOP OF RISER	93.33
	GROUND SURFACE	92.38
0.5	FILL-SILTY SAND, with gravel, compact, well graded, beige to brown, moist	
1.0		91.29
	FILL-SILTY SAND, with clay, gravel, few cobble, compact, beige to brown, moist	
		91.01
1.5	SM-SILTY SAND, with gravel, cobble, compact, well graded, brown to grey, moist	
2.0		
2.5	- rootmat, large cobble, becoming wet at 2.44m BGS	
3.0	- REFUSAL at 3.05m BGS	89.33
	END OF BOREHOLE @ 3.05m BGS	
3.5		
4.0		
4.5		
5.0		
5.5		
6.0		
6.5		



WELL DETAILS
Screened interval:
90.85 to 89.33m
1.52 to 3.05m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 0.010
Material: PVC
Sand Pack:
91.16 to 89.33m
1.22 to 3.05m BGS
Material: #2 SAND

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1SS		29	6	0.1
2SS		38	16	0.1
3SS		83	26	0.0
4SS		50		0.2
5SS		4		0.1

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW104-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	94.63 94.55					
0	ASPHALT on surface	94.53					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - silty sand, with gravel, compact, red-brown, moist	94.17					
1.0							
1.5	FILL - sand and gravel, concrete debris, weathered asphalt, black to brown, moist	93.11					
2.0							
2.5							
3.0			▽				
	SANDY GRAVEL - coarse sand, fine gravel, compact, wet	91.53					
3.5	SILTY SAND - trace clay, compact, grey moist to wet	91.20					
	END OF BOREHOLE @ 3.66m BGS	90.97					
4.0							
4.5							
5.0							
5.5							
6.0							
6.5							

WELL DETAILS
Screened interval:
92.50 to 90.97m m AMSL
2.13 to 3.66m BGS
Length: 1.52m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
92.80 to 94.17m m AMSL
1.83 to 0.46m BGS
Material: Bentonite
Sand Pack:
92.80 to 90.97m m AMSL
1.83 to 3.66m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804-59
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW105-13
DATE COMPLETED: 28 February 2013
DRILLING METHOD: Geo Probe
FIELD PERSONNEL: T. Saunders, J. Hamilton

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m m AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	GROUND SURFACE TOP OF RISER	95.06 94.95					
0	ASPHALT on surface	94.95					
	Granular Material - A and B type - compact, grey, moist						
0.5	FILL - shot rock mixed with sands and gravels.	94.60					
1.0							
1.5			▽				
2.0							
2.5							
3.0							
3.5							
4.0			WELL DETAILS Screened interval: 92.92 to 91.40m m AMSL 2.13 to 3.66m BGS Length: 1.52m Diameter: 51mm Slot Size: 10 Material: PVC Seal: 93.23 to 94.60m m AMSL 1.83 to 0.46m BGS Material: Bentonite Sand Pack: 93.23 to 91.40m m AMSL 1.83 to 3.66m BGS Material: No. 3 Silica Sand				
	END OF BOREHOLE @ 4.27m BGS	90.79					
4.5							
5.0							
5.5							
6.0							
6.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ Feb 28, 2013

OVERBURDEN LOG 45804-00(MAR-2013)MW-OT005.GPJ CRA_CORP.GDT 6/3/13

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: MW106
DATE COMPLETED: March 3, 2015
DRILLING METHOD: CME HSA 8 1/4"
FIELD PERSONNEL: T. Saunders

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER TOP OF CASING	-0.46 -0.61					
0	GRASS AND TOPSOIL	0.05		1		12	
	FILL - concrete, red brick, ashphalt, sand, gravel, moist			2		10	64
1				3		15	13
2				4		4	
3				5		13	38
4	- wet at 4.27m BGS		▽	6		13	59
5	- concrete at 4.95m BGS			7		12	
	SILTY SAND TILL - trace clay, gravel, round bedded, wet, compact, grey to brown	5.18		8		14	26
6				9		5	
	END OF BOREHOLE @ 6.38m BGS	6.38					
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
3.33 to 6.38m BGS
Length: 3.05m
Diameter: 51mm
Slot Size: 10
Material: PVC
Seal:
0.00 to 2.72m BGS
Material: Bentonite
Sand Pack:
2.72 to 6.38m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/3/2015

OVERBURDEN LOG 045804-MAR2015(MW40T006.GPJ CRA_CORP.GDT 3/13/15

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: Orgaworld
PROJECT NUMBER: 045804
CLIENT: Orgaworld Canada Ltd.
LOCATION: 5123 Hawthorne Rd, Ottawa, Ontario

HOLE DESIGNATION: EW107-15
DATE COMPLETED: March 18, 2015
DRILLING METHOD: Mud Rotary
FIELD PERSONNEL: K. Schaller

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH m BGS	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
0	TOPSOIL - sandy, medium brown, dry						
1	rock fragments	1.07					
	SILTY SAND - medium brown	1.22					
	CLEARSTONE - dry	1.37					
2	rock fragments	1.68					
	LIMESTONE - grey	2.13					
3							
4							
5	- highly fractured at 5.18m BGS						
	END OF BOREHOLE @ 5.49m BGS	5.49					
6							
7							
8							
9							
10							
11							

WELL DETAILS
Screened interval:
2.44 to 5.49m BGS
Length: 3.05m
Diameter: 152mm
Slot Size: 10
Material: Stainless Steel
Seal:
0.30 to 1.52m BGS
Material: 3/8" Bentonite Holeplug
Sand Pack:
1.52 to 5.49m BGS
Material: No. 3 Silica Sand

Sand Pack:
0.00 to 0.30m BGS
Material: No. 3 Silica Sand

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▽ 3/18/2015

OVERBURDEN LOG 045804-00(MAR-2015)MW-QT006.GPJ CRA_CORP.GDT 2/23/16

Appendix C.2
Deep Bedrock Water Well and Stratigraphic Logs

OCT 07 '98 08:59 BEAVER ROAD BUILDING

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-1

Ottawa Carleton	Gloucester	6	26
Beaver Road Builders Ltd.	P.O. Box 4208 st. "E" Ottawa, Ontario K1S 5B2	DATE COMPLETED 19 4 93	

LOG OF OVERBURDEN AND BEDROCK MATERIALS

COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH (FEET) FROM	TO
Brown	Sandy Clay	Broken Rock	Fill	0	9
Grey	Hardpan	Boulders		9	15
Grey	Limestone		Soft	15	33
White & Grey	Sandstone		Hard	33	135

WATER RECORD

KIND OF WATER	
FRESH / SALTY	EVIDENCE OF MINERALS / GAS
FRESH / SALTY	EVIDENCE OF MINERALS / GAS
FRESH / SALTY	EVIDENCE OF MINERALS / GAS
FRESH / SALTY	EVIDENCE OF MINERALS / GAS

CASING & OPEN HOLE RECORD

INSIDE DIA.	MATERIAL	WALL THICKNESS	DEPTH FEET FROM	TO
6 1/4	STEEL / PLASTIC / CONCRETE / OPEN HOLE / OTHER	.188	0	31
6 1/8	STEEL / PLASTIC / CONCRETE / OPEN HOLE / OTHER		31	75
6	STEEL / PLASTIC / CONCRETE / OPEN HOLE / OTHER		75	135

SCREEN

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT / CLAY PUMPED, ETC.)
31	0	Grouted - Cement (10)

METHOD OF CONSTRUCTION	☒ CABLE TOOL / ☐ ROTARY (CONVENTIONAL) / ☐ ROTARY (REVERSE) / ☐ ROTARY (AIR) / ☐ AIR PERCUSSION	☐ BORING / ☐ DIAMOND / ☐ JETTING / ☐ DRIVING / ☐ DIGGING / ☐ OTHER	
WATER USE	☐ DOMESTIC / ☐ STOCK / ☐ IRRIGATION / ☐ INDUSTRIAL / ☐ OTHER	☐ COMMERCIAL / ☐ MUNICIPAL / ☐ PUBLIC SUPPLY / ☐ COOLING OR AIR CONDITIONING / ☐ NOT USED	
PROPOSED USE OF WELL	☒ WATER SUPPLY / ☐ OBSERVATION WELL / ☐ TEST HOLE / ☐ RECHARGE WELL	☐ DEWATERING / ☐ MONITORING WELL / ☐ UNFINISHED / ☐ ABANDONED	

DEPTH SET AT - FEET	DIAMETER OF OPENING	WATER LEVELS DURING	TO YIELD?	AFTER HOURS	AFTER HOURS
31	130	40	38	31	31

☐ FLOWING ☐ ARTESIAN ☐ FLOWING ☒ PUMPED

☐ FLOWING RATE ☐ GPM

☐ PUMP ☐ AIR LIFT

PUMPING RATE 15-20 GPM

DURATION OF PUMPING 1 HRS

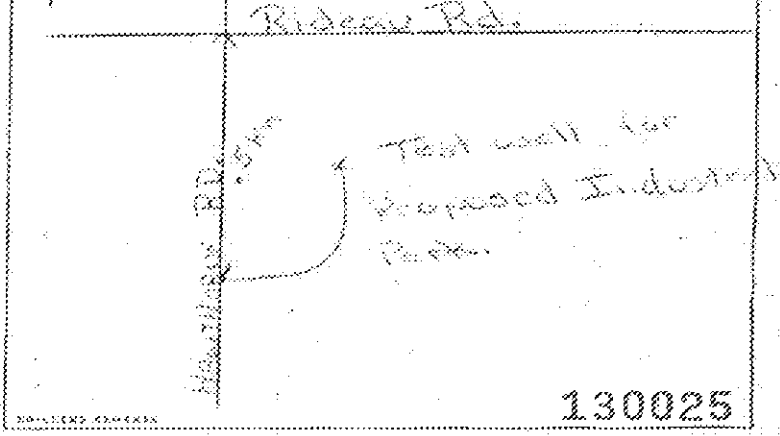
☐ GALLON ☒ GPM

RECOMMENDED PUMP SETTING 125 FEET

RECOMMENDED PUMP RATE 8 GPM

LOCATION OF WELL

IN THE BOX BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



130025

NAME OF WELL CONTRACTOR	WELL CONTRACTOR'S LICENCE NUMBER
Capital Water Supply Ltd.	1568
ADDRESS OF WELL CONTRACTOR	
P.O. Box 490, Stittsville, Ontario K2S 1A5	
NAME OF WELL TECHNICIAN (PROFESSIONAL ENGINEER OR CONTRACTOR)	WELL TECHNICIAN'S LICENCE NUMBER
S. Miller	3097
SIGNATURE OF TECHNICIAN (PROFESSIONAL ENGINEER OR CONTRACTOR)	SUBMISSION DATE
	DAY 20 MO 4 YR 93

OFFICE USE ONLY

FORM NO. 0506 (11/80) FORM 9

WHITE - MINISTER'S COPY

004001

OCT 07 '99 08:19 BEAVER POND BUILDERS

Ministry of the Environment

The Ontario Water Resources Act

WATER WELL RECORD

TEST WELL TW-2

Ottawa Carleton — Gloucester — 6 — 26

Beaver Road Builders — P.O. Box 4200 stn. "E" Ottawa, Ontario K1S 5B2 — Oct 16 — 8 — 99

LOG OF OVERBURDEN AND BEDROCK MATERIALS

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
Brown	Sand	Stone		0	5
Gray	Bedrock	Boulders		5	28
Gray	Sandstone		Hard	28	100

WATER RECORD

NOT TESTED

CASING & OPEN HOLE RECORD

Depth Set From	Depth Set To	Material	Internal Diameter	Wall Thickness	Depth From	Depth To
6 1/4		Steel	.188		0	30
5 1/2		Open Hole			30	100

SCREEN

PLUGGING & SEALING RECORD

Depth Set From	Depth Set To	Material and Type
37.5	0	Cement - Grouted

2'6"	14'6"	13'11"	14	14'8"	14'6"

Pumping rate: 50 — Duration of pumping: 5

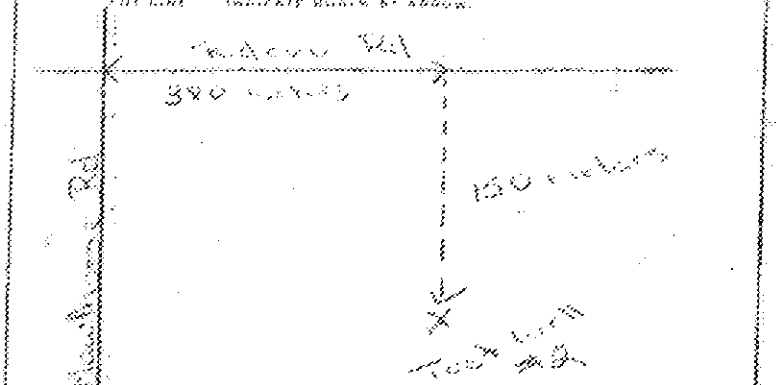
Final status of well: Water Supply

Water use: Domestic

Method of construction: Air Rotary

LOCATION OF WELL

Indicate distance of well from road and lot line. Indicate north by arrow.



Lot: 26 — Concession: 1

Township: Gloucester

Address of well location: Beaver Rd

135946

Name of well contractor: Typical Water Supply Ltd.

Well Contractor's Licence No.: 1558

Address of well contractor: 400 Bilsteville, Ontario K2S 1A6

Name of well technician: Miller/T. Harrison

Well Technician's Licence No.: 0007/12251

Date Package Delivered: Oct 22 — 8 — 99

Date Received: Oct 25 — 8 — 99

OWNER'S COPY

004002

Ministry of the Environment

Ontario

WATER WELL RECORD

TEST WELL TW-3

Ottawa Carleton — Gloucester — 6 — 29

Beaver Road Builders — P.O. Box 4208 stn "E" Ottawa, Ontario K1S 5S2 — 10 — 8 — 90

LOG OF OVERBURDEN AND BEDROCK MATERIALS

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH FROM	DEPTH TO
Grey & White	Sandstone		Used	0	100

WATER RECORD

Not Treated

CASING & OPEN HOLE RECORD

DIAMETER	MATERIAL	WALL THICKNESS	DEPTH FROM	DEPTH TO
6 1/4	Steel	.188	0	22
6 1/16	Open Hole		22	100

SCREEN

PLUGGING & SEALING RECORD

DEPTH SET AT	MATERIAL AND TYPE	DIAMETER
20'8"	Grouted cement 131	

33'6"	24'4"	23'6"	24	24'4"	24'4"

Static Level: 33'6" — Pumping Level: 24'4" — Pumping Rate: 15-20 — Duration of Pumping: 1

Recommended Pump Rate: 40 — Recommended Pump Setting: 50

FINAL STATUS OF WELL: Water Supply

WATER USE: Domestic

METHOD OF CONSTRUCTION: Air Percussion

LOCATION OF WELL

Rideau Road

Hazeldean Road

250 metres

135944

Capital Water Supply Ltd. — 1556

Box 490, Stittsville, Ontario K2S 1A6

S. Miller/T. Harrison — (709)7/82251

Date: 18 — 7 — 23

CONTRACTOR'S COPY

OFFICE USE ONLY

004003

Ministry of the Environment

Measurements recorded in: [x] Metric [ ] Imperial

Well Tag No. (Place Sticker and/or Print Below): A068332

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	[ ] Well Constructed by Well Owner
	Orgaworld		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/@ 651 Colby Drive	Waterloo	Ontario	N2V1C1	519 884 0510

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #4 - Rideau Rd.	Gloucestor	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucestor	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456470	5016578		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Sandy Clay	Boulders	Packed	0	3.96
Gray	Sandstone		Very Hard	3.96	29.86

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
13.10	0	Grouted Cement	.42m³

Method of Construction

[ ] Cable Tool [ ] Diamond [x] Rotary (Reverse) Air [ ] Boring [x] Air percussion [ ] Other, specify

[ ] Rotary (Conventional) [ ] Jetting [ ] Driving [ ] Digging

Well Use

[ ] Public [x] Commercial [ ] Not used

[x] Domestic [ ] Municipal [ ] Dewatering

[ ] Livestock [ ] Test Hole [ ] Monitoring

[ ] Irrigation [ ] Cooling & Air Conditioning

[x] Industrial [ ] Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	13.10

Status of Well

[ ] Water Supply [ ] Replacement Well [ ] Test Hole [ ] Recharge Well [ ] Dewatering Well [ ] Observation and/or Monitoring Hole [ ] Alteration (Construction) [ ] Abandoned, Insufficient Supply [ ] Abandoned, Poor Water Quality [ ] Abandoned, other, specify [ ] Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
26.51	[x] Fresh [ ] Untested	[ ]	[ ]
(m/ft)	[ ] Fresh [ ] Untested	[ ]	[ ]
(m/ft)	[ ] Fresh [ ] Untested	[ ]	[ ]

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	13.10	15.86
13.10	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was: [ ] Clear and sand free [ ] Other, specify

If pumping discontinued, give reason:

Pump Intake set at (m/ft): 27.43

Pumping rate (l/min / GPM): 36.4

Duration of pumping: 6 hrs + ____ mins

Final water level end of pumping (m/ft): 18.40

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 36.4

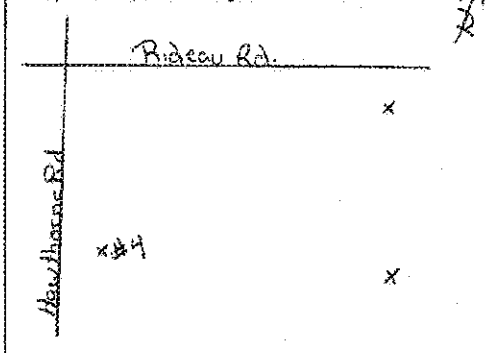
Well production (l/min / GPM):

Disinfected? [x] Yes [ ] No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	14.15		
1	15.97	1	16.76
2	16.98	2	15.74
3	17.30	3	15.20
4	17.43	4	15.
5	17.50	6	14.91
10	17.88	10	14.71
15		15	
20	18.16	20	14.54
25	18.23	25	14.51
30	18.26	30	14.47
40	18.34	40	14.41
50	18.39	50	14.38
60	18.41	60	14.35

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality
Box 490	Stittsville

Province	Postal Code	Business E-mail Address
Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138361266	Miller, Stephen

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
0097		2009 MAR 04

Well owner's information package delivered: [ ] Yes [x] No

Date Package Delivered: ____

Date Work Completed: ____

Ministry Use Only: Audit No. 8042 11

05085 (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

Ontario Ministry of the Environment

Well Record

Regulation 903 Ontario Water Resources Act

Well Tag No. (Place Sticker and/or Print Below) A068335 A 068336

Page ____ of ____

Measurements recorded in: ☒ Metric ☐ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Stencie Drive	Kanata	Ontario	K2K2A9	613 592 9600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #5 - Rideau	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457044	5016849		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Soil	Stones	Fill	0	1.21
Gray	Sandy Soil	Stones	Wet	1.21	3.96
Gray	Sandstone		Very Hard	3.96	29.85

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
12.80	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☒ Rotary (Reverse) Air ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☒ Industrial
☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.45	12.80

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water	Gas	Other, specify
27.12	☐ Fresh ☒ Untested	☐	
	☐ Fresh ☐ Untested	☐	
	☐ Fresh ☐ Untested	☐	

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	12.80	15.86
12.80	29.86	15.23

Results of Well Yield Testing

After test of well yield, water was:
☒ Clear and sand free
☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 22.85

Pumping rate (l/min / GPM): 54.6

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 9.99

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 22.85

Recommended pump rate (l/min / GPM): 45.5

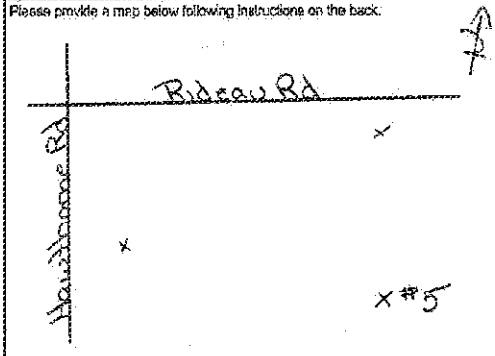
Well production (l/min / GPM):

Disinfected? ☒ Yes ☐ No

	Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level		6.85		
1		8.03	1	8.97
2		8.35	2	8.69
3		8.60	3	8.55
4		8.76	4	8.46
5		8.88	5	8.40
10		9.20	10	8.23
15			15	
20		9.49	20	8.04
25		9.62	25	7.99
30		9.68	30	7.93
40		9.82	40	7.84
50		9.91	50	7.77
60		9.99	60	7.69

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capitol Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code): 6138361766

Name of Well Technician (Last Name, First Name): Miller, Stephon

Well Technician's Licence No.: 0097

Signature of Technician and/or Contractor:

Date Submitted: 2008/09/20

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: 2008/09/29

Date Work Completed: 2008/08/26

Ministry Use Only: Audit No. Z 8424; Received

05082 (12/2007) Contractor's Copy

© Queen's Printer for Ontario, 2007

004005

Ontario Ministry of the Environment

Well Tag No. (Place Sticker and/or Print Below) A068344 **A 068344**

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☒ Metric ☐ Imperial

Page ____ of ____

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
R.W. Tomlinson			

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
c/o 32 Stancie Drive	Kanata	Ontario	K2K 2A9	613 592 6600

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
TW #6 - Rideau Rd.	Gloucester	26	6

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	457102	5012660		

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
Brown	Clay		Packed	0	3.65
Gray	Clay	Stones	Sticky	3.65	9.14
Gray	Shale		Soft	9.14	42.66
Gray	Limestone		Medium Soft	42.66	83.20

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
17.67	0	Grouted Cement	.525m³

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) Air ☐ Driving
☐ Boring ☐ Digging
☐ Air percussion
☐ Other, specify

Well Use

☐ Public ☒ Commercial ☐ Not used
☐ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☒ Industrial
☐ Other, specify Test Well

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
15.86	Steel	.48	+.60	17.67

Status of Well

☐ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Water Details

Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify
Water found at Depth (m/ft)	Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	17.67	15.86
17.67	83.20	15.23

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft): 79.24

Pumping rate (l/min / GPM): 13.65

Duration of pumping: 6 hrs + ____ min

Final water level end of pumping (m/ft): 30.57

If flowing give rate (l/min / GPM):

Recommended pump depth (m/ft): 60.95

Recommended pump rate (l/min / GPM): 13.65

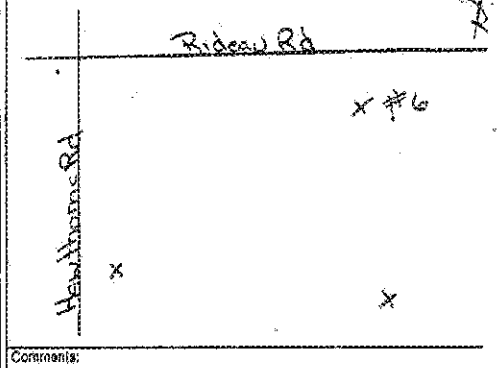
Well production (l/min / GPM):

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	3.18		
1	3.24	1	
2	4.23	2	
3	5.19	3	
4		4	
5	6.53	5	
10	8.06	10	
15	9.99	15	22.80
20	11.53	20	19.40
25	12.92	25	17.12
30	14.08	30	15.13
40		40	11.82
50		50	9.47
60		60	7.94

Map of Well Location

Please provide a map below following instructions on the back.



Comments:

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Capital Water Supply Ltd.	1558

Business Address (Street Number/Name)	Municipality	Province	Postal Code	Business E-mail Address
Box 490	Stittsville	Ontario	K2S1A6	office@capitalwater.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
6138361766	Millar, Stephen	00997		2008/06/10

Well owner's information package delivered: ☐ Yes ☒ No

Date Package Delivered: 2008/06/06

Date Work Completed: 2008/05/26

Ministry Use Only

Received: APR 2 2008

0506E (12/2007)

Contractor's Copy

© Queen's Printer for Ontario, 2007

004006

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-7
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER	92.98					
	GROUND SURFACE	92.48					
	FILL, sand and gravel, packed, brown		15cm BOREHOLE				
1.54	SANDSTONE, very hard, grey and white	90.94	CEMENT GROUT				
2			STEEL CASING Ø 15.86cm				
4							
6			15.23cm BOREHOLE				
8							
10							
12							
14							
16							
18							
20							
22							
24							
26							
28							
29.87	END OF BOREHOLE @ 29.87m BGS	62.59					
30							
32							
34							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: OCL-OTTAWA
PROJECT NUMBER: 045804
CLIENT: OCL
LOCATION: OTTAWA, ONTARIO

HOLE DESIGNATION: TW-8
DATE COMPLETED: May 26, 2010
DRILLING METHOD: ROTARY
FIELD PERSONNEL: M. MATHÉ DRADER

DEPTH m BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. m	MONITORING WELL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE
	TOP OF RISER	94.88					
	GROUND SURFACE	94.46					
	LIMESTONE, grey, broken rock		15cm BOREHOLE; CEMENT GROUT; STEEL CASING Ø 15.86cm; 15.23cm BOREHOLE				
	SANDSTONE, very hard, grey and white	92.94					
	END OF BOREHOLE @ 29.87m BGS	64.59					

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 045804WIN.GPJ CRA_CORP.GDT 3/28/12

Appendix D
QA/QC Assessment Memorandum and Laboratory Analytical Reports

Memorandum

March 30, 2020

To:	Ben Kempel	Ref. No.:	045804-58
From:	Pascal Renella/vl/11		450-902-4349

Subject: Data Quality Assessment and Validation

Laboratory:	ALS Canada Ltd	Date(s) Sampled:	June 17 – November 28, 2019
Lab Job No.:	L2295339, L2295371, L2341968, L2343281, L2388150, L2389044, L2389558, L2389602, L2389575		
Sampled By:	Trevor Saunders, Jacquelyn Curphey		
Media Sampled:	Groundwater & Surface Water		

QA/QC	Criteria	Pass	Qualifiers	Fail	N/A
Holding Times	Analyte specific	☐	☒	☐	☐
Field Duplicate (blind)	Matrix specific	☐	☒	☐	☐
Field Blank (blind)	Non-detect	☐	☒	☐	☐
Trip Blank	Non-detect	☐	☐	☐	☒
Temperature	Analyte specific	☒	☐	☐	☐
Lab QA/QC	Within standard recoveries	☒	☐	☐	☐
Data OK for Use	Yes ☐ With Qualifiers ☒ No ☐ Initial: PR				

The following results are qualified due to holding time exceedance:

Lab Report	Sample Date	Sample ID	Analyte	Result	Qualifier	Unit
L2295339	06/17/2019	SW-45804-061719-JC-001	Escherichia coli	16	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-002	Escherichia coli	4	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-003	Escherichia coli	68	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-004	Escherichia coli	170	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-005	Escherichia coli	52	J	cfu/ 100mL

Lab Sample ID	Sample Collection Date	Sample ID	Analyte	Result	Qualifier	Units
L2295339	06/17/2019	SW-45804-061719-JC-006	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/17/2019	GW-45804-061719-TS-014	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/17/2019	GW-45804-061719-JC-015	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/18/2019	GW-45804-061819-TS-012	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/18/2019	GW-45804-061819-JC-013	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/18/2019	GW-45804-061819-JC-016	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/18/2019	GW-45804-061819-JC-017	Escherichia coli	0	UJ	cfu/ 100mL
L2295371	06/18/2019	GW-45804-061819-TS-007	Orthophosphate (dissolved)	1.67	J	mg/L

The following results are qualified due to field blank detection:

Lab Sample ID	Sample Collection Date	Sample ID	Analyte	Result	Qualifier	Units
L2295339	06/17/2019	SW-45804-061719-JC-001	Ammonia-N	0.079	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-002	Ammonia-N	0.067	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-003	Ammonia-N	0.028	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-004	Ammonia-N	0.052	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Ammonia-N	0.020	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Dissolved organic carbon (DOC) (dissolved)	4.23	J+	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-003	Nitrate (as N)	0.088	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-004	Nitrate (as N)	0.169	U	mg/L
L2295339	06/17/2019	SW-45804-061719-JC-005	Nitrate (as N)	0.62	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-001	Ammonia-N	5.6	U	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-002	Ammonia-N	1.7	U	mg/L

Lab Sample ID	Collection Date	Sample ID	Analyte	Result	Qualifier	Units
L2295371	06/18/2019	GW-45804-061819-JC-003	Ammonia-N	1.3	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-008	Ammonia-N	11.6	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-010	Ammonia-N	1.7	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-016	Ammonia-N	3.3	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-004	Ammonia-N	2.1	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-012	Ammonia-N	3.0	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-001	Dissolved organic carbon (DOC) (dissolved)	3.02	U	mg/L
L2295371	06/17/2019	GW-45804-061719-JC-015	Dissolved organic carbon (DOC) (dissolved)	5.28	J+	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-002	Dissolved organic carbon (DOC) (dissolved)	2.77	U	mg/L
L2295371	06/17/2019	GW-45804-061719-TS-014	Dissolved organic carbon (DOC) (dissolved)	5.62	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-003	Dissolved organic carbon (DOC) (dissolved)	1.97	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-006	Dissolved organic carbon (DOC) (dissolved)	6.74	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-008	Dissolved organic carbon (DOC) (dissolved)	9.47	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-010	Dissolved organic carbon (DOC) (dissolved)	8.60	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-011	Dissolved organic carbon (DOC) (dissolved)	3.02	U	mg/L
L2295371	06/18/2019	GW-45804-061819-JC-013	Dissolved organic carbon (DOC) (dissolved)	9.23	J+	mg/L

L2295371	06/18/2019	GW-45804-061819-JC-017	Dissolved organic carbon (DOC) (dissolved)	2.35	U	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-004	Dissolved organic carbon (DOC) (dissolved)	6.39	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-005	Dissolved organic carbon (DOC) (dissolved)	6.33	J+	mg/L
L2295371	06/18/2019	GW-45804-061819-TS-012	Dissolved organic carbon (DOC) (dissolved)	8.07	J+	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-001	Dissolved organic carbon (DOC) (dissolved)	9.21	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-002	Dissolved organic carbon (DOC) (dissolved)	6.76	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-003	Dissolved organic carbon (DOC) (dissolved)	7.29	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-004	Dissolved organic carbon (DOC) (dissolved)	11.6	J+	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-006	Dissolved organic carbon (DOC) (dissolved)	4.37	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-007	Dissolved organic carbon (DOC) (dissolved)	10.7	U	mg/L
L2388150	11/26/2019	GW-045804-112619-JC-002	Turbidity	1.26	U	NTU
L2388150	11/26/2019	GW-045804-112619-JC-003	Turbidity	1.42	U	NTU
L2389558	11/28/2019	SW-045804-112819-JC-004	Dissolved organic carbon (DOC) (dissolved)	5.92	J+	mg/L

The following results are qualified due to field duplicate variability:

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
L2295339	06/17/2019	SW-45804-061719-JC-001	Escherichia coli	16	J	cfu/ 100mL
L2295339	06/17/2019	SW-45804-061719-JC-002	Escherichia coli	4	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-010	Chromium (dissolved)	0.00193	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Chromium (dissolved)	0.00131	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Copper (dissolved)	0.00067	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Copper (dissolved)	0.00020	UJ	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Copper (dissolved)	0.00058	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Copper (dissolved)	0.00033	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Zinc (dissolved)	0.0032	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Zinc (dissolved)	0.0010	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Escherichia coli	3	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-011	Escherichia coli	1	J	cfu/ 100mL
L2343281	09/05/2019	GW-045804-090519-JC-005	Phenolics (total)	0.0013	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-006	Phenolics (total)	0.0033	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-007	Phenolics (total)	0.0010	UJ	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-008	Phenolics (total)	0.0090	J	mg/L

Lab Sample ID	Collection Date	Sample ID	Analyte	Result	Qualifier	Units
L2343281	09/05/2019	GW-045804-090519-JC-005	Total suspended solids (TSS)	15.4	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-006	Total suspended solids (TSS)	5.4	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-010	Total suspended solids (TSS)	67	J	mg/L
L2343281	09/05/2019	GW-045804-090519-JC-011	Total suspended solids (TSS)	41	J	mg/L
L2389602	11/28/2019	GW-045804-112819-JC-017	Iron (dissolved)	0.44	J	mg/L
L2389602	11/28/2019	GW-045804-112819-JC-018	Iron (dissolved)	0.64	J	mg/L

Notes:

J	Estimated Concentration
UJ	Not Detected; Estimated Reporting Limit
U	Not Detected
J+	Estimated Concentration; Result may be bias high
N	Nitrogen
NTU	Nephelometric Turbidity Units
CFU	Colony Forming Unit

GHD Limited (Waterloo)
ATTN: Pascal Renella
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Date Received: 25-APR-19
Report Date: 01-MAY-19 11:29 (MT)
Version: FINAL

Client Phone: 450-973-4165

Certificate of Analysis

Lab Work Order #: L2263274
Project P.O. #: 73510913-1
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-1 GW-45804-042519-04									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	1980		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	935		0.50	mg/L	29-APR-19	*80-100			
pH	8.08		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	1420	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	525		10	mg/L	26-APR-19	*30-500			
Ammonia, Total (as N)	0.213		0.010	mg/L	29-APR-19				
Chloride (Cl)	111	DLDS	2.5	mg/L	29-APR-19	250			
Fluoride (F)	0.15	DLDS	0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L	29-APR-19			10	
Nitrite (as N)	0.156	DLDS	0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	0.66		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0049		0.0030	mg/L	29-APR-19		0.01		
Sulfate (SO4)	510	DLDS	1.5	mg/L	29-APR-19	*500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	6.27		0.50	mg/L	29-APR-19	*5			
Total Organic Carbon	6.78		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	<0.0050		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00034		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00744		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.062		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	0.000021		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	242		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00024		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00190		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	<0.010		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000188		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	80.2		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	1.96		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00746		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00202		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	8.10		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	0.000051		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	133	DLHC	0.50	mg/L	26-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0096		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.0044		0.0010	mg/L	26-APR-19		*0.001		
L2263274-2 GW-45804-042519-05									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-2 GW-45804-042519-05									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	564		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	136		0.50	mg/L	29-APR-19	*80-100			
pH	7.46		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	373	DLDS	20	mg/L	29-APR-19	500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	85		10	mg/L	26-APR-19	30-500			
Ammonia, Total (as N)	0.059		0.010	mg/L	29-APR-19				
Chloride (Cl)	9.25		0.50	mg/L	29-APR-19	250			
Fluoride (F)	0.034		0.020	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10	
Nitrite (as N)	0.012		0.010	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	0.30		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0156		0.0030	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	179		0.30	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	4.99		0.50	mg/L	29-APR-19	5			
Total Organic Carbon	5.31		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0075		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00023		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00154		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.054		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	32.9		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00014		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00451		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.013		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000182		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	13.2		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.313		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00166		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00188		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	2.30		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	65.3		0.50	mg/L	29-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0080		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	<0.0010		0.0010	mg/L	26-APR-19		0.001		
L2263274-3 GW-45804-042519-06									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines

#2: Ontario PWQO (July 1994)

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-3 GW-45804-042519-06									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	92.8		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	17.7		0.50	mg/L	29-APR-19	*80-100			
pH	6.36		0.10	pH units	26-APR-19	*6.5-8.5	*6.5-8.5		
Total Dissolved Solids	75	DLDS	13	mg/L	29-APR-19	500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	<10		10	mg/L	26-APR-19	**30-500			
Ammonia, Total (as N)	0.012		0.010	mg/L	29-APR-19				
Chloride (Cl)	2.14		0.50	mg/L	29-APR-19	250			
Fluoride (F)	<0.020		0.020	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10	
Nitrite (as N)	<0.010		0.010	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	<0.15		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.0110		0.0030	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	28.2		0.30	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	3.67		0.50	mg/L	29-APR-19	5			
Total Organic Carbon	3.78		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0093		0.0050	mg/L	29-APR-19	0.1	0.015		
Arsenic (As)-Dissolved	0.00016		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00038		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.048		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	4.32		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	<0.00050		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	<0.00010		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00442		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.017		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000444		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	1.68		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.0400		0.00050	mg/L	29-APR-19	0.05			
Molybdenum (Mo)-Dissolved	0.000422		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00120		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	0.250		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	<0.000050		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	9.49		0.50	mg/L	29-APR-19	200		20	
Zinc (Zn)-Dissolved	0.0046		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	<0.0010		0.0010	mg/L	26-APR-19		0.001		
L2263274-4 GW-45804-042519-07									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines

#2: Ontario PWQO (July 1994)

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits			
L2263274-4 GW-45804-042519-07									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									
Conductivity	2750		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	1060		1.3	mg/L	29-APR-19	*80-100			
pH	8.04		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	1950	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	1130	DLM	50	mg/L	30-APR-19	*30-500			
Ammonia, Total (as N)	0.066		0.010	mg/L	29-APR-19				
Chloride (Cl)	216	DLDS	2.5	mg/L	29-APR-19	250			
Fluoride (F)	<0.10	DLDS	0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10	DLDS	0.10	mg/L	29-APR-19			10	
Nitrite (as N)	<0.050	DLDS	0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	4.40		0.15	mg/L	26-APR-19				
Phosphorus, Total	1.80	DLHC	0.0060	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	272	DLDS	1.5	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	154	DLM	2.5	mg/L	29-APR-19	*5			
Total Organic Carbon	161	DLM	2.5	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	<0.050	DLHC	0.050	mg/L	26-APR-19	0.1	**0.015		
Arsenic (As)-Dissolved	0.0030	DLHC	0.0010	mg/L	26-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.0123	DLHC	0.0010	mg/L	26-APR-19			1	
Boron (B)-Dissolved	<0.10	DLHC	0.10	mg/L	26-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000050	DLHC	0.000050	mg/L	26-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	275	DLHC	0.50	mg/L	26-APR-19				
Chromium (Cr)-Dissolved	<0.0050	DLHC	0.0050	mg/L	26-APR-19			0.05	
Cobalt (Co)-Dissolved	<0.0010	DLHC	0.0010	mg/L	26-APR-19		**0.0009		
Copper (Cu)-Dissolved	<0.0020	DLHC	0.0020	mg/L	26-APR-19	1	**0.001		
Iron (Fe)-Dissolved	<0.10	DLHC	0.10	mg/L	26-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	<0.00050	DLHC	0.00050	mg/L	26-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	90.6	DLHC	0.050	mg/L	26-APR-19				
Manganese (Mn)-Dissolved	0.820	DLHC	0.0050	mg/L	26-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.0219	DLHC	0.00050	mg/L	26-APR-19		0.04		
Nickel (Ni)-Dissolved	<0.0050	DLHC	0.0050	mg/L	26-APR-19		0.025		
Potassium (K)-Dissolved	17.2	DLHC	0.50	mg/L	26-APR-19				
Selenium (Se)-Dissolved	0.00944	DLHC	0.00050	mg/L	26-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	291	DLHC	0.50	mg/L	26-APR-19	*200		*20	
Zinc (Zn)-Dissolved	<0.010	DLHC	0.010	mg/L	26-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.181	DLM	0.010	mg/L	26-APR-19		*0.001		
L2263274-5 GW-45804-042519-08									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines **#2: Ontario PWQO (July 1994)**

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-5 GW-45804-042519-08									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	1200		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	315		0.50	mg/L	29-APR-19	*80-100			
pH	7.96		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	828	DLDS	20	mg/L	29-APR-19	*500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	417		10	mg/L	26-APR-19	30-500			
Ammonia, Total (as N)	0.030		0.010	mg/L	29-APR-19				
Chloride (Cl)	32.0		2.5	mg/L	29-APR-19	250			
Fluoride (F)	<0.10		0.10	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.10		0.10	mg/L	29-APR-19			10	
Nitrite (as N)	<0.050		0.050	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	2.88		0.15	mg/L	26-APR-19				
Phosphorus, Total	1.18	DLHC	0.0060	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	177		1.5	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	65.8	DLM	2.5	mg/L	29-APR-19	*5			
Total Organic Carbon	69.5	DLM	2.5	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0267		0.0050	mg/L	29-APR-19	0.1	*0.015		
Arsenic (As)-Dissolved	0.00246		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00395		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.078		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	79.0		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	0.00306		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00048		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00126		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.100		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000478		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	28.6		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.291		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00890		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00290		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	7.96		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	0.000166		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	172	DLHC	0.50	mg/L	26-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0049		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.0718		0.0010	mg/L	26-APR-19		*0.001		
L2263274-6 GW-45804-042519-09									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER						#1	#2	#3	
Physical Tests									

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines

#2: Ontario PWQO (July 1994)

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Sample Details Grouping / Analyte	Result	Qualifier	D.L.	Units	Analyzed	Guideline Limits #1	#2	#3	
L2263274-6 GW-45804-042519-09									
Sampled By: CLIENT on 25-APR-19 @ 17:00									
Matrix: WATER									
Physical Tests									
Conductivity	417		3.0	umhos/cm	26-APR-19				
Hardness (as CaCO3)	63.0		0.50	mg/L	29-APR-19	*80-100			
pH	7.51		0.10	pH units	26-APR-19	6.5-8.5	6.5-8.5		
Total Dissolved Solids	306	DLDS	20	mg/L	29-APR-19	500			
Anions and Nutrients									
Alkalinity, Total (as CaCO3)	113		10	mg/L	26-APR-19	30-500			
Ammonia, Total (as N)	<0.010		0.010	mg/L	29-APR-19				
Chloride (Cl)	4.93		0.50	mg/L	29-APR-19	250			
Fluoride (F)	<0.020		0.020	mg/L	29-APR-19			1.5	
Nitrate (as N)	<0.020		0.020	mg/L	29-APR-19			10	
Nitrite (as N)	<0.010		0.010	mg/L	29-APR-19			1	
Total Kjeldahl Nitrogen	2.50		0.15	mg/L	26-APR-19				
Phosphorus, Total	0.735		0.0030	mg/L	29-APR-19		*0.01		
Sulfate (SO4)	86.4		0.30	mg/L	29-APR-19	500			
Organic / Inorganic Carbon									
Dissolved Carbon Filtration Location	LAB			No Unit	26-APR-19				
Dissolved Organic Carbon	36.1	DLM	2.5	mg/L	29-APR-19	*5			
Total Organic Carbon	35.0		0.50	mg/L	26-APR-19				
Dissolved Metals									
Dissolved Metals Filtration Location	LAB			No Unit	26-APR-19				
Aluminum (Al)-Dissolved	0.0257		0.0050	mg/L	29-APR-19	0.1	*0.015		
Arsenic (As)-Dissolved	0.00191		0.00010	mg/L	29-APR-19		0.005	0.025	
Barium (Ba)-Dissolved	0.00170		0.00010	mg/L	29-APR-19			1	
Boron (B)-Dissolved	0.073		0.010	mg/L	29-APR-19		0.2	5	
Cadmium (Cd)-Dissolved	<0.000010		0.000010	mg/L	29-APR-19		0.0001	0.005	
Calcium (Ca)-Dissolved	17.3		0.050	mg/L	29-APR-19				
Chromium (Cr)-Dissolved	0.00236		0.00050	mg/L	29-APR-19			0.05	
Cobalt (Co)-Dissolved	0.00035		0.00010	mg/L	29-APR-19		0.0009		
Copper (Cu)-Dissolved	0.00148		0.00020	mg/L	29-APR-19	1	*0.001		
Iron (Fe)-Dissolved	0.079		0.010	mg/L	29-APR-19	0.3	0.3		
Lead (Pb)-Dissolved	0.000460		0.000050	mg/L	29-APR-19		0.001	0.01	
Magnesium (Mg)-Dissolved	4.82		0.050	mg/L	29-APR-19				
Manganese (Mn)-Dissolved	0.0768		0.00050	mg/L	29-APR-19	*0.05			
Molybdenum (Mo)-Dissolved	0.00461		0.000050	mg/L	29-APR-19		0.04		
Nickel (Ni)-Dissolved	0.00257		0.00050	mg/L	29-APR-19		0.025		
Potassium (K)-Dissolved	2.19		0.050	mg/L	29-APR-19				
Selenium (Se)-Dissolved	0.000130		0.000050	mg/L	29-APR-19		0.1	0.01	
Sodium (Na)-Dissolved	66.9		0.50	mg/L	29-APR-19	200		*20	
Zinc (Zn)-Dissolved	0.0059		0.0010	mg/L	29-APR-19	5	0.02		
Aggregate Organics									
Phenols (4AAP)	0.0459		0.0010	mg/L	26-APR-19		*0.001		

** Detection Limit for result exceeds Guideline Limit. Assessment against Guideline Limit cannot be made.
* Analytical result for this parameter exceeds Guideline Limit listed on this report. Guideline Limits applied:

Ontario PWQO + Sanitary + Storm + R153 + TCLP+ODWS = [Suite] - ON-PWQO+ODWS

#1: ODWS Aesthetic and Operational Guidelines

#2: Ontario PWQO (July 1994)

#3: ODWS Table 1 (Microbiological) and Table 2 (Chemical) Standards - Jan.1, 2017

Reference Information

Qualifiers for Sample Submission Listed:

Qualifier	Description
CINT	Cooling initiated. Samples were received packed with ice or ice packs and were sampled the same day as received.

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Method Reference***
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DOC-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-D-CCMS-WT	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

Reference Information

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

*** ALS test methods may incorporate modifications from specified reference methods to improve performance.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA		

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to, fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guideline limits are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
Alkalinity, Total (as CaCO3)		30	29		mg/L	1.2	20	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
Alkalinity, Total (as CaCO3)		<10	<10	RPD-NA	mg/L	N/A	20	26-APR-19
WG3035325-22 LCS								
Alkalinity, Total (as CaCO3)			101.9		%		85-115	26-APR-19
WG3035325-26 LCS								
Alkalinity, Total (as CaCO3)			101.9		%		85-115	26-APR-19
WG3035325-21 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	26-APR-19
WG3035325-25 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	26-APR-19
Batch R4618721								
WG3037667-4 DUP		**WG3037667-3**						
Alkalinity, Total (as CaCO3)		173	173		mg/L	0.3	20	30-APR-19
WG3037667-2 LCS								
Alkalinity, Total (as CaCO3)			99.7		%		85-115	30-APR-19
WG3037667-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	30-APR-19
CL-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Chloride (Cl)		<0.50	<0.50	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Chloride (Cl)			99.9		%		90-110	29-APR-19
WG3037081-1 MB								
Chloride (Cl)			<0.50		mg/L		0.5	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Chloride (Cl)			101.2		%		75-125	29-APR-19
DOC-WT	Water							
Batch R4617650								
WG3036115-3 DUP		**L2262728-1**						
Dissolved Organic Carbon		6.57	7.30		mg/L	11	25	29-APR-19
WG3036115-2 LCS								
Dissolved Organic Carbon			97.4		%		70-130	29-APR-19
WG3036115-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	29-APR-19
WG3036115-4 MS		**L2262728-1**						

Quality Control Report

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
DOC-WT	Water							
Batch R4617650								
WG3036115-4 MS		**L2262728-1**						
Dissolved Organic Carbon			97.4		%		70-130	29-APR-19
EC-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
Conductivity		3630	3660		umhos/cm	0.8	10	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
Conductivity		92.8	92.8		umhos/cm	0.0	10	26-APR-19
WG3035325-22 LCS								
Conductivity			99.4		%		90-110	26-APR-19
WG3035325-26 LCS								
Conductivity			100.0		%		90-110	26-APR-19
WG3035325-21 MB								
Conductivity			<3.0		umhos/cm		3	26-APR-19
WG3035325-25 MB								
Conductivity			<3.0		umhos/cm		3	26-APR-19
F-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Fluoride (F)		<0.020	<0.020	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Fluoride (F)			99.5		%		90-110	29-APR-19
WG3037081-1 MB								
Fluoride (F)			<0.020		mg/L		0.02	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Fluoride (F)			98.8		%		75-125	29-APR-19
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-4 DUP		**WG3035288-3**						
Aluminum (Al)-Dissolved		<0.0050	0.0053	RPD-NA	mg/L	N/A	20	29-APR-19
Arsenic (As)-Dissolved		0.00034	0.00033		mg/L	1.1	20	29-APR-19
Barium (Ba)-Dissolved		0.00744	0.00754		mg/L	1.4	20	29-APR-19
Boron (B)-Dissolved		0.062	0.063		mg/L	1.0	20	29-APR-19
Cadmium (Cd)-Dissolved		0.0000205	0.0000174		mg/L	16	20	29-APR-19
Calcium (Ca)-Dissolved		242	248		mg/L	2.4	20	29-APR-19
Chromium (Cr)-Dissolved		<0.00050	<0.00050	RPD-NA	mg/L	N/A	20	29-APR-19

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-4 DUP		**WG3035288-3**						
Cobalt (Co)-Dissolved		0.00024	0.00023		mg/L	2.1	20	29-APR-19
Copper (Cu)-Dissolved		0.00190	0.00191		mg/L	0.4	20	29-APR-19
Iron (Fe)-Dissolved		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
Lead (Pb)-Dissolved		0.000188	0.000195		mg/L	3.2	20	29-APR-19
Magnesium (Mg)-Dissolved		80.2	85.2		mg/L	6.1	20	29-APR-19
Manganese (Mn)-Dissolved		1.96	2.01		mg/L	2.5	20	29-APR-19
Molybdenum (Mo)-Dissolved		0.00746	0.00752		mg/L	0.8	20	29-APR-19
Nickel (Ni)-Dissolved		0.00202	0.00207		mg/L	2.4	20	29-APR-19
Potassium (K)-Dissolved		8.10	8.16		mg/L	0.7	20	29-APR-19
Selenium (Se)-Dissolved		0.000051	<0.000050	RPD-NA	mg/L	N/A	20	29-APR-19
Sodium (Na)-Dissolved		133	130		mg/L	2.1	20	26-APR-19
Zinc (Zn)-Dissolved		0.0096	0.0096		mg/L	0.1	20	29-APR-19
WG3035288-2 LCS								
Aluminum (Al)-Dissolved			105.6		%		80-120	26-APR-19
Arsenic (As)-Dissolved			98.1		%		80-120	26-APR-19
Barium (Ba)-Dissolved			98.7		%		80-120	26-APR-19
Boron (B)-Dissolved			94.7		%		80-120	26-APR-19
Cadmium (Cd)-Dissolved			100.8		%		80-120	26-APR-19
Calcium (Ca)-Dissolved			94.9		%		80-120	26-APR-19
Chromium (Cr)-Dissolved			97.8		%		80-120	26-APR-19
Cobalt (Co)-Dissolved			94.5		%		80-120	26-APR-19
Copper (Cu)-Dissolved			99.0		%		80-120	26-APR-19
Iron (Fe)-Dissolved			105.0		%		80-120	26-APR-19
Lead (Pb)-Dissolved			103.9		%		80-120	26-APR-19
Magnesium (Mg)-Dissolved			100.1		%		80-120	26-APR-19
Manganese (Mn)-Dissolved			100.5		%		80-120	26-APR-19
Molybdenum (Mo)-Dissolved			96.9		%		80-120	26-APR-19
Nickel (Ni)-Dissolved			97.7		%		80-120	26-APR-19
Potassium (K)-Dissolved			103.5		%		80-120	26-APR-19
Selenium (Se)-Dissolved			97.2		%		80-120	26-APR-19
Sodium (Na)-Dissolved			102.9		%		80-120	26-APR-19
Zinc (Zn)-Dissolved			92.0		%		80-120	26-APR-19
WG3035288-1 MB								
Aluminum (Al)-Dissolved			<0.0050				0.005	

Quality Control Report

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-1 MB								
Aluminum (Al)-Dissolved			<0.0050		mg/L		0.005	26-APR-19
Arsenic (As)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Barium (Ba)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Boron (B)-Dissolved			<0.010		mg/L		0.01	26-APR-19
Cadmium (Cd)-Dissolved			<0.0000050		mg/L		0.000005	26-APR-19
Calcium (Ca)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Chromium (Cr)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Cobalt (Co)-Dissolved			<0.00010		mg/L		0.0001	26-APR-19
Copper (Cu)-Dissolved			<0.00020		mg/L		0.0002	26-APR-19
Iron (Fe)-Dissolved			<0.010		mg/L		0.01	26-APR-19
Lead (Pb)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Magnesium (Mg)-Dissolved			<0.0050		mg/L		0.005	26-APR-19
Manganese (Mn)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Molybdenum (Mo)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Nickel (Ni)-Dissolved			<0.00050		mg/L		0.0005	26-APR-19
Potassium (K)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Selenium (Se)-Dissolved			<0.000050		mg/L		0.00005	26-APR-19
Sodium (Na)-Dissolved			<0.050		mg/L		0.05	26-APR-19
Zinc (Zn)-Dissolved			<0.0010		mg/L		0.001	26-APR-19
WG3035288-5 MS		**WG3035288-6**						
Aluminum (Al)-Dissolved			91.8		%		70-130	29-APR-19
Arsenic (As)-Dissolved			96.1		%		70-130	29-APR-19
Barium (Ba)-Dissolved			87.2		%		70-130	29-APR-19
Boron (B)-Dissolved			N/A	MS-B	%		-	29-APR-19
Cadmium (Cd)-Dissolved			96.8		%		70-130	29-APR-19
Calcium (Ca)-Dissolved			N/A	MS-B	%		-	29-APR-19
Chromium (Cr)-Dissolved			90.8		%		70-130	29-APR-19
Cobalt (Co)-Dissolved			90.5		%		70-130	29-APR-19
Copper (Cu)-Dissolved			89.2		%		70-130	29-APR-19
Iron (Fe)-Dissolved			85.8		%		70-130	29-APR-19
Lead (Pb)-Dissolved			93.7		%		70-130	29-APR-19
Magnesium (Mg)-Dissolved			N/A	MS-B	%		-	29-APR-19
Manganese (Mn)-Dissolved			N/A	MS-B	%		-	29-APR-19
Molybdenum (Mo)-Dissolved			93.3		%		70-130	29-APR-19

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-D-CCMS-WT	Water							
Batch R4614046								
WG3035288-5 MS		**WG3035288-6**						
Nickel (Ni)-Dissolved			87.8		%		70-130	29-APR-19
Potassium (K)-Dissolved			89.3		%		70-130	29-APR-19
Selenium (Se)-Dissolved			103.2		%		70-130	29-APR-19
Sodium (Na)-Dissolved			N/A	MS-B	%		-	29-APR-19
Zinc (Zn)-Dissolved			86.8		%		70-130	29-APR-19
NH3-F-WT	Water							
Batch R4618406								
WG3037011-3 DUP		**L2258890-6**						
Ammonia, Total (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037011-7 DUP		**L2263283-1**						
Ammonia, Total (as N)		0.020	0.020		mg/L	0.5	20	29-APR-19
WG3037011-2 LCS								
Ammonia, Total (as N)			96.7		%		85-115	29-APR-19
WG3037011-6 LCS								
Ammonia, Total (as N)			94.7		%		85-115	29-APR-19
WG3037011-1 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037011-5 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037011-4 MS		**L2258890-6**						
Ammonia, Total (as N)			101.9		%		75-125	29-APR-19
WG3037011-8 MS		**L2263283-1**						
Ammonia, Total (as N)			87.5		%		75-125	29-APR-19
NO2-IC-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	29-APR-19
WG3037081-2 LCS								
Nitrite (as N)			101.1		%		90-110	29-APR-19
WG3037081-1 MB								
Nitrite (as N)			<0.010		mg/L		0.01	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Nitrite (as N)			103.6		%		75-125	29-APR-19
NO3-IC-WT	Water							

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NO3-IC-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Nitrate (as N)		0.154	0.152		mg/L	1.0	20	29-APR-19
WG3037081-2 LCS								
Nitrate (as N)			101.6		%		90-110	29-APR-19
WG3037081-1 MB								
Nitrate (as N)			<0.020		mg/L		0.02	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Nitrate (as N)			101.7		%		75-125	29-APR-19
P-T-COL-WT	Water							
Batch R4615058								
WG3035987-3 DUP		**L2262838-4**						
Phosphorus, Total		0.0150	0.0147		mg/L	1.8	20	29-APR-19
WG3035987-2 LCS								
Phosphorus, Total			103.5		%		80-120	29-APR-19
WG3035987-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	29-APR-19
WG3035987-4 MS		**L2262838-4**						
Phosphorus, Total			97.3		%		70-130	29-APR-19
PH-WT	Water							
Batch R4614477								
WG3035325-24 DUP		**WG3035325-23**						
pH		7.29	7.28	J	pH units	0.01	0.2	26-APR-19
WG3035325-28 DUP		**WG3035325-27**						
pH		6.36	6.35	J	pH units	0.01	0.2	26-APR-19
WG3035325-22 LCS								
pH			7.01		pH units		6.9-7.1	26-APR-19
WG3035325-26 LCS								
pH			7.01		pH units		6.9-7.1	26-APR-19
PHENOLS-4AAP-WT	Water							
Batch R4615187								
WG3035693-11 DUP		**L2263274-6**						
Phenols (4AAP)		0.0459	0.0461		mg/L	0.5	20	26-APR-19
WG3035693-10 LCS								
Phenols (4AAP)			87.9		%		85-115	26-APR-19
WG3035693-9 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	26-APR-19
WG3035693-12 MS		**L2263274-6**						

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PHENOLS-4AAP-WT	Water							
Batch R4615187								
WG3035693-12 MS		**L2263274-6**						
Phenols (4AAP)			N/A	MS-B	%		-	26-APR-19
SO4-IC-N-WT	Water							
Batch R4618444								
WG3037081-4 DUP		**WG3037081-3**						
Sulfate (SO4)		1.85	1.88		mg/L	1.5	20	29-APR-19
WG3037081-2 LCS								
Sulfate (SO4)			99.96		%		90-110	29-APR-19
WG3037081-1 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	29-APR-19
WG3037081-5 MS		**WG3037081-3**						
Sulfate (SO4)			99.5		%		75-125	29-APR-19
SOLIDS-TDS-WT	Water							
Batch R4618320								
WG3036840-3 DUP		**L2262029-2**						
Total Dissolved Solids		192	192		mg/L	0.3	20	29-APR-19
WG3036840-2 LCS								
Total Dissolved Solids			95.0		%		85-115	29-APR-19
WG3036840-1 MB								
Total Dissolved Solids			<10		mg/L		10	29-APR-19
TKN-WT	Water							
Batch R4614093								
WG3035348-3 DUP		**L2262459-9**						
Total Kjeldahl Nitrogen		0.35	0.31		mg/L	13	20	26-APR-19
WG3035348-2 LCS								
Total Kjeldahl Nitrogen			101.3		%		75-125	26-APR-19
WG3035348-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	26-APR-19
WG3035348-4 MS		**L2262459-9**						
Total Kjeldahl Nitrogen			110.1		%		70-130	26-APR-19
TOC-WT	Water							
Batch R4614865								
WG3035302-3 DUP		**L2263274-1**						
Total Organic Carbon		6.78	6.85		mg/L	1.0	20	26-APR-19
WG3035302-2 LCS								
Total Organic Carbon			96.7		%		80-120	26-APR-19

Quality Control Report

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
TOC-WT	Water							
Batch R4614865								
WG3035302-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	26-APR-19
WG3035302-4 MS		**L2263274-1**						
Total Organic Carbon			95.3		%		70-130	26-APR-19

Quality Control Report

Workorder: L2263274 Report Date: 01-MAY-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2263274-COFC

COC Number: 17 -

Page 1 of 1

Report To	Contact and company name below will appear on the final report	Report Format / Distribution	Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
Company:	GHD LIMITED - ACCT #13791	Select Report Format: ☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)	Regular [R] ☒ Standard TAT if received by 3 pm - business days - no surcharges apply
Contact:	Pascal Renella	Quality Control (QC) Report with Report ☑ YES ☐ NO	PRIORITY (Business Days): 4 day [P4-20%] ☐ / 3 day [P3-25%] ☑ / 2 day [P2-50%] ☐
Phone:	450-973-4165	☐ Compare Results to Criteria on Report - provide details below if box checked	EMERGENCY: 1 Business day [E - 100%] ☐ / Same Day, Weekend or Statutory holiday [E2 -200% (Laboratory opening fees may apply)] ☐
	Company address below will appear on the final report	Select Distribution: ☑ EMAIL ☐ MAIL ☐ FAX	Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm
Street:	455 Phillip St	Email 1 or Fax pascal.renella@ghd.com	For tests that can not be performed according to the service level selected, you will be contacted.
City/Province:	Waterloo,Ontario	Email 2 See PO	
Postal Code:	N2L 3X2	Email 3	
Invoice To	Same as Report To ☑ YES ☐ NO	**Invoice Distribution**	
	Copy of Invoice with Report ☐ YES ☑ NO	Select Invoice Distribution: ☐ EMAIL ☐ MAIL ☐ FAX	
Company:	GHD Limited	Email 1 or Fax pascal.renella@ghd.com	
Contact:	Pascal Renella	Email 2	

Project Information		Oil and Gas Required Fields (client use)	
ALS Account # / Quote #:	13791	AFE/Cost Center:	PO#
Job #:	45804-58	Major/Minor Code:	Routing Code:
PO / AFE:	73510913-1	Requisitioner:	
LSD:		Location:	
ALS Lab Work Order # (lab use only):	L2263274	ALS Contact: Rick H	Sampler:

Analysis Request

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Anions (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Conductivity	Dissolved Metals (Field Filter) -Select	TKN, NH3, TP, TOC, Phenols	DOC (Field Filter)	TDS	Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below	SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
	GW-45804-042519-04	25-Apr-19	17:00	Water	5	P3	P3	P3	P3	P3	P3	P3	TWO extra bottle		
	" -05	↓	↓	Water	5	P3	P3	P3	P3	P3	P3	P3	sets in cooler		
	" -06			Water	5	P3	P3	P3	P3	P3	P3	P3			
	" -07			Water	5	P3	P3	P3	P3	P3	P3	P3	Not enough water		
	" -08			Water	5	P3	P3	P3	P3	P3	P3	P3	to fill all containers		
	" -09			Water	5	P3	P3	P3	P3	P3	P3	P3			

Drinking Water (DW) Samples[1] (client use)	Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)	SAMPLE CONDITION AS RECEIVED (lab use only)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO		Frozen ☐ SIF Observations Yes ☐ No ☐
Are samples for human consumption/ use? ☐ YES ☐ NO	ODWS and PWQO Requirements Select Metals: Al,As,Ba,B,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Na,Se,Zn	Ice Packs ☐ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐
		Cooling Initiated ☒
		INITIAL COOLER TEMPERATURES °C: FINAL COOLER TEMPERATURES °C: 18.0°C

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: Hugh MacEachern	Date: 2019/04/25	Time: 17:40	Received by:	Date:	Time	Received by:	Date: 25/Apr/2019.	Time: 17:34

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

0040434

GHD Limited (Waterloo)
ATTN: Pascal Renella
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5

Date Received: 31-JUL-19
Report Date: 12-AUG-19 12:47 (MT)
Version: FINAL

Client Phone: 450-973-4165

Certificate of Analysis

Lab Work Order #: L2320919
Project P.O. #: 73510913-1
Job Reference: 45804-58
C of C Numbers:
Legal Site Desc:

Rick Hawthorne
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-1 GW-45804-073019-JL-100 Sampled By: J. LEADER on 30-JUL-19 @ 10:23 Matrix: WATER							
Physical Tests							
Conductivity	2350		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	906	HTC	1.3	mg/L		06-AUG-19	
pH	7.67		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1310	DLDS	20	mg/L		04-AUG-19	R4739495
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	841	DLHC	50	mg/L		02-AUG-19	R4739081
Ammonia, Total (as N)	64.2	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	118	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.20	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	62.6	DLHC	1.5	mg/L	07-AUG-19	07-AUG-19	R4742627
Phosphorus, Total	1.21	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	313	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	14.8	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	14.1	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0026	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.114	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	244	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.80	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	72.0	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.630	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00323	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	52.6	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	76.9	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	0.033	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.024	DLM	0.010	mg/L		01-AUG-19	R4737245
L2320919-2 GW-45804-073019-JL-101 Sampled By: J. LEADER on 30-JUL-19 @ 12:48							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-2 GW-45804-073019-JL-101 Sampled By: J. LEADER on 30-JUL-19 @ 12:48 Matrix: WATER							
Physical Tests							
Conductivity	2220		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	887	HTC	1.3	mg/L		02-AUG-19	
pH	7.61		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1250	DLDS	20	mg/L		07-AUG-19	R4744503
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	809		10	mg/L		02-AUG-19	R4737304
Ammonia, Total (as N)	59.6	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	120	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.19	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	54.7	DLHC	1.5	mg/L	06-AUG-19	07-AUG-19	R4742622
Phosphorus, Total	1.14	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	367	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	14.1	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	13.0	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0021	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.104	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	240	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.77	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	69.7	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.656	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00279	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	49.1	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	71.8	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.066	DLM	0.010	mg/L		01-AUG-19	R4737245
L2320919-3 GW-45804-073019-JL-102 Sampled By: J. LEADER on 30-JUL-19 @ 16:07							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L2320919-3 GW-45804-073019-JL-102 Sampled By: J. LEADER on 30-JUL-19 @ 16:07 Matrix: WATER							
Physical Tests							
Conductivity	2180		3.0	umhos/cm		02-AUG-19	R4737304
Hardness (as CaCO3)	878	HTC	1.3	mg/L		02-AUG-19	
pH	7.66		0.10	pH units		02-AUG-19	R4737304
Total Dissolved Solids	1240	DLDS	20	mg/L		07-AUG-19	R4744503
Anions and Nutrients							
Alkalinity, Total (as CaCO3)	770		10	mg/L		02-AUG-19	R4737304
Ammonia, Total (as N)	56.7	DLHC	5.0	mg/L		09-AUG-19	R4745441
Chloride (Cl)	115	DLDS	2.5	mg/L		02-AUG-19	R4740193
Fluoride (F)	0.20	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrate (as N)	<0.10	DLDS	0.10	mg/L		02-AUG-19	R4740193
Nitrite (as N)	<0.050	DLDS	0.050	mg/L		02-AUG-19	R4740193
Total Kjeldahl Nitrogen	55.8	DLHC	1.5	mg/L	06-AUG-19	07-AUG-19	R4742622
Phosphorus, Total	1.08	DLHC	0.0060	mg/L	07-AUG-19	08-AUG-19	R4743483
Sulfate (SO4)	371	DLDS	1.5	mg/L		02-AUG-19	R4740193
Organic / Inorganic Carbon							
Dissolved Carbon Filtration Location	LAB					02-AUG-19	R4740969
Dissolved Organic Carbon	12.7	DLM	2.5	mg/L	02-AUG-19	07-AUG-19	R4743212
Total Organic Carbon	17.1	DLM	5.0	mg/L		07-AUG-19	R4743210
Total Metals							
Aluminum (Al)-Total	<0.050	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Arsenic (As)-Total	0.0019	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Barium (Ba)-Total	0.0984	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Boron (B)-Total	<0.10	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Cadmium (Cd)-Total	<0.000050	DLHC	0.000050	mg/L	02-AUG-19	02-AUG-19	R4737970
Calcium (Ca)-Total	239	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Chromium (Cr)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Cobalt (Co)-Total	<0.0010	DLHC	0.0010	mg/L	02-AUG-19	02-AUG-19	R4737970
Copper (Cu)-Total	<0.010	DLHC	0.010	mg/L	02-AUG-19	02-AUG-19	R4737970
Iron (Fe)-Total	0.78	DLHC	0.10	mg/L	02-AUG-19	02-AUG-19	R4737970
Lead (Pb)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Magnesium (Mg)-Total	68.3	DLHC	0.050	mg/L	02-AUG-19	02-AUG-19	R4737970
Manganese (Mn)-Total	0.664	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Molybdenum (Mo)-Total	0.00266	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Nickel (Ni)-Total	<0.0050	DLHC	0.0050	mg/L	02-AUG-19	02-AUG-19	R4737970
Potassium (K)-Total	46.3	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Selenium (Se)-Total	<0.00050	DLHC	0.00050	mg/L	02-AUG-19	02-AUG-19	R4737970
Sodium (Na)-Total	69.0	DLHC	0.50	mg/L	02-AUG-19	02-AUG-19	R4737970
Zinc (Zn)-Total	<0.030	DLHC	0.030	mg/L	02-AUG-19	02-AUG-19	R4737970
Aggregate Organics							
Phenols (4AAP)	0.039	DLM	0.010	mg/L		01-AUG-19	R4737245

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Aluminum (Al)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Barium (Ba)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Iron (Fe)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Magnesium (Mg)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Manganese (Mn)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Potassium (K)-Total	MS-B	L2320919-1, -2, -3
Matrix Spike	Sodium (Na)-Total	MS-B	L2320919-1, -2, -3

Sample Parameter Qualifier key listed:

Qualifier	Description
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
HTC	Hardness was calculated from Total Ca and/or Mg concentrations and may be biased high (dissolved Ca/Mg results unavailable).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-WT	Water	Alkalinity, Total (as CaCO3)	EPA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

CL-IC-N-WT	Water	Chloride by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

DOC-WT	Water	Dissolved Organic Carbon	APHA 5310B

Sample is filtered through a 0.45um filter, then injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic carbon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

EC-SCREEN-WT	Water	Conductivity Screen (Internal Use Only)	APHA 2510

Qualitative analysis of conductivity where required during preparation of other tests - e.g. TDS, metals, etc.

EC-WT	Water	Conductivity	APHA 2510 B

Water samples can be measured directly by immersing the conductivity cell into the sample.

F-IC-N-WT	Water	Fluoride in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-WT	Water	Hardness	APHA 2340 B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

MET-T-CCMS-WT	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

NH3-F-WT	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-IC-WT	Water	Nitrite in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-IC-WT	Water	Nitrate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

Reference Information

P-T-COL-WT	Water	Total P in Water by Colour	APHA 4500-P PHOSPHORUS

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is deteremined colourimetrically after persulphate digestion of the sample.

PH-WT	Water	pH	APHA 4500 H-Electrode

Water samples are analyzed directly by a calibrated pH meter.

Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011). Holdtime for samples under this regulation is 28 days

PHENOLS-4AAP-WT	Water	Phenol (4AAP)	EPA 9066

An automated method is used to distill the sample. The distillate is then buffered to pH 9.4 which reacts with 4AAP and potassium ferricyanide to form a red complex which is measured colorimetrically.

SO4-IC-N-WT	Water	Sulfate in Water by IC	EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

SOLIDS-TDS-WT	Water	Total Dissolved Solids	APHA 2540C

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-WT	Water	Total Kjeldahl Nitrogen	APHA 4500-Norg D

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 Celsius with analysis using an automated colorimetric method.

TOC-WT	Water	Total Organic Carbon	APHA 5310B

Sample is injected into a heated reaction chamber which is packed with an oxidative catalyst. The water is vaporized and the organic cabon is oxidized to carbon dioxide. The carbon dioxide is transported in a carrier gas and is measured by a non-dispersive infrared detector.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid weight of sample
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ALK-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
Alkalinity, Total (as CaCO3)		225	223		mg/L	0.8	20	02-AUG-19
WG3122692-2 LCS								
Alkalinity, Total (as CaCO3)			101.5		%		85-115	02-AUG-19
WG3122692-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	02-AUG-19
Batch R4739081								
WG3122887-4 DUP		**WG3122887-3**						
Alkalinity, Total (as CaCO3)		232	232		mg/L	0.1	20	02-AUG-19
WG3122887-2 LCS								
Alkalinity, Total (as CaCO3)			102.4		%		85-115	02-AUG-19
WG3122887-1 MB								
Alkalinity, Total (as CaCO3)			<10		mg/L		10	02-AUG-19
CL-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Chloride (Cl)		47.8	47.8		mg/L	0.1	20	02-AUG-19
WG3122819-22 LCS								
Chloride (Cl)			101.6		%		90-110	02-AUG-19
WG3122819-21 MB								
Chloride (Cl)			<0.50		mg/L		0.5	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Chloride (Cl)			103.2		%		75-125	02-AUG-19
DOC-WT	Water							
Batch R4743212								
WG3125099-3 DUP		**L2322602-1**						
Dissolved Organic Carbon		3.22	3.34		mg/L	3.6	20	07-AUG-19
WG3125099-2 LCS								
Dissolved Organic Carbon			100.0		%		80-120	07-AUG-19
WG3125099-1 MB								
Dissolved Organic Carbon			<0.50		mg/L		0.5	07-AUG-19
WG3125099-4 MS		**L2322602-1**						
Dissolved Organic Carbon			99.0		%		70-130	07-AUG-19
EC-WT	Water							

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
EC-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
Conductivity		449	448		umhos/cm	0.2	10	02-AUG-19
WG3122692-2 LCS								
Conductivity			99.1		%		90-110	02-AUG-19
WG3122692-1 MB								
Conductivity			<3.0		umhos/cm		3	02-AUG-19
F-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Fluoride (F)		0.036	0.037		mg/L	1.7	20	02-AUG-19
WG3122819-22 LCS								
Fluoride (F)			104.7		%		90-110	02-AUG-19
WG3122819-21 MB								
Fluoride (F)			<0.020		mg/L		0.02	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Fluoride (F)			104.8		%		75-125	02-AUG-19
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-4 DUP		**WG3122355-3**						
Aluminum (Al)-Total		1.11	1.10		mg/L	0.7	20	02-AUG-19
Arsenic (As)-Total		0.00120	0.00121		mg/L	1.0	20	02-AUG-19
Barium (Ba)-Total		0.135	0.134		mg/L	1.0	20	02-AUG-19
Boron (B)-Total		0.018	0.018		mg/L	0.4	20	02-AUG-19
Cadmium (Cd)-Total		0.0000199	0.0000194		mg/L	2.5	20	02-AUG-19
Calcium (Ca)-Total		79.5	78.9		mg/L	0.7	20	02-AUG-19
Chromium (Cr)-Total		0.00206	0.00213		mg/L	3.3	20	02-AUG-19
Cobalt (Co)-Total		0.00085	0.00083		mg/L	1.8	20	02-AUG-19
Copper (Cu)-Total		0.0027	0.0026		mg/L	1.8	20	02-AUG-19
Iron (Fe)-Total		1.73	1.70		mg/L	1.4	20	02-AUG-19
Lead (Pb)-Total		0.00103	0.000985		mg/L	4.2	20	02-AUG-19
Magnesium (Mg)-Total		30.7	30.6		mg/L	0.3	20	02-AUG-19
Manganese (Mn)-Total		0.112	0.112		mg/L	0.1	20	02-AUG-19
Molybdenum (Mo)-Total		0.000579	0.000599		mg/L	3.4	20	02-AUG-19
Nickel (Ni)-Total		0.00186	0.00186		mg/L	0.2	20	02-AUG-19
Potassium (K)-Total		2.55	2.54		mg/L	0.5	20	02-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-4 DUP		**WG3122355-3**						
Selenium (Se)-Total		0.000169	0.000161		mg/L	4.7	20	02-AUG-19
Sodium (Na)-Total		28.6	28.5		mg/L	0.3	20	02-AUG-19
Zinc (Zn)-Total		0.0066	0.0070		mg/L	5.5	20	02-AUG-19
WG3122355-2 LCS								
Aluminum (Al)-Total			99.7		%		80-120	02-AUG-19
Arsenic (As)-Total			96.5		%		80-120	02-AUG-19
Barium (Ba)-Total			97.3		%		80-120	02-AUG-19
Boron (B)-Total			91.7		%		80-120	02-AUG-19
Cadmium (Cd)-Total			97.1		%		80-120	02-AUG-19
Calcium (Ca)-Total			97.2		%		80-120	02-AUG-19
Chromium (Cr)-Total			101.3		%		80-120	02-AUG-19
Cobalt (Co)-Total			98.3		%		80-120	02-AUG-19
Copper (Cu)-Total			98.1		%		80-120	02-AUG-19
Iron (Fe)-Total			98.7		%		80-120	02-AUG-19
Lead (Pb)-Total			98.6		%		80-120	02-AUG-19
Magnesium (Mg)-Total			99.6		%		80-120	02-AUG-19
Manganese (Mn)-Total			100.0		%		80-120	02-AUG-19
Molybdenum (Mo)-Total			100.3		%		80-120	02-AUG-19
Nickel (Ni)-Total			99.1		%		80-120	02-AUG-19
Potassium (K)-Total			99.9		%		80-120	02-AUG-19
Selenium (Se)-Total			93.9		%		80-120	02-AUG-19
Sodium (Na)-Total			100.1		%		80-120	02-AUG-19
Zinc (Zn)-Total			95.2		%		80-120	02-AUG-19
WG3122355-1 MB								
Aluminum (Al)-Total			<0.0050		mg/L		0.005	02-AUG-19
Arsenic (As)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Barium (Ba)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Boron (B)-Total			<0.010		mg/L		0.01	02-AUG-19
Cadmium (Cd)-Total			<0.0000050		mg/L		0.000005	02-AUG-19
Calcium (Ca)-Total			<0.050		mg/L		0.05	02-AUG-19
Chromium (Cr)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Cobalt (Co)-Total			<0.00010		mg/L		0.0001	02-AUG-19
Copper (Cu)-Total			<0.0010		mg/L		0.001	02-AUG-19
Iron (Fe)-Total			<0.010		mg/L		0.01	02-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-T-CCMS-WT	Water							
Batch R4737970								
WG3122355-1 MB								
Lead (Pb)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Magnesium (Mg)-Total			<0.0050		mg/L		0.005	02-AUG-19
Manganese (Mn)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Molybdenum (Mo)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Nickel (Ni)-Total			<0.00050		mg/L		0.0005	02-AUG-19
Potassium (K)-Total			<0.050		mg/L		0.05	02-AUG-19
Selenium (Se)-Total			<0.000050		mg/L		0.00005	02-AUG-19
Sodium (Na)-Total			<0.050		mg/L		0.05	02-AUG-19
Zinc (Zn)-Total			<0.0030		mg/L		0.003	02-AUG-19
WG3122355-5 MS		**WG3122355-3**						
Aluminum (Al)-Total			N/A	MS-B	%		-	02-AUG-19
Arsenic (As)-Total			98.2		%		70-130	02-AUG-19
Barium (Ba)-Total			N/A	MS-B	%		-	02-AUG-19
Boron (B)-Total			93.6		%		70-130	02-AUG-19
Cadmium (Cd)-Total			96.5		%		70-130	02-AUG-19
Calcium (Ca)-Total			N/A	MS-B	%		-	02-AUG-19
Chromium (Cr)-Total			103.8		%		70-130	02-AUG-19
Cobalt (Co)-Total			97.4		%		70-130	02-AUG-19
Copper (Cu)-Total			93.1		%		70-130	02-AUG-19
Iron (Fe)-Total			N/A	MS-B	%		-	02-AUG-19
Lead (Pb)-Total			92.0		%		70-130	02-AUG-19
Magnesium (Mg)-Total			N/A	MS-B	%		-	02-AUG-19
Manganese (Mn)-Total			N/A	MS-B	%		-	02-AUG-19
Molybdenum (Mo)-Total			103.2		%		70-130	02-AUG-19
Nickel (Ni)-Total			96.7		%		70-130	02-AUG-19
Potassium (K)-Total			N/A	MS-B	%		-	02-AUG-19
Selenium (Se)-Total			96.1		%		70-130	02-AUG-19
Sodium (Na)-Total			N/A	MS-B	%		-	02-AUG-19
Zinc (Zn)-Total			95.0		%		70-130	02-AUG-19
NH3-F-WT	Water							
Batch R4745441								
WG3128201-11 DUP		**L2321617-1**						
Ammonia, Total (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	09-AUG-19
WG3128201-10 LCS								

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
NH3-F-WT	Water							
Batch R4745441								
WG3128201-10 LCS								
Ammonia, Total (as N)			104.7		%		85-115	09-AUG-19
WG3128201-9 MB								
Ammonia, Total (as N)			<0.010		mg/L		0.01	09-AUG-19
WG3128201-12 MS		**L2321617-1**						
Ammonia, Total (as N)			93.2		%		75-125	09-AUG-19
NO2-IC-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Nitrite (as N)		<0.010	<0.010	RPD-NA	mg/L	N/A	20	02-AUG-19
WG3122819-22 LCS								
Nitrite (as N)			103.0		%		90-110	02-AUG-19
WG3122819-21 MB								
Nitrite (as N)			<0.010		mg/L		0.01	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Nitrite (as N)			105.2		%		75-125	02-AUG-19
NO3-IC-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Nitrate (as N)		0.830	0.830		mg/L	0.0	20	02-AUG-19
WG3122819-22 LCS								
Nitrate (as N)			101.1		%		90-110	02-AUG-19
WG3122819-21 MB								
Nitrate (as N)			<0.020		mg/L		0.02	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Nitrate (as N)			103.5		%		75-125	02-AUG-19
P-T-COL-WT	Water							
Batch R4743483								
WG3126044-3 DUP		**L2320339-6**						
Phosphorus, Total		0.0839	0.0855		mg/L	1.9	20	08-AUG-19
WG3126044-2 LCS								
Phosphorus, Total			99.0		%		80-120	08-AUG-19
WG3126044-1 MB								
Phosphorus, Total			<0.0030		mg/L		0.003	08-AUG-19
WG3126044-4 MS		**L2320339-6**						
Phosphorus, Total			94.9		%		70-130	08-AUG-19
PH-WT	Water							

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PH-WT	Water							
Batch R4737304								
WG3122692-4 DUP		**WG3122692-3**						
pH		6.47	6.45	J	pH units	0.02	0.2	02-AUG-19
WG3122692-2 LCS								
pH			7.01		pH units		6.9-7.1	02-AUG-19
PHENOLS-4AAP-WT	Water							
Batch R4737245								
WG3121581-7 DUP		**L2318400-1**						
Phenols (4AAP)		<0.0010	<0.0010	RPD-NA	mg/L	N/A	20	01-AUG-19
WG3121581-6 LCS								
Phenols (4AAP)			101.2		%		85-115	01-AUG-19
WG3121581-5 MB								
Phenols (4AAP)			<0.0010		mg/L		0.001	01-AUG-19
WG3121581-8 MS		**L2318400-1**						
Phenols (4AAP)			94.3		%		75-125	01-AUG-19
SO4-IC-N-WT	Water							
Batch R4740193								
WG3122819-25 DUP		**WG3122819-23**						
Sulfate (SO4)		16.8	16.8		mg/L	0.0	20	02-AUG-19
WG3122819-22 LCS								
Sulfate (SO4)			102.2		%		90-110	02-AUG-19
WG3122819-21 MB								
Sulfate (SO4)			<0.30		mg/L		0.3	02-AUG-19
WG3122819-24 MS		**WG3122819-23**						
Sulfate (SO4)			105.0		%		75-125	02-AUG-19
SOLIDS-TDS-WT	Water							
Batch R4739495								
WG3123950-3 DUP		**L2318400-3**						
Total Dissolved Solids		96	95		mg/L	0.3	20	04-AUG-19
WG3123950-2 LCS								
Total Dissolved Solids			100.8		%		85-115	04-AUG-19
WG3123950-1 MB								
Total Dissolved Solids			<10		mg/L		10	04-AUG-19
Batch R4744503								
WG3124100-3 DUP		**L2319505-1**						
Total Dissolved Solids		826	827		mg/L	0.1	20	07-AUG-19
WG3124100-2 LCS								
Total Dissolved Solids			100.3		%		85-115	07-AUG-19

Quality Control Report

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SOLIDS-TDS-WT	Water							
Batch R4744503								
WG3124100-1 MB								
Total Dissolved Solids			<10		mg/L		10	07-AUG-19
TKN-WT	Water							
Batch R4742622								
WG3124982-3 DUP		**L2320241-2**						
Total Kjeldahl Nitrogen		0.44	0.57	J	mg/L	0.12	0.3	07-AUG-19
WG3124982-2 LCS								
Total Kjeldahl Nitrogen			101.2		%		75-125	07-AUG-19
WG3124982-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-AUG-19
WG3124982-4 MS		**L2320241-2**						
Total Kjeldahl Nitrogen			103.5		%		70-130	07-AUG-19
Batch R4742627								
WG3125405-3 DUP		**L2320801-1**						
Total Kjeldahl Nitrogen		0.95	0.82		mg/L	15	20	07-AUG-19
WG3125405-2 LCS								
Total Kjeldahl Nitrogen			98.4		%		75-125	07-AUG-19
WG3125405-1 MB								
Total Kjeldahl Nitrogen			<0.15		mg/L		0.15	07-AUG-19
WG3125405-4 MS		**L2320801-1**						
Total Kjeldahl Nitrogen			80.3		%		70-130	07-AUG-19
TOC-WT	Water							
Batch R4743210								
WG3125378-3 DUP		**L2318373-1**						
Total Organic Carbon		1.93	1.99		mg/L	3.2	20	07-AUG-19
WG3125378-2 LCS								
Total Organic Carbon			101.6		%		80-120	07-AUG-19
WG3125378-1 MB								
Total Organic Carbon			<0.50		mg/L		0.5	07-AUG-19
WG3125378-4 MS		**L2318373-1**						
Total Organic Carbon			102.3		%		70-130	07-AUG-19

Quality Control Report

Workorder: L2320919 Report Date: 12-AUG-19

Client: GHD Limited (Waterloo)
3061, rue Joseph-A Bombardier
Laval QC H7P 6C5
Contact: Pascal Renella

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

Chain of Custody (COC) / Analytical Request Form

ALS Environmental
www.alsglobal.com

Canada Toll Free: 1 800 668 9878

L2320919-COFC

COC Number: 17 - AP

Page 1 of 1 KH

Report To	Contact and company name below will appear on the final report
Company:	GHD LIMITED - ACCT #13791
Contact:	Pascal Renella
Phone:	450-973-4165
	Company address below will appear on the final report
Street:	455 Phillip St
City/Province:	Waterloo, Ontario
Postal Code:	N2L 3X2
Invoice To	Same as Report To ☑ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☑ NO
Company:	GHD Limited
Contact:	Pascal Renella

Report Format / Distribution	
Select Report Format:	☑ PDF ☑ EXCEL ☑ EDD (DIGITAL)
Quality Control (QC) Report with Report	☑ YES ☐ NO
☐ Compare Results to Criteria on Report - provide details below if box checked	
Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	pascal.renella@ghd.com
Email 2	See PO
Email 3	

Invoice Distribution	
Select Invoice Distribution:	☐ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax	pascal.renella@ghd.com
Email 2	

Project Information	
ALS Account # / Quote #:	13791
Job #:	45804-58
PO / AFE:	73510913-1
LSD:	

Oil and Gas Required Fields (client use)	
AFE/Cost Center:	PO#
Major/Minor Code:	Routing Code:
Requisitioner:	
Location:	

ALS Lab Work Order # (lab use only): L2320919 AP **ALS Contact:** Rick H **Sampler:** J. Leader

Select Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)

Regular [R] ☑ Standard TAT if received by 3 pm - business days - no surcharges apply

PRIORITY (Business Days)		EMERGENCY	
	4 day [P4-20%] ☐		1 Business day [E - 100%] ☐
	3 day [P3-25%] ☐		Same Day, Weekend or Statutory holiday [E2 -200%] ☐
	2 day [P2-50%] ☐		(Laboratory opening fees may apply)]

Date and Time Required for all E&P TATs: dd-mmm-yy hh:mm

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	NUMBER OF CONTAINERS	Anions5 (Cl, F, SO4, NO2, NO3)	Alkalinity, pH	Conductivity	Total ~~Dissolved~~ Metals (Field Filter) -Select	TKN, NH3, TP, TOC, Phenols	DOC (~~Field Filter~~ Lab Filt	TDS	Hardness-Calc	Field pH	Field Temp °C					SAMPLES ON HOLD	SUSPECTED HAZARD (see Special Instructions)
									P												
	GW-45804-073019-JL-100	30-JUL-19	10:23	Water	5	R	R	R	R	R	R	R	R	7.13	18.80						
	↓ ↓ ↓ 101	30-JUL-19	12:48	Water	5	R	R	R	R	R	R	R	R	7.16	18.89						
	102	30-JUL-19	16:07	Water	5	R	R	R	R	R	R	R	R	7.15	19.03						

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ YES ☑ NO

Are samples for human consumption/ use? ☐ YES ☐ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)

LAB filter DOC (Not preserved)

ODWS and PWQO Requirments Select Metals: Al,As,Ba,B,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Na,Se,Zn

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen ☐ SIF Observations Yes ☐ No ☐

Ice Packs ☒ Ice Cubes ☒ Custody seal intact Yes ☐ No ☐

Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C			
1.8				0.4			

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:
	July 31, 2019	8:30	EUSTAS FARASSIOON	JULY 31, 2019	9:00		08/01/19	8:55

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY

JUNE 2018 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

If any water samples are taken from a **Regulated Drinking Water (DW) System**, please submit using an **Authorized DW COC form.**

004049

Appendix E
2010 – 2019 Analytical Data

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MHD-009	GW-45804-110511-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
Sample Type:				Duplicate		Duplicate			
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0046	0.0013	0.0013	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.050)
Cadmium (dissolved)	mg/L	0.00031	0.00023	0.00024	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.00050)
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Iron (dissolved)	mg/L	1.04	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L	62.4	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0987	0.0211	0.0224	0.0093	0.0071	0.0016	0.0035	0.0066
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0930	0.0652	0.0780	0.0135	0.0147	0.0132	0.0152	0.0328
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	0.0021
Zinc (dissolved)	mg/L	0.0199	0.0482	0.0052	ND(0.0030)	ND(0.0030)	0.0043	0.0147	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	300	279	278	316	322	278	278	259
Ammonia-N	mg/L	0.123	0.077	0.076	0.073	0.059	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	15
Chloride	mg/L	25.1	28.4	31.8	27.5	27.4	21.8	55.7	43.9
Color (apparent)	TCU	10.2	16.9	19.7	38.3	42.9	34.4	16.3	52.4
Conductivity	umhos/cm	1080	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	1.6	1.7	3.5	5.0	3.1	2.5	ND(5.0)
Escherichia coli	cfu/100mL	0	0	0	0	0	0	2	0
Fecal coliform bacteria	cfu/100mL	0	0	0	1	0	0	4	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)
pH, lab	s.u.	7.97	--	--	--	--	--	--	7.96
Phenol	mg/L	--	--	--	--	--	--	--	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.376	0.105	0.060	0.093	0.079	0.075	ND(0.030)	0.240
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	3	1	10	120	430	1	60	0
Total dissolved solids (TDS)	mg/L	736	618	590	766	778	482	1040	780
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	0.29
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	303
Turbidity	NTU	2.70	--	--	--	--	--	--	149
Un-ionized ammonia	mg/L	0.0000050	0.00118	0.00119	0.000095	0.000076	ND(0.00012)	ND(0.000049)	--
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.27	0.002	0.002	1.02	1.02	0.95	1.02	1.3
Dissolved oxygen (DO), field	mg/L	4.42	--	--	1.47	1.47	--	1.47	2.87
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	38	38	394	394	--	120	51
pH, field	s.u.	5.05	7.75	7.75	6.82	6.82	7.08	5.58	6.87
Temperature, field	Deg C	9.6	12.5	12.5	6.4	6.4	6.61	8.7	9.81
Turbidity, field	NTU	424	--	--	--	--	150	99	504

004051

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-011310-TS-001	GW-45804-051910-MB-010	GW-45804-051910-MB-011	GW-45804-110210-TS-001	GW-45804-110210-TS-002	GW-45804-051711-MHD-009	GW-45804-110511-TS-001	GW-45804-051512-MB-011
Sample Date:		1/13/2010	5/19/2010	5/19/2010	11/2/2010	11/2/2010	5/17/2011	11/9/2011	5/15/2012
Sample Type:				Duplicate		Duplicate			
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	380	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.0073
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

004052

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-012	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-015	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-016	GW-45804-051816-TS-017
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00025	ND(0.0010)
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.024	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00065	ND(0.0050)
Cobalt (dissolved)	mg/L	0.00057	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	0.0019	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00048	ND(0.0020)
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.000060	ND(0.00050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0273	0.0614	0.0942	0.0055	ND(0.0010)	0.0012	ND(0.00050)	0.0386
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0200	0.0148	0.0165	0.0459	0.0300	0.121	0.0182	0.191
Nickel (dissolved)	mg/L	0.0034	0.0021	0.0023	ND(0.0020)	0.0028	0.0043	0.00233	0.0063
Zinc (dissolved)	mg/L	ND(0.0030)	0.0075	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0013	ND(0.010)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	308	275	285	262	283	250	278	239
Ammonia-N	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.051	ND(0.113)	ND(0.050)	ND(0.036)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	36	11	30	12	ND(10)	ND(10)	ND(10)	14
Chloride	mg/L	65.4	49	43.1	48.6	52.5	59.6	44.1	64.3
Color (apparent)	TCU	45.5	34.0	50.7	10.4	13.3	11.2	17.2	17.1
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	2.2	2.9	2.7	1.5	1.7	3.4	2.9
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0	1	0	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	2	0	1	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.032
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.76	7.67	7.62	7.62	7.52	7.81	7.62	7.93
Phenol	mg/L	ND(0.0010)	0.0030	0.0012	0.0045	ND(0.0010)	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	0.0017	0.0019	ND(0.0010)
Phosphorus	mg/L	0.301	0.038	0.166	0.074	ND(0.030)	0.042	0.035	0.0778
Sulfate	mg/L	495	292	445	222	456	474	413	506
Total coliform bacteria	cfu/100mL	120	ND(100)	200	5	50	30	170	ND(10)
Total dissolved solids (TDS)	mg/L	1130	714	1020	613	994	982	884	1060
Total kjeldahl nitrogen (TKN)	mg/L	ND(0.15)	0.16	1.34	ND(0.52)	0.18	ND(0.15)	0.23	0.25
Total suspended solids (TSS)	mg/L	842	99.0	209	108	72.8	116	42.0	101
Turbidity	NTU	13.8	13.5	6.82	4.84	44.8	8.42	36.7	70.5
Unionized ammonia	mg/L	ND(0.00042)	ND(0.0000015)	ND(0.000017)	ND(0.00017)	0.00030	0.00103	ND(0.0017)	0.0021
Field Parameters									
Color	TCU	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm	1.21	1.16	1.46	0.946	434	0.954	1.03	0.983
Dissolved oxygen (DO), field	mg/L	1.53	5.1	7.8	4.73	8.64	8.93	9	1.26
Odor	none	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	16	--	--	105	60	175	-40	76
pH, field	s.u.	7.58	5.09	6.16	7.24	7.48	7.52	6.31	6.32
Temperature, field	Deg C	9.8	11.3	10.4	8.09	8.44	12.6	12.08	13.77
Turbidity, field	NTU	473	393	25	164	--	211	0.3	21

004053

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111312-MB-012	GW-45804-052213-TS-008	GW-45804-111413-TS-014	GW-45804-052914-MB-016	GW-45804-112614-TS-014	GW-45804-052815-TS-015	GW-45804-111015-TS-018	GW-45804-051816-TS-017
Sample Date:		11/13/2012	5/22/2013	11/14/2013	5/29/2014	11/26/2014	5/28/2015	11/10/2015	5/18/2016
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	ND(250)	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	0.094	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	0.212	--	--	--	--	--	--
Acenaphthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Acenaphthylene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Acridine	µg/L	--	ND(4.0)	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benzo(a)anthracene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0052	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	ND(0.040)	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	ND(0.080)	--	--	--	--	--	--
Chrysene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Fluoranthene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Fluorene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Naphthalene	µg/L	--	0.113	--	--	--	--	--	--
Phenanthrene	µg/L	--	ND(0.020)	--	--	--	--	--	--
Pyrene	µg/L	--	ND(0.020)	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111616-TS-014	GW-45804-060217-TS-015	GW-45804-113017-TS-012	GW-45804-051619-TS-016	GW-45804-110816-TS-015	GW-45804-051619-JC-017	GW-045804-112719-JC-015
Sample Date:		11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	5/16/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.00026	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.022	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	0.000013	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	ND(0.00010)	--	--	--	--	--	--
Copper (dissolved)	mg/L	ND(0.00065)	--	--	--	--	--	--
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.015	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	0.000067	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	ND(0.00050)	0.0185	ND(0.00050)	0.00054	0.00270	0.0226	0.00074
Mercury (dissolved)	mg/L	ND(0.000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0152	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00226	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0089	--	--	--	--	--	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	277	270	286	248	285	240	255
Ammonia-N	mg/L	ND(0.020)	ND(0.111)	ND(0.264)	ND(0.224)	ND(0.218)	ND(0.020)	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	13	--	--	--	--	--	--
Chloride	mg/L	56.9	--	--	--	--	--	--
Color (apparent)	TCU	4.2	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.4	1.7	ND(3.0)	1.9	ND(5.00)	2.35	3.04
Escherichia coli	cfu/100mL	0	1	1	ND(0)	1	0	1
Fecal coliform bacteria	cfu/100mL	0	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)	ND(0.020)	0.032	0.020	0.054	ND(0.10)
Nitrite (as N)	mg/L	ND(0.010)	--	--	--	--	--	--
pH, lab	s.u.	7.24	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--
Phenolics (total)	mg/L	ND(0.0055)	--	--	--	--	--	--
Phosphorus	mg/L	0.0186	0.0134	0.0245	0.0075	0.0091	0.0143	0.0223
Sulfate	mg/L	361	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	30	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	667	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	0.24	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	11.7	--	--	--	--	--	--
Turbidity	NTU	15.0	--	--	--	--	--	20.1
Un-ionized ammonia	mg/L	ND(0.000045)	--	--	--	--	--	ND(0.000055)
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.953	0.847	0.536	0.501	1.19	0.898	1.45
Dissolved oxygen (DO), field	mg/L	0	0	0	0	0.36	0	0.33
Odor	none	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	55	44	99	70	-11	5	99
pH, field	s.u.	6.96	7.4	7.62	7.44	7.45	7.2	7.21
Temperature, field	Deg C	11.09	11.21	8.56	14.71	10.82	10.29	8.4
Turbidity, field	NTU	14.6	2.2	17.8	8.7	0	15.5	8.3

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08	MW3-08
Sample ID:		GW-45804-111616-TS-014	GW-45804-060217-TS-015	GW-45804-113017-TS-012	GW-45804-051618-TS-016	GW-45804-110816-TS-015	GW-45804-051619-JC-017	GW-045804-112719-JC-015
Sample Date:		11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	5/16/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalens	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	--	--	--	--	--	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

004056

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-RMD-006	GW-45804-110911-TS-005	GW-45804-051412-MB-001	GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	0.052	--	0.072	0.056
Cadmium (dissolved)	mg/L	0.00027	0.00015	0.00010	0.00012	--	ND(0.00010)	0.00020
Chromium (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	0.00122	--	0.00373	0.00056
Copper (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	0.0014
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	0.320	ND(0.050)
Lead (dissolved)	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.10	0.451	0.405	0.464	--	0.320	0.416
Mercury (dissolved)	mg/L	--	--	--	ND(0.00010)	--	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0299	0.0180	0.0235	0.0192	--	0.0461	0.0204
Nickel (dissolved)	mg/L	--	--	--	0.0110	--	0.0053	0.0083
Zinc (dissolved)	mg/L	0.0691	0.0131	0.0090	ND(0.0030)	--	0.0053	0.0105
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	367	416	379	388	--	387	405
Ammonia-N	mg/L	0.089	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	ND(10)	--	23	13
Chloride	mg/L	94.6	73.6	70.4	81.3	--	72.3	78
Color (apparent)	TCU	26.3	36.5	77.5	--	91.7	39.4 J	29.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.6	2.4	6.7	2.0	--	1.7	1.6
Escherichia coli	cfu/100mL	0	0	ND(2)	--	0	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	0	ND(2)	--	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)
pH, lab	s.u.	--	--	--	7.54	--	7.67	7.60
Phenol	mg/L	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--
Phosphorus	mg/L	0.156	0.098	0.479	0.100	--	0.226	0.058
Sulfate	mg/L	--	--	--	--	--	697	731
Total coliform bacteria	cfu/100mL	0	40	2	--	16	2	ND(100)
Total dissolved solids (TDS)	mg/L	1650	1330	1480	1530	--	1540	1450
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	0.21	--	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	--	--	--	24.0	--	1370	100
Turbidity	NTU	--	--	--	--	22.0	4.60 J	10.3
Un-ionized ammonia	mg/L	0.00049	ND(0.0000084)	ND(0.00012)	--	--	ND(0.00049)	ND(0.0000023)
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.855	2.19	2.25	2.06	2.03	1.75	1.99
Dissolved oxygen (DO), field	mg/L	--	--	--	--	--	4.99	5.26
Odor	none	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	--	--	--	18	47
pH, field	s.u.	7.44	5.95	7.00	6.43	6.27	7.57	5.20
Temperature, field	Deg C	11.7	7.78	10.5	11.89	12.51	12.0	13.4
Turbidity, field	NTU	--	455	389	--	--	355	594

004057

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-051910-MB-008	GW-45804-051711-RMD-006	GW-45804-110911-TS-005	GW-45804-051412-MB-001	GW-45804-052312-MB-006	GW-45804-111212-MB-010	GW-45804-052213-TS-007
Sample Date:		5/19/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	340	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	340	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	320	ND(250)	ND(250)	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	660	ND(250)	ND(250)	--	ND(250)	ND(250)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Acridine	µg/L	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L	0.0087	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluorene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Naphthalene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Phenanthrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)
Pyrene	µg/L	--	--	--	--	--	ND(0.020)	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

004058

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-111413-TS-012	GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Boron (dissolved)	mg/L	0.058	0.052	0.062	0.060	ND(0.10)	0.054	ND(0.10)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000049	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	0.00068	ND(0.0050)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	0.00021	ND(0.0010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0020)	0.00050	0.0017
Iron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)	ND(0.010)	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.000050)	ND(0.00050)
Manganese (dissolved)	mg/L	0.220	0.270	0.0861	0.167	0.154	0.267	0.160
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)
Molybdenum (dissolved)	mg/L	0.0195	0.0201	0.0232	0.0199	0.0242	0.0188	0.0211
Nickel (dissolved)	mg/L	0.0063	0.0061	0.0051	0.0055	0.0052	0.00675	0.0064
Zinc (dissolved)	mg/L	0.0041	ND(0.0030)	0.0097	ND(0.0030)	ND(0.010)	0.0017	ND(0.010)
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	372	360	336	343	349	338	342
Ammonia-N	mg/L	ND(0.050)	ND(0.067)	ND(0.050)	ND(0.050)	ND(0.050)	0.030	0.048
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	21	ND(10)	ND(10)	ND(10)	ND(10)	ND(10)	10
Chloride	mg/L	69.2	68.1	68	77.6	82.6	70.8	95.9
Color (apparent)	TCU	61.7	1.7 J	10.9	2.4	1.6	ND(1.0)	ND(2.0)
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.9	ND(1.0)	1.4	1.5	2.2	3.5	1.1
Escherichia coli	ctu/100mL	0	0	0	0	0	0	0
Fecal coliform bacteria	ctu/100mL	0	0	0	0	0	0	0
Nitrate (as N)	mg/L	0.13	ND(0.10)	ND(0.50)	0.32	0.18	0.18	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
pH, lab	s.u.	7.58	7.40	7.66	7.77	7.63	7.79	7.08
Phenol	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	--	--	--
Phenolics (total)	mg/L	--	--	--	0.0058	0.0029	ND(0.0010)	0.0020
Phosphorus	mg/L	0.109	ND(0.050)	0.032	ND(0.030)	ND(0.030)	ND(0.0030)	0.0036
Sulfate	mg/L	681	621	695	665	755	660	816
Total coliform bacteria	ctu/100mL	ND(10)	0	9	9	1	1	0
Total dissolved solids (TDS)	mg/L	1510	1370	1290	1300	1380	1500	1620
Total kjeldahl nitrogen (TKN)	mg/L	0.18	ND(0.21)	ND(0.15)	ND(0.15)	0.56	ND(0.15)	0.15
Total suspended solids (TSS)	mg/L	361	7.2	10.0	8.5	2.4	ND(2.0)	ND(2.0)
Turbidity	NTU	6.56	0.22	4.22	ND(0.44)	0.69	0.16	1.21
Un-ionized ammonia	mg/L	ND(0.000019)	0.00024	ND(0.00012)	ND(0.00015)	ND(0.0016)	0.00029	0.000194
Field Parameters								
Color	TCU	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm	0.96	2.04	--	1.42	1.4	1.22	1.69
Dissolved oxygen (DO), field	mg/L	7.73	0.58	--	2.21	0	5.67	0
Odor	none	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	99	--	181	-7	106	77
pH, field	s.u.	6.20	7.11	7.07	6.93	8.15	7.58	7.24
Temperature, field	Deg C	10.4	12.62	8.5	15.63	10.14	11.88	10.39
Turbidity, field	NTU	56	57	--	0	0.6	1	2

GHD 045804 (8),

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08	MW4-08
Sample ID:		GW-45804-111413-TS-012	GW-45804-052914-MB-005	GW-45804-112514-TS-001	GW-45804-052815-TS-016	GW-45804-111015-TS-013	GW-45804-051716-TS-007	GW-45804-111516-TS-008
Sample Date:		11/14/2013	5/29/2014	11/25/2014	5/28/2015	11/10/2015	5/17/2016	11/15/2016
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0061	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-251810-RB-009	GW-45804-110210-TB-011	GW-45804-051711-MSD-007	GW-45804-110911-TB-002	GW-45804-051412-MB-002	GW-45804-052313-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TB-009	GW-45804-111413-TB-013	GW-45804-052214-MB-006	GW-45804-112512-TB-002
Sample Date:		5/18/2010	11/2/2010	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013	5/28/2014	11/25/2014
Sample Type:												
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	0.0055	0.0021	0.0012	0.0012	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L	--	--	--	--	0.059	--	0.059	0.065	0.070	0.055	0.071
Cadmium (dissolved)	mg/L	0.00017	0.00014	ND(0.00010)	ND(0.00010)	0.00010	--	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	--	0.00231	--	0.00186	0.00287	0.00144	0.00061	0.00145
Copper (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	0.400	0.487	0.301	0.781	0.089	--	ND(0.050)	0.247	1.86	0.221	0.382
Lead (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	1.25	0.583	0.520	0.292	0.372	--	0.422	0.317	0.218	0.182	0.234
Mercury (dissolved)	mg/L	--	--	--	--	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0467	0.0409	0.0370	0.0360	0.0317	--	0.0225	0.0462	0.0351	0.0445	0.0397
Nickel (dissolved)	mg/L	--	--	--	--	0.0054	--	0.0110	0.0058	0.0023	0.0022	ND(0.0020)
Zinc (dissolved)	mg/L	0.104	0.0112	0.0041	ND(0.0030)	ND(0.0030)	--	0.0073	0.0054	ND(0.0030)	ND(0.0030)	0.0095
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	459	427	376	357	351	--	396	383	350	309	329
Ammonia-N	mg/L	0.117	0.064	0.081	0.062	ND(0.050)	--	ND(0.050)	0.060	ND(0.050)	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	--	ND(10)	--	13	21	42	ND(10)	ND(10)
Chloride	mg/L	81.4	200	87.3	83.4	76.0	--	80.4	66	67.4	73.5	69
Color (apparent)	TCU	25.3	93.5	139	68.4	--	271	11.2 J	33.5	117	12.9	16.5
Dissolved organic carbon (DOC) (dissolved)	mg/L	2.3	1.0	2.7	3.1	1.7	--	1.8	1.6	2.3	2.0	1.7
Escherichia coli	cfu/100mL	0	0	0	ND(2)	--	0	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	ND(2)	--	0	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.20)	ND(0.30)	0.13	--	ND(0.10)	ND(0.50)	ND(0.10)	0.24	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.10)	--	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.	--	--	--	--	7.67	--	7.74	7.73	7.58	7.48	7.72
Phenol	mg/L	--	--	--	--	ND(0.0010)	--	ND(0.0010)	0.0040	ND(0.0010)	0.0018	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.974	1.05	1.23	1.49	0.672	--	0.293	0.906	1.75	0.070	0.697
Sulfate	mg/L	--	--	--	--	--	--	718	796	702	848	710
Total coliform bacteria	cfu/100mL	0	4	3	2	--	0	10	ND(10)	ND(10)	5	9
Total dissolved solids (TDS)	mg/L	1910	1820	1700	1730	1740	--	1800	1540	1460	1350	1460
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	0.19	--	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)	ND(0.15)
Total suspended solids (TSS)	mg/L	--	--	--	--	5260	--	528	1710	2950	110	61.2
Turbidity	NTU	--	--	--	--	--	57.0	2.60 J	84.0	19.4	22.0	9.33
Un-ionized ammonia	mg/L	0.00065	0.00001	0.00030	0.00014	--	--	ND(0.0005)	0.0000073	ND(0.0000018)	ND(0.000018)	ND(0.000018)
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	ND()	--	--
Conductivity, field	mS/cm	1.96	2.41	2.55	2.46	2.13	2.1	1.88	1.88	2.01	2	0.059
Dissolved oxygen (DO), field	mg/L	--	5.39	--	--	--	--	5.47	8.74	6.45	8.95	6.44
Odor	none	--	--	--	--	--	--	--	--	ND()	--	--
Oxidation reduction potential (ORP), field	millivolts	--	5	--	--	--	--	-78	-45	--	10	19
pH, field	s.u.	7.46	6.00	7.0	7.04	6.27	6.27	8.70	8.54	6.17	7.2	7.21
Temperature, field	Deg C	11.4	11.4	7.60	11.4	10.22	13.03	13.3	14.5	11.2	9.82	10.23
Turbidity, field	NTU	--	--	--	5	--	--	640	45	556	54.5	--
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F3 minus PAH	µg/L	570	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	280
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1320	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	300
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	3900	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	--	--	--	--	ND(100)	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2090	ND(270)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(380)	580

GHD 4566/ 8C.

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-45804-021910-RB-009	GW-45804-110210-TB-011	GW-45804-051711-MSD-007	GW-45804-110911-TB-002	GW-45804-051412-MB-002	GW-45804-052313-MB-005	GW-45804-111212-MB-008	GW-45804-052213-TB-009	GW-45804-111414-TB-013	GW-45804-052914-MB-004	GW-45804-112512-TB-002
Sample Date:		5/19/2016	11/2/2016	5/17/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/22/2013	11/14/2013	5/29/2014	11/25/2014
Sample Type:												
Parameters	Units											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	ND(0.0284)	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	ND(5.0)	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	0.038	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(a)pyrene	µg/L	0.0309	0.0199	0.0050	0.0074	0.0121	--	ND(0.010)	0.0063	ND(0.0050)	0.0064	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	ND(0.040)	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	ND(0.050)	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Dibenzo(a,h)anthracene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.038)	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

CHD 24567 REC.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-4580-052815-TS-012	GW-4580-111015-TS-015	GW-4580-051716-TS-008	GW-4580-111516-TS-007	GW-4580-060217-TS-014	GW-4580-112917-TS-008	GW-4580-051518-TS-005	GW-4580-110818-TS-010	GW-4580-061819-DUP-005	GW-4580-112719-TS-015
Sample Date:		5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/2/2017	11/29/2017	5/15/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:											
Parameters	**Units**										
Metals											
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.00010)	0.00017	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.064	0.10	0.056	0.074	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	0.000012	0.000021	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	0.00065	ND(0.0010)	0.00023	0.00036	--	--	--	--	--	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0020)	0.00035	0.00287	--	--	--	--	--	--
Iron (dissolved)	mg/L	0.380	0.13	0.045	0.410	0.055	0.38	ND(0.10) J	0.15	0.15	ND(0.10)
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.00050)	ND(0.000050)	ND(0.000050)	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.168	0.137	0.180	0.126	0.127	0.0711	0.154 J	0.0558	0.249	0.0582
Mercury (dissolved)	mg/L	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0415	0.0532	0.0266	0.0450	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.0022	ND(0.0050)	0.00136	0.00142	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0061	ND(0.010)	0.0029	ND(0.0010)	--	--	--	--	--	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	310	340	314	313	322	323	318 J	294	316	307
Ammonia-N	mg/L	ND(0.131)	ND(0.050)	0.027	0.073	ND(0.020)	0.194	ND(0.554) J	ND(0.020)	1.3	ND(0.020)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	ND(10)	ND(10)	ND(10)	14	--	--	--	--	--	--
Chloride	mg/L	63.7	71.4	64.4	77.2	--	--	--	--	--	--
Color (apparent)	TCU	17.7	7.8	3.8	13.2	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	1.3	1.8	2.0	1.3	1.6	3.5	2.0 J	ND(2.36)	1.97	2.46
Escherichia coli	cfu/100mL	0	0	0	0	0	0	ND(0) J	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.10	0.24	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	--	--	--	--	--
pH, field	s.u.	7.75	7.73	7.84	7.24	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0028	0.0030	ND(0.0010)	0.0034	--	--	--	--	--	--
Phosphorus	mg/L	0.045	ND(0.030)	0.0046	0.0093	0.0051	0.0156	0.0034 J	0.0162	0.0086	0.0214
Sulfate	mg/L	755	718	883	710	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	0	1	1	0	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	1280	1310	1420	1460	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	0.46	0.20	ND(0.15)	0.16	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	23.3	10.4	2.8	9.5	--	--	--	--	--	--
Turbidity	NTU	13.9	9.22	1.41	3.39	--	--	--	--	--	7.99
Un-ionized ammonia	mg/L	0.00041	ND(0.0019)	0.00058	0.00237	--	--	--	--	--	ND(0.000029)
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.89	1.78	1.94	1.58	1.57	1.09	1.62	2.08	1.66	1.89
Dissolved oxygen (DO), field	mg/L	1.63	0	0	0.15	0.19	0	0	2.06	0	1.06
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	181	-89	45	-55	-36	41	-20	-80	-64	19
pH, field	s.u.	6.98	8.21	7.66	7.09	7.15	7.68	7.3	7.38	8.53	6.84
Temperature, field	Deg C	14.98	11.14	15.72	11.98	13.14	10.04	11.6	11.00	15.86	6.85
Turbidity, field	NTU	34.3	5.8	6.5	1.4	20.4	2.4	20	18.2	22.1	12.5
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	ND(100)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	ND(250)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	ND(250)	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(360)	ND(360)	ND(360)	ND(360)	--	--	--	--	--	--

GHD 2156677 (E)

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:		MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09	MW4-09
Sample ID:		GW-4580-052815-TS-012	GW-4580-111015-TS-015	GW-4580-051716-TS-008	GW-4580-111516-TS-007	GW-4580-060217-TS-014	GW-4580-112917-TS-008	GW-4580-051518-TS-005	GW-4580-110818-TS-010	GW-4580-061819-JC-003	GW-4580-112719-JC-015
Sample Date:		5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/2/2017	11/29/2017	5/15/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:											
Parameters	**Units**										
Semi-Volatiles											
1-diethylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-diethylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-diethylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-002	GW-45804-081611-TS-004	GW-45804-111011-TS-009
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011
Sample Type:									
Parameters	**Units**								
Metals									
Aluminum (dissolved)	mg/L	-	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	0.0017	0.0032	0.0096	0.0101	0.0196	ND(0.010)	0.0026
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	ND(0.00010)
Calcium (dissolved)	mg/L	-	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	0.068	ND(0.050)	0.178	0.252	ND(0.050)	0.058	2.89	0.154
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	98.1	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.462	0.570	0.859	1.81	0.797	1.50	1.56	1.11
Mercury (dissolved)	mg/L	-	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.0633	0.0020	0.0012	ND(0.0010)	ND(0.0010)	0.0010	ND(0.010)	ND(0.0010)
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	-	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.180	0.0074	0.0256	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--
General Chemistry									
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	175	831	442	510	499	983	452	477
Ammonia-N	mg/L	ND(0.050)	61.6	27.2	18.5	22.2	89.1	15.8	23.0
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	423	ND(2.0)	14.4	8.5	40.6	2.5	12.6
Chemical oxygen demand (COD)	mg/L	-	--	--	--	--	--	--	--
Chloride	mg/L	29.7	38.8	93.4	166	89.7	82.1	67.8	74.1
Color (apparent)	TCU	6.1	181	53.2	167	239	102	114	17.9
Conductivity	umhos/cm	1920	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.0	256	9.0	90.0	16.7	25.0	9.3	7.7
Escherichia coli	cfu/100mL	0	20	24	1700	17	108	1	2
Fecal coliform bacteria	cfu/100mL	0	50	90	6000	80	160	20	10
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	0.27	ND(0.30)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)	ND(0.30)
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.90	--	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09	MW101-09
Sample ID:		GW-45804-011410-MB-001	GW-45804-051810-MB-006	GW-45804-081910-MMD-003	GW-45804-110210-TS-004	GW-45804-021511-MB-004	GW-45804-051711-MMD-002	GW-45804-081611-TS-004	GW-45804-111011-TS-009
Sample Date:		1/14/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	5/17/2011	8/16/2011	11/10/2011
Sample Type:									
Parameters	**Units**								
General Chemistry (cont'd)									
Phosphorus	mg/L	ND(0.030)	0.672	0.751	0.319	0.439	0.570	0.127	0.134
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	0	80	350	16000	13700	1510	290	210
Total dissolved solids (TDS)	mg/L	1720	1960	1760	1640	1530	2290	1660	1610
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--
Turbidity	NTU	1.04	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L	ND(0.000019)	0.612	0.0224	0.0474	0.0160	0.0645	0.0523	0.0836
Field Parameters									
Conductivity, field	mS/cm	1.17	3.02	2.23	2.1	0.036	4.19	2.97	2.43
Dissolved oxygen (DO), field	mg/L	1.73	26.8	0	0	--	--	0	2.48
Oxidation reduction potential (ORP), field	millivolts	23	-341	-288	-282	-333	--	-279	-238
pH, field	s.u.	6.40	7.51	6.16	6.79	6.47	6.26	6.86	6.87
Temperature, field	Deg C	4.8	14.07	22.3	17.2	11.0	15.99	21.7	17.5
Turbidity, field	NTU	185	--	--	--	--	--	166	15.3
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	270	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

004066

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-08	MW101-09	MW101-05	MW101-09	MW101-02	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
Sample Type:				Duplicate			
Parameters	**Units**						
Metals							
Aluminum (dissolved)	mg/L	--	--	--	--	ND(0.10)	--
Antimony (dissolved)	mg/L	--	--	--	--	ND(0.050)	--
Arsenic (dissolved)	mg/L	0.0073	--	--	ND(0.0010)	ND(0.010)	0.0055
Barium (dissolved)	mg/L	--	--	--	--	0.11	--
Beryllium (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Bismuth (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Boron (dissolved)	mg/L	ND(0.050)	--	--	0.064	ND(0.50)	0.089
Cadmium (dissolved)	mg/L	ND(0.00010)	--	--	ND(0.00010)	ND(0.00090)	ND(0.00010)
Calcium (dissolved)	mg/L	--	--	--	--	282	--
Chromium (dissolved)	mg/L	0.0026	--	--	ND(0.0010)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L	0.00060	--	--	0.00470	ND(0.0050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	--	--	ND(0.0010)	ND(0.010)	ND(0.0010)
Iron (dissolved)	mg/L	ND(0.050)	--	--	1.45	ND(0.50)	3.24
Lead (dissolved)	mg/L	ND(0.0010)	--	--	ND(0.0010)	ND(0.010)	ND(0.0010)
Magnesium (dissolved)	mg/L	--	--	--	--	98.9	--
Manganese (dissolved)	mg/L	0.536	--	--	1.21	1.12	1.17
Mercury (dissolved)	mg/L	ND(0.00010)	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0021	--	--	0.0102	ND(0.010)	0.0129
Nickel (dissolved)	mg/L	0.0041	--	--	0.0059	ND(0.020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	--	--	--	--	ND(0.50)	--
Potassium (dissolved)	mg/L	--	--	--	--	24	--
Selenium (dissolved)	mg/L	--	--	--	--	ND(0.0040)	--
Silicon (dissolved)	mg/L	--	--	--	--	ND(10)	--
Silver (dissolved)	mg/L	--	--	--	--	ND(0.0010)	--
Sodium (dissolved)	mg/L	--	--	--	--	54.2	--
Strontium (dissolved)	mg/L	--	--	--	--	1.67	--
Thallium (dissolved)	mg/L	--	--	--	--	ND(0.0030)	--
Tin (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Titanium (dissolved)	mg/L	--	--	--	--	ND(0.020)	--
Tungsten (dissolved)	mg/L	--	--	--	--	ND(0.10)	--
Uranium (dissolved)	mg/L	--	--	--	--	ND(0.050)	--
Vanadium (dissolved)	mg/L	--	--	--	--	ND(0.010)	--
Zinc (dissolved)	mg/L	ND(0.0030)	--	--	0.0052	ND(0.020)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	--	--	ND(0.040)	--
General Chemistry							
Alkalinity, bicarbonate	mg/L	--	--	--	--	482	--
Alkalinity, carbonate	mg/L	--	--	--	--	ND(10)	--
Alkalinity, hydroxide	mg/L	--	--	--	--	ND(10)	--
Alkalinity, total (as CaCO3)	mg/L	941	268	285	284	445	486
Ammonia-N	mg/L	98.9	10.6	10.6	7.89	108	36.4
Biochemical oxygen demand (carbonaceous)	mg/L	149	ND(2.8)	ND(2.8)	ND(2.0)	ND(2.0)	50.4
Chemical oxygen demand (COD)	mg/L	524	--	--	11	42	114
Chloride	mg/L	--	92.9	95.9	106	87.3	157
Color (apparent)	TCU	310	61.2	48.9	60.4	34.4	189
Conductivity	umhos/cm	--	1810	1620	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	164	5.6	7.3	6.2	8.7	36.0
Escherichia coli	cfu/100mL	2970	28	41	1	30	10
Fecal coliform bacteria	cfu/100mL	150000	160 J	400 J	1	120	20
Nitrate (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(1.0)	ND(0.5)	ND(0.5)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite/Nitrate	mg/L	ND(2.0)	--	--	ND(0.20)	--	--
pH, lab	s.u.	7.95	7.37	7.74	7.87	7.75	7.82
Phenol	mg/L	0.0890	--	--	ND(0.0010)	0.0030	0.0280

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-08	MW101-09	MW101-09	MW101-09	MW101-08	MW101-09
Sample ID:		GW-45804-021512-MB-002	GW-45804-032112-MB-001	GW-45804-032112-MB-002	GW-45804-051612-MB-012	GW-45804-08-08-12-MB-004	GW-45804-111312-MB-011
Sample Date:		2/15/2012	3/21/2012	3/21/2012	5/16/2012	8/8/2012	11/13/2012
Sample Type:				Duplicate			
Parameters	**Units**						
General Chemistry (cont'd)							
Phosphorus	mg/L	1.36	0.150	0.142	0.079	0.310	0.135
Sulfate	mg/L	--	--	--	--	--	1060
Total coliform bacteria	cfu/100mL	93000	93000	96000	21	190	110
Total dissolved solids (TDS)	mg/L	1160	1560	1570	1530	1760	2240
Total kjeldahl nitrogen (TKN)	mg/L	127	--	--	9.54	110	40.6
Total suspended solids (TSS)	mg/L	10.0	--	--	6.8	7.2	17.0
Turbidity	NTU	200	7.00	6.50	13.0	2.60	53.0
Un-ionized ammonia	mg/L	--	0.000764	0.000763	--	--	0.668
Field Parameters							
Conductivity, field	mS/cm	2.62	2.29	2.29	2.23	2.75	3.42
Dissolved oxygen (DO), field	mg/L	--	--	--	1.6	0.59	0.83
Oxidation reduction potential (ORP), field	millivolts	--	--	--	123	-271	-548
pH, field	s.u.	6.8	5.38	5.38	6.8	8.2	7.70
Temperature, field	Deg C	11.87	12.3	13.3	15.79	24.2	16.5
Turbidity, field	NTU	50.3	189	189	52.3	4.3	8
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L	49	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	110	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	--	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	110	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles							
1-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--
Acenaphthene	µg/L	--	--	--	--	ND(0.020)	--
Acenaphthylene	µg/L	--	--	--	--	ND(0.020)	--
Anthracene	µg/L	ND(0.020)	--	--	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L	ND(0.010)	--	--	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	ND(0.020)	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Chrysene	µg/L	--	--	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	ND(0.020)	--
Fluoranthene	µg/L	--	--	--	--	ND(0.020)	--
Fluorene	µg/L	--	--	--	--	ND(0.020)	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	ND(0.020)	--
Naphthalene	µg/L	--	--	--	--	ND(0.053)	--
Phenanthrene	µg/L	--	--	--	--	ND(0.020)	--
Pyrene	µg/L	--	--	--	--	ND(0.020)	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014	GW-45804-051618-TS-021
Sample Date:			8/13/2015	8/13/2015	11/10/2015	6/2/2017	8/30/2017	8/30/2017	11/30/2017	5/16/2018
Sample Type:				Duplicate				Duplicate		
Parameters	**Units**	**TLP2**								
Metals										
Arsenic (dissolved)	mg/L		0.0140	0.0138	ND(0.0010)	--	--	--	--	--
Boron (dissolved)	mg/L		0.23	0.24	0.11	--	--	--	--	--
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	--	--	--	--	--
Chromium (dissolved)	mg/L		0.0321	0.0330	ND(0.0050)	--	--	--	--	--
Cobalt (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	--	--	--	--	--
Copper (dissolved)	mg/L		ND(0.0020)	ND(0.0020)	ND(0.0020)	--	--	--	--	--
Iron (dissolved)	mg/L	19.6	0.45	0.40	0.19	0.394	ND(0.10) J	ND(0.10) J	1.14	ND(0.10)
Lead (dissolved)	mg/L		ND(0.00050)	ND(0.00050)	ND(0.00050)	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	0.55	0.57	1.04	0.593	0.169 J	0.191 J	1.03	0.441
Mercury (dissolved)	mg/L		0.000038 J	0.000018 J	ND(0.000010)	--	--	--	--	--
Molybdenum (dissolved)	mg/L		0.00268	0.00266	0.00068	--	--	--	--	--
Nickel (dissolved)	mg/L		0.0075	0.0075	ND(0.0050)	--	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	--	--	--	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	996	1810	1820	496	344	1280 J	1250 J	442	467
Ammonia-N	mg/L	0.2	51.2	50.7	3.01	14.7	61.1 J	62.0 J	32.2	28.3
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		1340	1380	4.3	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L		2480	2840	38	--	--	--	--	--
Chloride	mg/L		483	480	162	--	--	--	--	--
Color (apparent)	TCU		1100	1110	119	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	986	1090	10.7	5.8	33.4 J	33.2 J	7.2	12.1
Escherichia coli	cfu/100mL	5	1000 J	4000 J	0	0	0 J	1 J	0	1
Fecal coliform bacteria	cfu/100mL		4000	4000	0	--	--	--	--	--
Nitrate (as N)	mg/L	0.5	ND(0.20)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.050)	--	--	--	--	--
Orthophosphate (dissolved)	mg/L		--	--	--	--	--	--	--	--
pH, lab	s.u.		7.11	7.15	7.52	--	--	--	--	--
Phenolics (total)	mg/L		1.07	1.07	0.0029	--	--	--	--	--
Phosphorus	mg/L	0.5	1.23	1.29	0.281	0.130	0.587 J	0.584 J	0.141	0.181
Sulfate	mg/L		399	391	848	--	--	--	--	--
Total coliform bacteria	cfu/100mL		100000	130000	40	--	--	--	--	--
Total dissolved solids (TDS)	mg/L		3800	3620	1630	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		85.7	86.1	7.98	--	--	--	--	--
Total suspended solids (TSS)	mg/L		12.3	15.6	64.1	--	--	--	--	--
Turbidity	NTU		463	418	81.3	--	--	--	--	--
Un-ionized ammonia	mg/L		0.198	--	0.292	--	--	--	--	--
Field Parameters										
Conductivity, field	mS/cm		5.44	--	2.48	1.7	2.86	--	2.2	1.96
Dissolved oxygen (DO), field	mg/L		1.37	--	3.33	3.13	7.56	--	1.85	13.26
Oxidation reduction potential (ORP), field	millivolts		-362	--	-215	-84	-239	--	-83	-272
pH, field	s.u.		8.59	--	8	7.44	7.23	--	7.54	7.38
Temperature, field	Deg C		21.61	--	16.66	16.04	20.73	--	15.8	15.68
Turbidity, field	NTU		182	--	242	9.7	8.3	--	45.1	10.3

004069

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:			GW-45804-081315-TS-009	GW-45804-081315-TS-010	GW-45804-111015-TS-002	GW-45804-060217-TS-017	GW-45804-083017-TS-008	GW-45804-083017-TS-009	GW-45804-113017-TS-014	GW-45804-051618-TS-021
Sample Date:			8/13/2015	8/13/2015	11/10/2015	6/2/2017	8/30/2017	8/30/2017	11/30/2017	5/16/2018
Sample Type:				Duplicate				Duplicate		
Parameters	**Units**	**TLP2**								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		--	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(380)	ND(380)	ND(380)	--	--	--	--	--
Semi-Volatiles										
Anthracene	µg/L		ND(0.035)	ND(0.020)	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	--	--	--	--	--
Misc										
Oil and grease	mg/L		--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-051618-TS-022	GW-45804-051518-TS-009	GW-45804-110915-TS-016	GW-45804-061619-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-019
Sample Date:		5/16/2018	5/15/2018	11/9/2018	6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:		Duplicate						
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	--	--	--	--	--	0.0014	--
Boron (dissolved)	mg/L	--	--	--	--	--	ND(0.10)	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	--
Chromium (dissolved)	mg/L	--	--	--	--	--	ND(0.0050)	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	ND(0.0010)	--
Copper (dissolved)	mg/L	--	--	--	--	--	ND(0.0020)	--
Iron (dissolved)	mg/L	ND(0.10)	4.20	0.18	ND(0.10)	--	ND(0.10)	0.83
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.00050)	--
Manganese (dissolved)	mg/L	0.435	1.42	1.21	0.388	--	0.424	1.45
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	ND(0.0050)	--
Zinc (dissolved)	mg/L	--	--	--	--	--	ND(0.010)	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	466	484	514	1150	--	--	380
Ammonia-N	mg/L	22.7	2.75	0.927	28.8	--	--	3.14
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	40	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	247	--	--
Chloride	mg/L	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	12.1	12.0	9.28	34	--	--	7.88
Escherichia coli	cfu/100mL	1	ND(0)	ND(0)	--	6	--	7
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.020)	0.139	ND(0.10)	--	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	ND(0.050)	--	--
Orthophosphate (dissolved)	mg/L	--	--	--	1.67	--	--	--
pH, lab	s.u.	--	--	--	--	7.72	--	--
Phenolics (total)	mg/L	--	--	--	--	0.056	--	--
Phosphorus	mg/L	0.181	0.0507	0.0049	3.32	--	--	0.450
Sulfate	mg/L	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	116	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	148	--	--
Turbidity	NTU	--	--	--	--	--	--	55.0
Un-ionized ammonia	mg/L	--	--	--	--	--	--	0.0536
Field Parameters								
Conductivity, field	mS/cm	--	1.88	1.99	2.99	--	--	2.88
Dissolved oxygen (DO), field	mg/L	--	1.25	5.24	0.55	--	--	1.64
Oxidation reduction potential (ORP), field	millivolts	--	-175	-78	-343	--	--	-162
pH, field	s.u.	--	7.12	7.29	7.08	--	--	6.6
Temperature, field	Deg C	--	19.64	14.4	19.5	--	--	15.71
Turbidity, field	NTU	--	1.1	19.3	0	--	--	1.4

004071

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15	EW107-15
Sample ID:		GW-45804-051618-TS-022	GW-45804-081518-TS-009	GW-45804-110915-TS-016	GW-45804-061819-TS-007	GW-045804-090419-JC-004	GW-045804-090519-JC-004	GW-045804-112819-JC-019
Sample Date:		5/16/2018	8/15/2018	11/9/2018	6/18/2019	9/4/2019	9/5/2019	11/28/2019
Sample Type:		Duplicate						
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--
Semi-Volatiles								
Anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--
Misc								
Oil and grease	mg/L	--	--	--	--	15.9	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E-1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:			GW-45804-030513-TS-005	GW-45804-052013-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052514-MB-016	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
Sample Type:										Duplicate	
Parameters	**Units**	**TLPZ**									
Metals											
Arsenic (dissolved)	mg/L		0.0045	0.0025	0.0012	0.0083	ND(0.0010)	0.0015	0.0139	0.0146	0.0057
Boron (dissolved)	mg/L		0.076	0.116	0.158	0.150	0.151	0.112	0.161	0.157	0.079
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	0.00027	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0015	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		0.00227	0.00085	ND(0.00050)	0.00251	ND(0.00050)	ND(0.00050)	0.00166	0.00174	0.00056
Copper (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0026	ND(0.0010)	0.0022	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.6	28.5	4.09	ND(0.050)	126	ND(0.050)	0.206	4.76	4.85	15.7
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	2.26	1.21	0.179	0.711	0.0299	0.530	1.18	1.23	1.82
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0543	0.0196	0.0177	0.0270	0.0160	0.0230	0.0263	0.0261	0.0164
Nickel (dissolved)	mg/L		0.0039	ND(0.0020)	ND(0.0020)	0.0071	0.0022	0.0030	0.0049	0.0050	ND(0.0020)
Zinc (dissolved)	mg/L		0.0085	0.0146	0.0074	0.0063	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0052	0.0111
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	99	368	464	409	687	479	468	507 J	519 J	486
Ammonia-N	mg/L	0.2	0.59	1.18	0.32	16.2	22.1	3.10	35.8 J	35.7 J	19.5
Biochemical oxygen demand (SOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		3.6	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	3.2	ND(2.0) J	ND(2.0) J	ND(2.0)
Chemical oxygen demand (COD)	mg/L		74	27	30	55	ND(41)	14	23 J	32 J	26
Chloride	mg/L		157	141	135	164	184	140	114 J	115 J	111
Color (apparent)	TCU		76.5	29.6 J	8.2	121	16.8 J	15.9	39.4 J	35.8 J	101
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	14.3	ND(7.8)	5.6	13.0	5.4	3.5	5.8 J	5.8 J	8.7
Escherichia coli	cfu/100mL	5	ND(2)	ND(2)	ND(2)	ND(2)	59	0	0 J	0 J	0
Fecal coliform bacteria	cfu/100mL		ND(2) J	ND(2)	2	ND(2)	90	0	0 J	0 J	0
Nitrate (as N)	mg/L	0.5	0.21	2.55	2.16	0.18	0.53	0.82	0.31 J	0.34 J	ND(0.50)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)
pH, lab	s.u.		7.26	7.82	7.20	7.37	7.23	7.42	7.15 J	7.15 J	7.66
Phenol	mg/L		ND(0.0010)	ND(0.0030)	ND(0.0010)	ND(0.0010)	0.0032	ND(0.0010)	ND(0.0010) J	ND(0.0010) J	ND(0.0010)
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.097	0.313	ND(0.030)	1.23	ND(0.030)	0.032	0.066 J	0.062 J	0.151
Sulfate	mg/L		1060	797	807	669	887	834	582 J	596 J	695
Total coliform bacteria	cfu/100mL		2	30	300	200	4200	50	0 J	0 J	1
Total dissolved solids (TDS)	mg/L		2180	1860	1880	1910	2040	1640	1430 J	1410 J	1550
Total Kjeldahl nitrogen (TKN)	mg/L		11.4	13.5	9.52	14.3	23.0	21.6	28.1 J	26.0 J	21.7
Total suspended solids (TSS)	mg/L		152	366	10.0	226	6.6	3.5	15.2 J	10.4 J	220
Turbidity	NTU		280	22.0	0.71	55.3	12.6	0.85	21.7 J	16.3 J	43.0
Unionized ammonia	mg/L		0.00226	0.00241	0.00211	0.00858	0.0436	0.352	1.59 J	1.49 J	0.0664
Field Parameters											
Color	TCU		--	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm		2.89	2.62	2.37	2.67	3.09	2.82	2.46	--	1.4
Dissolved oxygen (DO), field	mg/L		3.22	2.93	3.73	6.15	3.7	0.81	0.36	--	4.14
Odor	none		--	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-73	--	38	--	59	-62	-66	--	-75
pH, field	s.u.		5.32	5.74	5.60	5.29	7	7.09	6.02	6.02	7.07
Temperature, field	Deg C		5.4	16.5	22.32	15.5	8.31	17.57	22.61	22.6	13.19
Turbidity, field	NTU		329	97.5	24	73.9	38.8	27.5	16.2	--	--
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	360	ND(250)	2130	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	350	ND(250)	2110	ND(250)	ND(250)	ND(250) J	ND(250) J	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	920	ND(250)	7060	ND(250)	ND(250)	ND(250) J	ND(250) J	289
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	--	51400	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	1280	ND(250)	9210	ND(380)	ND(380)	ND(380) J	ND(380) J	ND(380)

004073

Uncontined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-030513-TS-005	GW-45804-052013-TS-016	GW-45804-080713-TS-007	GW-45804-111413-TS-004	GW-45804-042114-TS-003	GW-45804-052514-MB-016	GW-45804-082114-TS-001	GW-45804-082114-TS-002	GW-45804-112514-TS-004
Sample Date:		3/5/2013	5/23/2013	8/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	8/21/2014	11/25/2014
Sample Type:									Duplicate	
Parameters	**Units**	**TLPZ**								
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Acridine	µg/L	--	--	--	--	ND(4.0)	--	--	--	--
Anthracene	µg/L	0.048	0.59	ND(0.020)	0.67	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J	0.028
Benzo(a)anthracene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Benzo(a)pyrene	µg/L	0.097	1.26	0.0179	1.74	ND(0.0050)	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	0.0803
Benzo(b)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	ND(0.040)	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	ND(0.050)	--	--	--	--
Chrysene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Fluorene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Naphthalene	µg/L	--	--	--	--	ND(0.050)	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Pyrene	µg/L	--	--	--	--	ND(0.020)	--	--	--	--
Misc										
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--

Notes

ND Not detected at the associated reporting limit.
J Estimated concentration.

Uncontined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Rentsel Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-042815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-005	GW-45804-110915-TS-011	GW-45804-021016-TS-009	GW-45804-051616-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	5/16/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:											
Parameters	**Units**										
Metals											
Arsenic (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0130	0.0067	0.00467	--	--
Boron (dissolved)	mg/L	ND(0.10)	0.13	0.17	0.12	ND(0.10)	0.073	0.12	0.111	--	--
Cadmium (dissolved)	mg/L	ND(0.00090)	ND(0.00090)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000012	ND(0.00010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00058)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	0.0012	ND(0.0010)	ND(0.0010)	0.00053	ND(0.0010)	0.00051	--	--
Copper (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00066	ND(0.0020)	ND(0.00235)	--	--
Iron (dissolved)	mg/L	11.6	ND(0.50)	1.23	ND(0.10)	ND(0.10)	1.60	7.07	6.55	0.344	0.157 J
Lead (dissolved)	mg/L	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0000500)	ND(0.00050)	0.000081	--	--
Manganese (dissolved)	mg/L	2.02	0.086	1.41	0.0536	ND(0.0114)	1.09	1.09	0.957	0.636	0.760 J
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.000010)	0.000014	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--
Molybdenum (dissolved)	mg/L	0.0090	0.0071	0.0135	0.0146	ND(0.00987)	0.0201	0.0160	0.0198	--	--
Nickel (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00282	ND(0.0050)	0.00225	--	--
Zinc (dissolved)	mg/L	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0049)	ND(0.010)	0.0015	--	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	434	387	451	387	ND(333)	417	532	519	499	511 J
Ammonia-N	mg/L	10.2	ND(0.450)	11.2	1.36	0.237	13.2	29.5	17.1	8.25	15.8 J
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	41	18	25	19	ND(14)	15	ND(25)	43	--	--
Chloride	mg/L	133	187	185	136	ND(126)	81.3	85.7	97.2	--	--
Color (apparent)	TCU	127	9.4	78.7	8.8	ND(8.3) J	18.0	237	216	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.1	4.3	6.3	5.0	ND(4.5)	5.8	9.3	10.4	5.2	11.2 J
Escherichia coli	cfu/100mL	ND(2)	0	0	0	0 J	0	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0	0	0 J	0	2	0	--	--
Nitrate (as N)	mg/L	2.21	11.8	0.17	5.66	1.80	ND(0.10)	ND(0.10)	3.44	0.028	ND(0.020) J
Nitrite (as N)	mg/L	0.111	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.162	--	--
pH, lab	s.u.	7.64	7.47	7.77	7.28	7.72	7.86	7.54	7.05	--	--
Phenol	mg/L	ND(0.0034)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	0.0027	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0024)	0.0044	ND(0.0024)	--	--
Phosphorus	mg/L	0.31	ND(0.030)	0.048	ND(0.030)	ND(0.030)	0.0115	0.0569	0.0440	0.0157	0.0365 J
Sulfate	mg/L	1000	1010	759	795	ND(752)	710	528	432	--	--
Total coliform bacteria	cfu/100mL	4	20	20	15	ND(10) J	ND(10)	200	20	--	--
Total dissolved solids (TDS)	mg/L	1960	1920	1880	1520	ND(1480)	1460	1370	1340	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	17.2	0.49	9.49	1.88	0.61	12.6	32.3	20.7	--	--
Total suspended solids (TSS)	mg/L	2530	6.8	28.3	6.4	ND(6.8)	ND(6.2)	18.0	21.0	--	--
Turbidity	NTU	40.1	ND(1.34)	3.98	4.34	ND(2.38) J	11.2	94.5	56.3	--	--
Un-ionized ammonia	mg/L	0.0881	0.00109	0.164	0.0147	0.000544	0.321	0.0908	0.0727	--	--
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	1.681	2.51	2.65	2.13	1.1	1.76	1.91	0.504	1.91	1.32
Dissolved oxygen (DO), field	mg/L	--	2.12	1.35	0	0	0	1.26	1.44	0	0.09
Odor	none	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	247	-90	14	-16	-31	-89	-125	-61	-33
pH, field	s.u.	7.45	6.83	7.55	7.5	7.08	7.68	8.72	7.23	7.09	6.98
Temperature, field	Deg C	5.94	16.08	15.48	15.26	7.67	15.91	22.7	11.39	17.76	23.51
Turbidity, field	NTU	--	0	15.4	4.4	0	3.1	0	36	3	0
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	1330	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	1310	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	4480	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	5830	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--	--

GI 5/4853-(65)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-45804-040815-TS-003	GW-45804-052815-TS-007	GW-45804-081315-TS-005	GW-45804-110915-TS-011	GW-45804-021016-TS-009	GW-45804-051816-TS-012	GW-45804-081616-TS-003	GW-45804-111616-TS-009	GW-45804-060117-TS-003	GW-45804-083017-TS-007
Sample Date:		4/8/2015	5/28/2015	8/13/2015	11/9/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:											
Parameters	**Units**										
Semi-Volatiles											
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	0.82	ND(0.020)	0.020	ND(0.020)	ND(0.020)	ND(0.020)	0.022	ND(0.020)	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	2.26	0.0072	0.0284	0.0117	ND(0.0050)	0.0144	0.0451	ND(0.0050)	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--

Notes

ND Not detected at the associated reporting limit.
J Estimated concentration.

004076

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-455804-051018-TS-005	GW-455804-051018-TS-005	GW-455804-081618-TS-003	GW-455804-110818-TS-005	GW-455804-061719-TS-014	GW-455804-090519-JC-007	GW-455804-090519-JC-008	GW-455804-112619-JC-002	GW-455804-112619-JC-003	
Sample Date:		5/15/2018	5/16/2018	8/15/2018	11/8/2018	6/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019	
Sample Type:								Duplicate			Duplicate
Parameters	**Units**										
Metals											
Arsenic (dissolved)	mg/L	--	--	--	--	--	0.00080	0.00090	--	--	
Boron (dissolved)	mg/L	--	--	--	--	--	0.094	0.093	--	--	
Cadmium (dissolved)	mg/L	--	--	--	--	--	ND(0.000010)	ND(0.000010)	--	--	
Chromium (dissolved)	mg/L	--	--	--	--	--	0.00136	0.00168	--	--	
Cobalt (dissolved)	mg/L	--	--	--	--	--	0.00022	0.00024	--	--	
Copper (dissolved)	mg/L	--	--	--	--	--	0.00067	ND(0.00020)	--	--	
Iron (dissolved)	mg/L	--	0.56	0.109	0.146	0.69	2.64	2.87	0.069	0.071	
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--	
Manganese (dissolved)	mg/L	--	0.894	0.899	0.692	0.800	0.825	0.871	1.42	1.36	
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--	
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	
Nickel (dissolved)	mg/L	--	--	--	--	--	0.00114	0.00113	--	--	
Zinc (dissolved)	mg/L	--	--	--	--	--	0.0032	0.0010	--	--	
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	--	574	485	363	406	--	--	503	504	
Ammonia-N	mg/L	--	22.5	20.5	0.15	19.1	--	--	12.8	14.0	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	6.3	8.8	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	27	29	--	--	
Chloride	mg/L	--	--	--	--	--	--	--	--	--	
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	--	9.9	8.86	14.8	5.62	--	--	6.76	7.25	
Escherichia coli	cfu/100mL	-	1	5	79.4	0	3	3	0	0	
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	
Nitrate (as N)	mg/L	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.10)	--	--	0.10	0.11	
Nitrite (as N)	mg/L	--	--	--	--	--	ND(0.050)	ND(0.050)	--	--	
pH, lab	s.u.	--	--	--	--	--	7.45	7.47	7.40	7.38	
Phenol	mg/L	--	--	--	--	--	--	--	--	--	
Phenolics (total)	mg/L	--	--	--	--	--	ND(0.0010)	0.0060	--	--	
Phosphorus	mg/L	--	0.0471	0.0294	0.148	0.121	--	--	0.0059	0.0073	
Sulfate	mg/L	-	-	--	--	--	--	--	--	-	
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	19.6	19.9	--	--	
Total suspended solids (TSS)	mg/L	--	--	--	--	--	16.0	14.6	--	--	
Turbidity	NTU	--	--	--	--	--	--	--	1.28	1.42	
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00869	0.00873	
Field Parameters											
Color	TCU	--	--	--	--	--	--	--	--	--	
Conductivity, field	mS/cm	1.74	--	1.9	1.48	1.87	1.540	1.540	2.05	2.05	
Dissolved oxygen (DO), field	mg/L	1.53	--	4.25	0.41	5.58	0.4	--	0.01	--	
Odor	none	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts	33	--	-41	-10	-118	-85	--	25	--	
pH, field	s.u.	7.01	--	6.77	7.23	7.03	6.93	6.95	6.41	6.41	
Temperature, field	Deg C	13.2	--	22.76	12.69	20.14	23.02	23.02	10.95	10.95	
Turbidity, field	NTU	26.1	--	0.6	19.8	1.6	16.6	--	0.4	--	
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	-	-	--	--	--	--	--	--	-	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	-	--	--	--	--	--	--	-	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	

GI 5 (455804-005)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13	MW101-13
Sample ID:		GW-455804-051618-TS-005	GW-455804-051618-TS-005	GW-455804-081618-TS-003	GW-455804-110618-TS-005	GW-455804-081718-TS-014	GW-455804-090519-JC-007	GW-455804-090519-JC-008	GW-455804-112619-JC-002	GW-455804-112619-JC-003
Sample Date:		5/15/2018	5/16/2018	8/15/2018	11/6/2018	8/17/2019	9/5/2019	9/5/2019	11/26/2019	11/26/2019
Sample Type:								Duplicate		Duplicate
Parameters	Units									
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	-	-	--	--	--	--	--	--	-
Anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	-	--	--	--	--	--	--	-
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz[a,h]anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc										
Oil and grease	mg/L	-	-	--	--	--	ND(5.0)	ND(5.0)	--	-

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-071310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MMD-004	GW-45804-110210-TS-003	GW-45804-021511-MB-001	GW-45804-021511-MB-002	GW-45804-051611-MMD-001	GW-45804-051611-MMD-002	GW-45804-081811-TS-003
Sample Date:			7/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011	8/18/2011
Sample Type:								Duplicate		Duplicate	
Parameters	**Units**	**T1.P2**									
Metals											
Aluminum (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.0053	0.0054	ND(0.010)
Barium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)
Calcium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	10.6	10.0	6.20	17.5	19.2	23.0	36.7	10.5	10.4	8.84
Lead (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Magnesium (dissolved)	mg/L		77.4	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	2.01	1.05	2.06	2.13	2.08	2.30	4.01	3.95	3.97
Mercury (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L		0.037	0.058	0.058	0.055	0.026	0.024	0.0249	0.0252	0.051
Nickel (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.0030)	ND(0.0030)	ND(0.030)
Zirconium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--
General Chemistry											
Alkalinity, bicarbonate	mg/L		--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L		--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L		--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	996	530	220	444	426	698	710	277	261	380
Ammonia-N	mg/L	0.2	2.60	1.12	3.23	0.802	0.031	0.102	0.055	0.06	3.07
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		9.0	ND(2.0)	ND(2.0)	ND(2.0)	2.5	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	--	--	--
Chloride	mg/L		58.1	105	56.1	71.8	78.7	78.5	107	105	141
Color (apparent)	TCU		36.8	61.3	312	36.2	87.4	96.9	39.3	19.1	44.4
Conductivity	umhos/cm		1600	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	10.4	7.7	13.0	10.8	14.8	15.2	10.5	10.2	9.9
Escherichia coli	cfu/100mL	5	0	0	0	ND(2)	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL		1	0	5	ND(2)	0	0	0	0	0
Nitrate (as N)	mg/L	0.5	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L		--	--	--	--	--	--	--	--	--
pH, lab	s.u.		7.77	--	--	--	--	--	--	--	--
Phenol	mg/L		--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	1.92	4.69	1.04	3.01	0.562	0.291	1.88	0.400	0.511
Sulfate	mg/L		--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		2	0	30	10	0	0	1	1	1
Total dissolved solids (TDS)	mg/L		1240	1250	1350	1260	1180	1200	1620	1660	1680
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	--	--	--
Turbidity	NTU		4.00	--	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L		0.000225	0.00324	0.00152	0.000267	0.000218	0.000105	0.0000810	0.000103	0.0329

GHD 54E3H-16)

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW102-08	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:			GW-45804-011310-TS-003	GW-45804-051810-MB-002	GW-45804-081910-MD-004	GW-45804-110210-TS-003	GW-45804-021511-MB-001	GW-45204-021511-MB-002	GW-45804-051611-MD-001	GW-45804-051611-MD-002	GW-45804-051611-TS-003	GW-45804-081811-TS-003
Sample Date:			1/13/2010	5/18/2010	8/19/2010	11/2/2010	2/15/2011	2/15/2011	5/16/2011	5/16/2011	5/16/2011	8/18/2011
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**	**T.P2**										
Field Parameters												
Color	TCU		--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		2.3	1.67	1.54	2.07	2.35	2.35	2.78	2.78	2.28	2.28
Dissolved oxygen (DO), field	mg/L		--	--	--	3	--	--	--	--	--	--
Odor	none		--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		--	--	--	-125	-130	-130	--	--	--	--
pH, field	s.u.		6.22	7.11	6.06	6.99	6.20	6.20	5.73	5.73	7.34	7.34
Temperature, field	Deg C		6.5	9.9	19.3	15.0	4.7	4.7	7.21	7.21	18.5	--
Turbidity, field	NTU		<5	--	--	--	--	--	427	427	--	--
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(1000)	ND(1000)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	ND(1000)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		3500	2900	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		2300	2800	750	480	ND(250)	470	ND(2500)	ND(2500)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		14350	13900	3120	1880	630	1800	4200	ND(2500)	520	520
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		46900	52800	8600	5000	--	5000	12200	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(1000)	ND(1000)	ND(100)	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		17900	16800	3870	2340	630	2270	4200	ND(2500)	520	
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L		--	ND(0.28)	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		--	ND(0.20)	ND(0.20)	0.099	0.031	0.069	ND(0.020)	ND(0.020)	0.033	0.033
Benzo(a)anthracene	µg/L		--	0.44	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		--	0.508	0.082	0.292	0.113	0.232	0.0141	0.0621	0.135	0.135
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--	--	--
Benzo(b,j)fluoranthene/Benzo(j)fluoranthene	µg/L		--	0.39	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	0.48	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	0.42	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		--	0.59	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		--	1.41	--	--	--	--	--	--	--	--
Fluorene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	µg/L		--	0.36	--	--	--	--	--	--	--	--
Naphthalene	µg/L		--	0.22	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		--	0.81	--	--	--	--	--	--	--	--
Pyrene	µg/L		--	1.32	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 54/23/11-16(5)

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-05	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-003	GW-45804-052312-MB-002	GW-45804-080812-MB-002	GW-45804-081212-MB-003	GW-45804-111212-MB-004	
Sample Date:		11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012	8/8/2012	8/8/2012	11/12/2012	
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.10)	ND(0.10)	--	
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.050)	--	
Arsenic (dissolved)	mg/L	0.0067	0.0042	--	--	0.0047	--	--	ND(0.010)	ND(0.010)	0.0044	
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	0.13	0.12	--	
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Boron (dissolved)	mg/L	--	ND(0.050)	--	--	0.056	--	--	ND(0.50)	ND(0.50)	0.068	
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	--	--	ND(0.00010)	--	--	ND(0.000060)	ND(0.000060)	ND(0.00010)	
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	262	273	--	
Chromium (dissolved)	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.0050)	ND(0.0050)	ND(0.0010)	
Cobalt (dissolved)	mg/L	--	ND(0.00069)	--	--	ND(0.00050)	--	--	ND(0.0050)	ND(0.0050)	0.00067	
Copper (dissolved)	mg/L	--	ND(0.0015)	--	--	ND(0.0010)	--	--	ND(0.010)	ND(0.010)	ND(0.0010)	
Iron (dissolved)	mg/L	7.95	10.8	--	--	9.87	--	--	8.58	8.05	5.48	
Lead (dissolved)	mg/L	--	ND(0.0015)	--	--	ND(0.0010)	--	--	ND(0.010)	ND(0.010)	ND(0.0010)	
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	79.1	88.6	--	
Manganese (dissolved)	mg/L	0.66	0.63	--	--	0.67	--	--	2.83	2.73	1.80	
Mercury (dissolved)	mg/L	--	ND(0.00015)	--	--	ND(0.00010)	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	
Molybdenum (dissolved)	mg/L	0.0250	0.0110	--	--	0.0158	--	--	0.024	0.024	0.0115	
Nickel (dissolved)	mg/L	--	ND(0.0020)	--	--	ND(0.0020)	--	--	ND(0.020)	ND(0.020)	ND(0.0020)	
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.50)	ND(0.50)	--	
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	23	23	--	
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0040)	ND(0.0040)	--	
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	15	15	--	
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	79.1	78.5	--	
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	2.74	2.80	--	
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.0030)	ND(0.0030)	--	
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.020)	ND(0.020)	--	
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.10)	ND(0.10)	--	
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.050)	--	
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.010)	ND(0.010)	--	
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	--	--	ND(0.0030)	--	--	ND(0.030)	ND(0.030)	0.0044	
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	ND(0.040)	ND(0.040)	--	
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	562	555	--	
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	ND(10)	ND(10)	--	
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	ND(10)	ND(10)	--	
Alkalinity, total (as CaCO3)	mg/L	493	511	498	--	564	--	--	567	560	555	
Ammonia-N	mg/L	3.10	3.02	3.18	2.63	3.73	--	--	3.62	3.55	3.26	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L	5.5	5.2	ND(3.0)	--	5.2	--	--	ND(2.0)	ND(2.0)	5.9 J	
Chemical oxygen demand (COD)	mg/L	--	49	--	--	36	--	--	53	51	42 J	
Chloride	mg/L	112	--	173	--	182	--	--	118	119	120	
Color (apparent)	TCU	30.2	19.2	23.3	--	--	158	112	184	88.6	65.6 J	
Conductivity	umhos/cm	--	--	1050	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	13.2	13.1	11.3	--	11.0	--	--	10.9	10.2	11.7	
Escherichia coli	cfu/100mL	ND(2)	0	0	0	--	0	0	0	0	ND(2)	
Fecal coliform bacteria	cfu/100mL	ND(2)	0	0 J	0 J	--	0	0	0	0	ND(2)	
Nitrate (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.5)	--	ND(0.10)	--	--	ND(0.10)	ND(0.10)	ND(0.10)	
Nitrite (as N)	mg/L	ND(0.30)	ND(0.50)	ND(0.5)	--	ND(0.10)	--	--	ND(0.10)	ND(0.10)	ND(0.10)	
Nitrite/Nitrate	mg/L	--	ND(1.0)	--	--	--	--	--	--	--	--	
pH, lab	s.u.	--	7.81	7.89	--	7.59	--	--	7.36	8.00	7.83	
Phenol	mg/L	--	ND(0.0010)	--	--	ND(0.0010)	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	
Phosphorus	mg/L	0.710	0.475	0.592	--	0.321	--	--	0.755	0.665	0.553	
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	435	
Total coliform bacteria	cfu/100mL	2	0	0	0	--	2	4	0	0	20 J	
Total dissolved solids (TDS)	mg/L	1560	1580	1510	--	1620	--	--	1430	1410	1370	
Total kjeldahl nitrogen (TKN)	mg/L	--	5.55	--	--	5.33	--	--	6.51	6.74	6.21	
Total suspended solids (TSS)	mg/L	--	455	--	--	567	--	--	464	594	466	
Turbidity	NTU	--	162	27.0	--	--	56.0 J	23.0 J	54.0	50.0	0.70 J	
Un-ionized ammonia	mg/L	0.0154	--	0.0000556	0.0000590	--	--	--	--	--	0.0017	

GHD 54/23411/65

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-110911-TS-006	GW-45804-021512-MB-001	GW-45804-032112-MB-004	GW-45804-032112-MB-009	GW-45804-051412-MB-005	GW-45804-052312-MB-003	GW-45804-052312-MB-002	GW-45804-08-08-12-MB-002	GW-45804-08-08-12-MB-003	GW-45804-111212-MB-004	
Sample Date:		11/9/2011	2/15/2012	3/21/2012	3/21/2012	5/14/2012	5/23/2012	5/23/2012	8/8/2012	8/8/2012	11/12/2012	
Sample Type:								Duplicate		Duplicate		
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.39	2.38	2.46	2.49	2.34	2.3	--	1.52	--	2.29	
Dissolved oxygen (DO), field	mg/L	--	--	--	--	--	--	--	6.1	--	8.24	
Odor	none	--	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts	--	--	--	--	--	--	--	--	--	-192	
pH, field	s.u.	7.29	5.9	5.09	5.09	6.46	6.29	--	7.2	--	7.75	
Temperature, field	Deg C	13.7	4.85	6.8	6.6	19.77	11.08	--	18.24	--	15.1	
Turbidity, field	NTU	981	-5	-5	-5	--	--	--	6.92	--	840	
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(25)	ND(100)	--	ND(100)	--	--	ND(25)	ND(25)	ND(100)	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	--	ND(100)	--	--	ND(100)	ND(100)	ND(100)	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	290	ND(250)	ND(250)	--	ND(250)	--	--	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F3 minus PAH	µg/L	280	ND(250)	--	--	ND(250)	--	--	ND(250)	ND(250)	ND(250)	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1130	450	690	--	ND(250)	--	--	480	520	630 J	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	3400	--	--	--	--	--	--	2500	ND(2500)	3000	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	ND(100)	--	--	--	--	--	ND(100)	ND(100)	ND(100)	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	1420	450	690	--	ND(250)	--	--	480	520	630 J	
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.26)	ND(0.26)	ND(0.026)	
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Acenaphthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Acenaphthylene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	
Anthracene	µg/L	0.021	ND(0.020)	--	--	ND(0.020)	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Benz(a)anthracene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.036	
Benzo(a)pyrene	µg/L	0.0923	0.014	--	--	0.0289	--	--	ND(0.10)	ND(0.10)	0.040	
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.040	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.051	
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.033	
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	
Chrysene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.046	
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Fluoranthene	µg/L	--	--	--	--	--	--	--	ND(0.20)	0.34	0.129	
Fluorene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	ND(0.020)	
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.028	
Naphthalene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.034	
Phenanthrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	ND(0.20)	0.072 J	
Pyrene	µg/L	--	--	--	--	--	--	--	ND(0.20)	0.36	0.154	
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 54/23411(65)

004082

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-015	GW-45804-052213-TS-014	GW-45804-080713-TS-005	GW-45804-080713-TS-006	GW-45804-111413-TS-015	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007	
Sample Date:		11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	
Sample Type:		Duplicate			Duplicate		Duplicate					
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Arsenic (dissolved)	mg/L	0.0044	0.0020	0.0034	0.0035	0.0071	0.0058	0.0029	0.0012	0.0024	0.0040	
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Boron (dissolved)	mg/L	0.065	ND(0.050)	0.067	0.068	0.076	0.075	0.067	ND(0.050)	0.075	0.062	
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023	0.0017	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Iron (dissolved)	mg/L	4.85	8.59	8.75	8.87	5.02	5.80	6.07	9.19	8.82	5.81	
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Manganese (dissolved)	mg/L	2.10	3.66	3.50	3.21	3.01	3.00	3.03	4.02	3.65	2.17	
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	
Molybdenum (dissolved)	mg/L	0.0127	0.0068	0.0130	0.0130	0.0151	0.0108	0.0107	0.0048	0.0084	0.0151	
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0050)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0050)	
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0041	ND(0.0030)	
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	
Alkalinity, total (as CaCO3)	mg/L	528	476	461	466	497	446	511	474	475 J	534 J	
Ammonia-N	mg/L	3.77	3.66	4.38	4.69	7.06	5.97	7.13	5.47	7.60 J	10.4 J	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L	6.8 J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0) J	
Chemical oxygen demand (COD)	mg/L	55 J	63	44	49	36 J	146 J	51	ND(50)	102 J	42 J	
Chloride	mg/L	118	184	186	190	148	147	143	176	179 J	180 J	
Color (apparent)	TCU	78.5 J	23.8	33.7	34.0	128	80.0	176	191 J	230 J	84.2 J	
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	12.0	17.6	16.5	15.8	13.8	14.7	11.5	8.6	8.2 J	7.7 J	
Escherichia coli	cfu/100mL	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J	
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	ND(10)	ND(10)	ND(2)	ND(2)	ND(2)	0	ND(2) J	0 J	
Nitrate (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	
Nitrite (as N)	mg/L	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	
pH, lab	s.u.	7.63	7.61	7.87	7.75	7.48	7.59	7.51	7.30	7.88 J	7.51 J	
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0030	0.0020	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	0.0010 J	0.0016 J	
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	
Phosphorus	mg/L	0.218	0.082	0.033	0.035	0.093	0.118	0.032	0.046	0.127 J	0.079 J	
Sulfate	mg/L	430	587	569	563	682	675	646	477	504 J	497 J	
Total coliform bacteria	cfu/100mL	ND(2) J	ND(2)	ND(100)	ND(100)	10	10	ND(2)	0	ND(2) J	0 J	
Total dissolved solids (TDS)	mg/L	1360	1850	1640	1650	1780	1770	1580	1450	1510 J	1450 J	
Total kjeldahl nitrogen (TKN)	mg/L	5.74	5.28	5.98	5.52	6.82	7.01	7.89	6.21	7.43 J	5.80 J	
Total suspended solids (TSS)	mg/L	778	2880	742	648	28.5	23.5	905	24.5	58.0 J	12.0 J	
Turbidity	NTU	5.70 J	72.0	40.0 J	26.5 J	34.0	32.0	50.8	117	36.0 J	62.2 J	
Un-ionized ammonia	mg/L	0.0082	0.0088	0.00151	0.00156	0.0151	0.0148	0.00316	0.0215	0.0364 J	1.90 J	

GHD 54/30/11 (6)

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-111212-MB-005	GW-45804-022713-TS-001	GW-45804-052213-TS-015	GW-45804-052213-TS-014	GW-45804-080713-TS-005	GW-45804-080713-TS-006	GW-45804-111413-TS-015	GW-45804-042114-TS-007	GW-45804-053014-MB-013	GW-45804-082114-TS-007
Sample Date:		11/12/2012	2/27/2013	5/22/2013	5/22/2013	8/7/2013	8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014
Sample Type:		Duplicate			Duplicate		Duplicate				
Parameters	**Units**										
Field Parameters											
Color	TCU	--	--	--	--	--	--	ND()	--	--	--
Conductivity, field	mS/cm	--	2.47	2.38	--	2.22	--	2.24	2.38	2.39	2.34
Dissolved oxygen (DO), field	mg/L	--	8.88	9.54	--	5.48	--	8.06	9.89	0	2.62
Odor	none	--	--	--	--	--	--	ND()	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	-131	--	-119	--	--	-148	-178	-164
pH, field	s.u.	7.75	7.78	8.11	8.11	8.63	8.63	8.21	7.34	7.32	8.04
Temperature, field	Deg C	15.1	6.9	12.3	12.3	20.7	20.7	12.5	7.17	10.58	20.21
Turbidity, field	NTU	--	-5	-5	--	0	--	641	33.6	30.1	45.1
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	290	ND(250)	ND(250) J	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250) J	ND(830)	420	490	ND(250)	ND(250)	1240	ND(250)	ND(250) J	ND(250) J
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250) J	ND(830)	420	490	ND(250)	ND(250)	1530	ND(380)	ND(380) J	ND(380) J
Semi-Volatiles											
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--
Acenaphthene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--
Acenaphthylene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--
Acridine	µg/L	--	--	ND(4.0)	ND(4.0)	--	--	--	ND(4.0)	--	--
Anthracene	µg/L	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020) J
Benz(a)anthracene	µg/L	0.037	--	0.022	0.033	--	--	--	ND(0.020)	--	--
Benzo(a)pyrene	µg/L	0.042	ND(0.10)	0.0252	0.0342	ND(0.0050)	ND(0.0050)	0.0551	ND(0.0050)	ND(0.0050) J	ND(0.0050) J
Benzo(b)fluoranthene	µg/L	0.040	--	0.025	0.047	--	--	--	ND(0.020)	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyrene (Quinoline)	µg/L	--	--	ND(0.040)	ND(0.040)	--	--	--	ND(0.040)	--	--
Benzo(g,h,i)perylene	µg/L	0.071	--	0.044	0.054	--	--	--	ND(0.020)	--	--
Benzo(k)fluoranthene	µg/L	0.034	--	0.024	0.036	--	--	--	ND(0.020)	--	--
Carcinogenic potency equivalent	µg/L	--	--	ND(0.060)	ND(0.060)	--	--	--	ND(0.060)	--	--
Chrysene	µg/L	0.053	--	0.031	0.041	--	--	--	ND(0.020)	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	--	--	ND(0.020)	--	--
Fluoranthene	µg/L	0.145	--	0.080 J	0.104 J	--	--	--	ND(0.020)	--	--
Fluorene	µg/L	0.021	--	ND(0.097)	ND(0.13)	--	--	--	ND(0.020)	--	--
Indeno(1,2,3-cd)pyrene	µg/L	0.032	--	0.024	0.029	--	--	--	ND(0.020)	--	--
Naphthalene	µg/L	0.034	--	0.033 J	0.036 J	--	--	--	ND(0.050)	--	--
Phenanthrene	µg/L	0.084 J	--	0.056	0.062	--	--	--	ND(0.020)	--	--
Pyrene	µg/L	0.176	--	0.101	0.131	--	--	--	ND(0.020)	--	--
Misc											
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 54/23411/65

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	
Sample ID:		GW-45804-112514-TS-002	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004	GW-45804-111015-TS-017	GW-45804-021516-TS-008	GW-45804-051816-TS-015	GW-45804-021516-TS-005	GW-45804-111515-TS-006	GW-45805-111516-TS-006	
Sample Date:		11/25/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/15/2015	11/15/2016	11/15/2016	
Sample Type:			Field Blank									
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	0.0017	ND(0.0010)	0.0018	ND(0.00010)	0.0015	ND(0.0010)	0.00116	0.0016	0.00106	--	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.068	ND(0.050)	0.078	ND(0.010)	ND(0.10)	ND(0.10)	0.065	0.11	0.072	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.000010)	--	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.0010)	ND(0.0010)	0.00016	ND(0.0010)	0.00027	--	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.0020)	0.00056	--	--
Iron (dissolved)	mg/L	5.12	10.7	8.11	ND(0.010)	5.82	8.02	7.89	4.86	4.06	--	--
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.31	0.62	0.41	ND(0.00050)	0.17	0.25	0.23	0.27	0.079	--	--
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000015)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	ND(0.0000010)	--	--
Molybdenum (dissolved)	mg/L	0.0063	0.0022	0.0056	ND(0.000050)	0.00840	ND(0.00500)	0.00789	0.0107	0.00670	--	--
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	ND(0.0050)	ND(0.0050)	0.00161	ND(0.0050)	0.00105	--	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0070	ND(0.0030)	ND(0.0030)	0.0019	ND(0.010)	ND(0.010)	ND(0.0012)	ND(0.010)	ND(0.0010)	--	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	545	672	464	ND(10)	489	ND(439)	398	512	528	--	--
Ammonia-N	mg/L	5.37	5.77	10.3	ND(0.050)	5.08	5.80	5.81	7.12	5.92	--	--
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	2.8	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	39	45	41	ND(10)	36	ND(30)	33	ND(44)	42	--	--
Chloride	mg/L	126	148	356	ND(0.50)	199	ND(157)	155	148	128	--	--
Color (apparent)	TCU	152	54.2	79.0	ND(1.0)	222	211	200	216	196	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.9	7.8	10.7	ND(1.0)	10.5	ND(8.3)	8.8	11.0	10.9	--	--
Escherichia coli	cfu/100mL	0	ND(2)	0	0	0	0	0	1	0	--	--
Fecal coliform bacteria	cfu/100mL	0	ND(2)	0	0	0	0	0	60	0	--	--
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)	ND(0.020)	ND(0.10)	ND(0.10)	--	--
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	--	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.84	7.71	7.89	7.18	7.76	7.89	7.91	7.74	7.84	--	--
Phenol	mg/L	ND(0.0010)	ND(0.0029)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	0.0027	0.0021	0.0029	ND(0.0010)	ND(0.0021)	0.0060	0.0022	--	--
Phosphorus	mg/L	0.088	0.038	0.075	ND(0.030)	0.101	0.058	0.0655	0.0820	0.0643	--	--
Sulfate	mg/L	425	405	570	ND(0.30)	660	ND(0.20)	726	569	511	--	--
Total coliform bacteria	cfu/100mL	0	12	10	1	0	0	10	3600	0	--	--
Total dissolved solids (TDS)	mg/L	1345	1410	1660	ND(10)	1690	ND(1540)	1690	1550	1580	--	--
Total kjeldahl nitrogen (TKN)	mg/L	9.05	8.99	11.6	ND(0.15)	8.47	8.70	7.59	7.70	5.82	--	--
Total suspended solids (TSS)	mg/L	16.4	1486	21.4	ND(2.0)	16.2	ND(16.0)	27.5	5.2	2.8	--	--
Turbidity	NTU	52.5	27.4	98.0	ND(0.10)	86.2	57.5	101	60.5	50.9	--	--
Un-ionized ammonia	mg/L	0.0267	0.0261	0.0477	--	0.355	0.0172	0.244	0.0265	0.0254	--	--

GHD 54/30/11 (6)

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-112514-TS-002	GW-45804-040815-TS-004	GW-45804-052815-TS-006	GW-45804-081215-TS-004	GW-45804-111015-TS-017	GW-45804-021016-TS-008	GW-45804-051816-TS-015	GW-45804-021616-TS-005	GW-45804-111515-TS-006	GW-45805-111516-TS-006	
Sample Date:		11/25/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	8/16/2016	11/15/2016	11/15/2016	
Sample Type:			Field Blank									
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.578	--	2.47	--	2.29	1.25	1.87	1.6	--	1.86	
Dissolved oxygen (DO_2), field	mg/L	3.03	--	1.04	--	0.57	0	0	0	--	3.14	
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-103	--	-86	--	-187	-115	-94	-21	--	-129	
pH, field	s.u.	7.14	7.44	7.19	--	8.11	7.22	6.18	6.27	--	7.1	
Temperature, field	Deg C	11.29	9.4	13.02	--	13.86	4.85	11.99	15.33	--	13.5	
Turbidity, field	NTU	--	--	0	--	2.3	0	1.5	0	--	0.2	
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	260	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	260	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1290	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	1540	ND(380)	ND(380)	ND(380)	ND(350)	ND(380)	ND(380)	ND(380)	ND(380)	--
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benz(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.566	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 54E3H-165

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09
Sample ID:		GW-45804-060117-TS-002	GW-45804-083017-TS-002	GW-45804-112917-TS-005	GW-45804-051618-TS-011	GW-45804-051618-TS-012	GW-45804-081516-TS-005	GW-45804-110516-TS-011	GW-45804-081516-JC-008	GW-045804-090415-JC-001	GW-045804-112618-JC-007
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018 Duplicate	8/15/2018	11/5/2018	8/15/2018	9/4/2019	11/26/2019
Sample Type:											
Parameters	**Units**										
Metals											
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00078	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.114	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.000010)	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00159	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00016	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.00025)	--
Iron (dissolved)	mg/L	6.06	3.65 J	3.64	4.82	4.83	6.28	3.09	4.53	2.87	2.41
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.000050)	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.65	3.03 J	3.28	3.46	3.47	3.67	1.80	3.32	1.67	1.85
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	0.00116	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	ND(0.0010)	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--
General Chemistry											
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	495	554 J	568	504	501	489	543	517	--	548
Ammonia-N	mg/L	5.61	9.38 J	7.54	8.80	7.69	12.2	10.0	11.2	--	9.61
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	26	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	8.2	13.6 J	10.8	9.7	9.6	12.5	12.0	9.47	--	10.7
Escherichia coli	cfu/100mL	0	0 J	0	ND(0)	ND(0)	ND(0)	ND(0) J	--	0	9
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	7.05	0.033	ND(0.10)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	ND(0.050)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--
pH, lab	SU	--	--	--	--	--	--	--	--	7.85	7.87
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	0.0095	--
Phosphorus	mg/L	0.0852	0.104 J	0.0818	0.125	0.123	ND(0.0123)	0.206	0.114	--	0.143
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	12.0	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	3.6	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	35.0
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	0.0151

GHD 54E3H-165)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW102-09	MW152-09
Sample ID:		GW-45804-060117-TS-002	GW-45804-083017-TS-002	GW-45804-112917-TS-005	GW-45804-051618-TS-011	GW-45804-051618-TS-012	GW-45804-081516-TS-005	GW-45804-110816-TS-011	GW-45804-061815-JC-008	GW-045804-090415-JC-001	GW-045804-112618-JC-007	
Sample Date:		6/1/2017	8/30/2017	11/29/2017	5/16/2018	5/16/2018 Duplicate	8/15/2018	11/8/2018	6/15/2019	9/4/2019	11/26/2019	
Sample Type:												
Parameters	**Units**											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.00	1.68	1.53	1.73	--	1.82	1.83	1.86	1.810	1.77	
Dissolved oxygen (DO), field	mg/L	0	9.77	0	0	--	0	0.09	0.03	0.82	0	
Odor	none	--	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts	-109	-123	-92	-128	--	-153	-125	-161	-96	-140	
pH, field	s.u.	7.04	7.24	7.31	7.25	--	7.28	7.49	7.22	7.01	6.86	
Temperature, field	Deg C	11.71	19.79	11.22	10.73	--	20.15	10.73	15.51	20.31	11.06	
Turbidity, field	NTU	0	0	59	4.3	--	2.4	0	0.7	0	27.4	
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	
Anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	ND(5.0)	--	

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 54/30415/E5

004088

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021511-MB-003	GW-45804-051611-MMD-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/15/2011	5/16/2011	8/16/2011
Sample Type:				Duplicate		Duplicate				
Parameters	**Units**	**TLP-2**								
Metals										
Arsenic (dissolved)	mg/L		0.011	0.012	0.012	0.012	ND(0.010)	ND(0.010)	0.0064	0.011
Boron (dissolved)	mg/L		--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.0010)
Chromium (dissolved)	mg/L		--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L		--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	10.6	22.6	23.6	19.8	21.1	7.54	7.87	6.33	6.79
Lead (dissolved)	mg/L		--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	6.75	7.06	7.07	7.29	5.81	5.96	4.05	4.28
Mercury (dissolved)	mg/L		--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L		ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.010	0.0052	ND(0.010)
Nickel (dissolved)	mg/L		--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0030	ND(0.030)
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	996	264	266	166	162	152	159	202	150
Ammonia-N	mg/L	0.2	0.35	0.28	1.89	1.91	0.873	0.892	0.863	0.892
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	--	--
Chloride	mg/L		107	106	78.7	78.4	40.1	44.3	58.9	50.5
Color (apparent)	TCU		83.8	87.8	520	488	387	196	71.4	254
Dissolved organic carbon (DOC) (dissolved)	mg/L	15.4	3.0	8.9	8.7	10.2	8.5	10.0	9.0	11.2
Escherichia coli	cfu/100mL	5	0	0	0	0	0	0	0	1
Fecal coliform bacteria	cfu/100mL		0	0	0	0	0	0	0	10
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.10)
Nitrite/Nitrate	mg/L		--	--	--	--	--	--	--	--
pH, lab	s.u.		--	--	--	--	--	--	--	--
Phenol	mg/L		--	--	--	--	--	--	--	--
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.057	ND(0.030)	ND(0.030)	ND(0.030)	0.036	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L		--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	0	0	0	1	0	10	20
Total dissolved solids (TDS)	mg/L		670	690	926	882	670	680	778	558
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	--	--
Turbidity	NTU		--	--	--	--	--	--	--	--
Un-ionized ammonia	mg/L		0.00799	0.00769	0.00108	0.000871	0.000396	0.000132	0.000262	0.00404
Field Parameters										
Color	TCU		--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		1.423	1.423	0.99	0.99	1.35	1.58	1.37	0.96
Dissolved oxygen (DO), field	mg/L		1.89	1.89	0	0	0	--	--	0
Odor	none		--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-123	-123	-152	-152	-143	-129	--	-165
pH, field	s.u.		7.05	7.05	6.20	6.20	6.17	6.17	6.43	7.17
Temperature, field	Deg C		13.62	13.62	19.2	19.2	14.3	4.7	6.88	18.1
Turbidity, field	NTU		--	--	--	--	--	--	14.3	89.1

GHD 042554 (8)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:			GW-45804-051810-MB-004	GW-45804-051810-MB-005	GW-45804-081910-MMD-001	GW-45804-081910-MMD-002	GW-45804-110210-TS-009	GW-45804-021511-MB-003	GW-45804-051611-MMD-003	GW-45804-081611-TS-001
Sample Date:			5/18/2010	5/18/2010	8/19/2010	8/19/2010	11/2/2010	2/15/2011	5/16/2011	8/16/2011
Sample Type:				Duplicate		Duplicate				
Parameters	**Units**	TLP-2								
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C19)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C19) F2 less naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles										
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
Sample Type:		Duplicate		Duplicate					
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.011	0.0092	--	0.0071	0.0067	0.0067	0.0074	0.0061
Boron (dissolved)	mg/L	--	--	--	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	6.44	5.89	--	7.59	7.12	8.77	11.6	7.17
Lead (dissolved)	mg/L	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	4.91	4.27	--	5.65	4.72	7.65	8.51	4.07
Mercury (dissolved)	mg/L	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.011	0.0079	--	0.0049	0.0041	0.0063	0.0044	0.0060
Nickel (dissolved)	mg/L	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.218 J	ND(0.0030)	--	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	0.0080
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	192	181	180	183	212	272	309	201
Ammonia-N	mg/L	0.665	0.592	0.517	0.582	0.818	0.929	1.08	1.01
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	2.4	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	--	--	--	26	30	46	44	36
Chloride	mg/L	51.0	38.9	37.7	--	61.5	52.4	111	92
Color (apparent)	TCU	259	103	75.3	14.2	277	322 J	75.9	42.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.0	10.1	10.7	12.2	11.0	9.9	13.6	17.9
Escherichia coli	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	ND(2)	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite/Nitrate	mg/L	--	--	--	ND(1.0)	--	--	--	--
pH, lab	s.u.	--	--	--	7.61	7.67	7.74	7.80	7.52
Phenol	mg/L	--	--	--	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.032	ND(0.030)	ND(0.030)	ND(0.030)	0.046	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L	--	--	--	--	--	328	278	317
Total coliform bacteria	cfu/100mL	1	ND(2)	ND(2)	0	ND(2)	ND(2)	2	10
Total dissolved solids (TDS)	mg/L	564	548	546	612	748	880	900	734
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	1.47	1.61	1.66	2.08	1.65
Total suspended solids (TSS)	mg/L	--	--	--	13.0	7.0	15.0	32.0	14.0
Turbidity	NTU	--	--	--	77.0	81.0	8.50 J	108	59.0
Un-ionized ammonia	mg/L	0.00410	0.00168	0.00171	--	--	0.197	0.00558	0.000456
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	--	0.75	--	1.05	1.21	1	1.62	1.28
Dissolved oxygen (DO), field	mg/L	--	1.55	--	--	1.66	9.47	1.62	2.38
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-153	--	--	-139	-119	-109	--
pH, field	s.u.	--	7.19	7.19	5.78	8.84	8.84	7.48	6.15
Temperature, field	Deg C	--	12.9	12.9	6	12.08	16.2	6.6	14.3
Turbidity, field	NTU	--	13.4	--	484	94.2	129	74.4	117

GHD-042554-(B5)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-081611-TS-002	GW-45804-111011-TS-011	GW-45804-111011-TS-012	GW-45804-021512-MB-005	GW-45804-051512-MB-008	GW-45804-111212-MB-001	GW-45804-022713-TS-003	GW-45804-052213-TS-006
Sample Date:		8/16/2011	11/10/2011	11/10/2011	2/15/2012	5/15/2012	11/12/2012	2/27/2013	5/22/2013
Sample Type:		Duplicate		Duplicate					
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	ND(100)	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	0.030
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.028)	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	0.025
Acenaphthene	µg/L	--	--	--	--	--	ND(0.020)	--	0.070
Acenaphthylene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Acridine	µg/L	--	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)	ND(0.010)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Fluoranthene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Fluorene	µg/L	--	--	--	--	--	ND(0.020)	--	0.054
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Naphthalene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)
Phenanthrene	µg/L	--	--	--	--	--	ND(0.020)	--	0.022
Pyrene	µg/L	--	--	--	--	--	ND(0.020)	--	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015
Sample Type:									Duplicate
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0103	0.0100	0.0031	0.0063	0.0101	0.0051	0.0063	0.0064
Boron (dissolved)	mg/L	0.056	ND(0.050)	ND(0.050)	ND(0.050)	0.053	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	ND(0.00050)	0.00008	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0020	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.03	5.22	2.89	5.16	3.91	4.89	7.30	7.22
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.09	2.23	1.78	2.20	1.66	2.31	5.06	5.05
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0051	0.0052	0.0060	0.0042	0.0049	0.0047	0.0029	0.0029
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	0.0036	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L	0.0147	ND(0.0030)	0.0146	0.0070	ND(0.0030)	0.0092	ND(0.0030)	ND(0.0030)
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	179	183	341	224 J	202 J	209	306	306
Ammonia-N	mg/L	1.25	0.674	0.862	1.39 J	1.49 J	1.33	0.569	1.35
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	3.6	ND(2.0)	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	27	82	ND(34)	54 J	30 J	30	29	25
Chloride	mg/L	65	51.9	71.1	87.2 J	62.7 J	52	84.7	87.7
Color (apparent)	TCU	208	60.0	59.4 J	269 J	136 J	203	132	133
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	9.3	7.7	6.9 J	11.3 J	9.9	7.0	7.0
Escherichia coli	cfu/100mL	ND(2)	ND(2)	0	0 J	0 J	0	ND(2)	2
Fecal coliform bacteria	cfu/100mL	ND(2)	ND(2)	0	0 J	1 J	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10) J	ND(0.10) J	ND(0.50)	ND(0.050)	ND(0.050)
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.44	7.11	7.26	7.89 J	7.54 J	7.82	7.71	7.72
Phenol	mg/L	ND(0.0010)	0.0048	0.0024	0.0014 J	0.0023 J	ND(0.0010)	ND(0.0027)	ND(0.0025)
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	ND(0.030)	1.64	ND(0.030)	0.043 J	ND(0.030) J	0.039	0.363	0.357
Sulfate	mg/L	185	171	272	183 J	196 J	126	174	185
Total coliform bacteria	cfu/100mL	100	ND(10)	7	0 J	7 J	300	178	128
Total dissolved solids (TDS)	mg/L	630	524	828	650 J	456 J	478	855	878
Total Kjeldahl nitrogen (TKN)	mg/L	2.31	0.61	ND(1.57)	2.15 J	2.10 J	1.22	1.48	1.59
Total suspended solids (TSS)	mg/L	3.2	2750	53.5	4.0 J	ND(2.0) J	3.6	446	390
Turbidity	NTU	18.7	196	47.0	34.0 J	7.03 J	19.6	52.0	53.0
Un-ionized ammonia	mg/L	0.00423	0.000251	0.00164	0.00788 J	0.317 J	0.00645	0.0113	0.0127
Field Parameters									
Color	TCU	--	ND	--	--	--	--	--	--
Conductivity, field	mS/cm	1.05	0.868	1.75	1.19	0.719	0.517	0.881	--
Dissolved oxygen (DO), field	mg/L	4.62	7.53	4.62	0	0.21	3.82	--	--
Odor	none	--	ND	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	174	--	-101	-154	-147	-96	--	--
pH, field	s.u.	6.91	6.19	7.06	7.43	6.77	7.41	7.89	7.89
Temperature, field	Deg C	17.7	12.7	9.34	9.06	18.75	11.08	5.1	5.1
Turbidity, field	NTU	32.1	250	28.1	38.8	28.9	--	--	--

GHD 042554 (8)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-080713-TS-008	GW-45804-111413-TS-008	GW-45804-042114-TS-006	GW-45804-053014-MB-015	GW-45804-082114-TS-008	GW-45804-112514-TS-006	GW-45804-040815-TS-005	GW-45804-040815-TS-006
Sample Date:		8/7/2013	11/14/2013	4/21/2014	5/30/2014	8/21/2014	11/25/2014	4/8/2015	4/8/2015
Sample Type:									Duplicate
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100) J	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	420	ND(250)	ND(250) J	ND(250) J	ND(250)	310	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	1280	ND(250)	ND(250) J	ND(250) J	ND(250)	980 J	370 J
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(250)	1700	ND(380)	ND(380) J	ND(380) J	ND(380)	1290 J	ND(380) J
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	ND(0.020)	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Acenaphthene	µg/L	--	--	0.037	--	--	--	--	--
Acenaphthylene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Acridine	µg/L	--	--	ND(4.0)	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	0.047	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.20)	ND(0.20)
Benzo(a)anthracene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	0.147	ND(0.0050)	ND(0.0050) J	ND(0.0050) J	ND(0.0050)	0.078	ND(0.050)
Benzo(b)fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	ND(0.040)	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	ND(0.060)	--	--	--	--	--
Chrysene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Fluoranthene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Fluorene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Naphthalene	µg/L	--	--	ND(0.050)	--	--	--	--	--
Phenanthrene	µg/L	--	--	ND(0.020)	--	--	--	--	--
Pyrene	µg/L	--	--	ND(0.020)	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007
Sample Date:		5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016	6/1/2017
Sample Type:						Duplicate				
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	0.0067	0.00886	0.00851	0.00519	0.00527	0.00631	0.00617	0.0101	--
Boron (dissolved)	mg/L	ND(0.050)	0.045	0.042	ND(0.026)	ND(0.027)	0.030	0.046	0.044	--
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.00050)	0.00086	ND(0.00066)	ND(0.00060)	0.00093	ND(0.00050)	ND(0.00050)	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00011	0.00013	0.00071	0.00067	0.00069	0.00184	0.00022	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.00020)	ND(0.00020)	ND(0.00067) J	ND(0.00020) J	ND(0.00020)	ND(0.00020)	0.0402	--
Iron (dissolved)	mg/L	4.77	4.92	4.74	3.73	3.81	5.32	5.93	8.49	3.76
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	ND(0.000050)	0.000107	--
Manganese (dissolved)	mg/L	2.45	2.07	2.21	2.55	2.52	2.05	3.76	4.35	2.11
Mercury (dissolved)	mg/L	ND(0.000010)	0.000013	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L	0.0041	0.00467	0.00376	ND(0.00368)	ND(0.00379)	0.00372	0.00983	0.00271	--
Nickel (dissolved)	mg/L	ND(0.0020)	0.00056	0.00052	ND(0.00178)	ND(0.00158)	0.00142	0.00426	0.00078	--
Zinc (dissolved)	mg/L	ND(0.0030)	0.0023	0.0016	0.0069 J	ND(0.0022) J	0.0015	0.0124	0.0024	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	226	262	254	ND(249)	ND(253)	292	322	329	347
Ammonia-N	mg/L	1.01	1.35	1.66	0.867	0.908	1.15	1.34	1.85	1.51
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	32	32	32	ND(29)	ND(28)	32	ND(58)	44	--
Chloride	mg/L	78.5	56.8	56.9	ND(43.4)	ND(44.2)	80.4	101	83.5	--
Color (apparent)	TCU	225	247	207	189 J	191 J	253	260	343	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.5	9.6	10.1	ND(8.5)	ND(8.5)	9.6	11.5	10.3	7.8
Escherichia coli	cfu/100mL	0	12	0	0	0	0	6	0	0
Fecal coliform bacteria	cfu/100mL	2	40	0	0	0	0	60	0	--
Nitrate (as N)	mg/L	ND(0.10)	0.022	ND(0.020)	ND(0.025)	ND(0.024)	ND(0.020)	ND(0.10)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.050)	ND(0.010)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.64	7.93	7.58	7.62	7.60	7.80	7.63	7.11	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0034	0.0021	0.0036	ND(0.0010)	ND(0.0010)	0.0021	0.0032	0.0011	--
Phosphorus	mg/L	ND(0.030)	ND(0.030)	0.048	ND(0.030)	ND(0.030)	0.0281	0.0156	0.0243	0.0258
Sulfate	mg/L	90.1	102	88.2	ND(187)	ND(176)	144	223	283	--
Total coliform bacteria	cfu/100mL	50	50	2	ND(100)	ND(100)	10	3200	100	--
Total dissolved solids (TDS)	mg/L	401	565	374	ND(486)	ND(488)	711	810	897	--
Total kjeldahl nitrogen (TKN)	mg/L	1.72	1.87	1.59	1.35	1.36	1.83	2.07	2.62	--
Total suspendent solids (TSS)	mg/L	6.3	ND(2.0)	ND(2.0)	ND(3.4)	ND(3.5)	20.1	9.0	10.3	--
Turbidity	NTU	24.6	18.5	18.0	ND(33.5) J	ND(31.4) J	61.1	65.0	111	--
Un-ionized ammonia	mg/L	0.00653	0.0170	0.0265	0.00287	0.00301	0.0130	0.00359	0.00431	--
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.609	2.56	0.602	0.843	--	0.695	0.826	1.02	0.936
Dissolved oxygen (DO), field	mg/L	2.3	1.46	3.52	0	--	0.12	0	0	2.64
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-43	-179	-136	-73	--	-87	-72	-107	-79
pH, field	s.u.	7.34	7.62	7.86	7.3	--	7.7	6.81	7.06	6.84
Temperature, field	Deg C	13.58	17.28	13.48	6.17	--	9.63	16.38	11.98	11.14
Turbidity, field	NTU	0	0	1.9	17.5	--	6.7	0	4.9	11.14

GHD 0425541(8)

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-052815-TS-002	GW-45804-081315-TS-002	GW-45804-110915-TS-005	GW-45804-021016-TS-004	GW-45804-021016-TS-007	GW-45804-051716-TS-005	GW-45804-081616-TS-005	GW-45804-111516-TS-004	GW-45804-060117-TS-007
Sample Date:		5/28/2015	8/13/2015	11/9/2015	2/10/2016	2/10/2016	5/17/2016	8/16/2016	11/15/2016	6/1/2017
Sample Type:						Duplicate				
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-112917-TS-002	GW-45804-112917-TS-003	GW-45804-051618-TS-007	GW-45804-051618-TS-008	GW-45804-110718-TS-001	GW-45804-110718-TS-002	GW-45804-061819-JC-019	GW-45804-112619-JC-004
Sample Date:		11/29/2017	11/29/2017	5/16/2018	5/16/2018	11/7/2018	11/7/2018	6/18/2019	11/26/2019
Sample Type:			Duplicate		Duplicate		Duplicate		
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	1.24	1.30	3.73	3.30	0.80	0.60	5.46	4.67
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.43	1.46	2.08	2.15	0.460	0.458	1.96	2.65
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	322	332	305	306	358	353	300	296
Ammonia-N	mg/L	0.820	0.831	1.23	1.24	0.247	ND(0.255)	1.7	0.95
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.6	10.5	8.0	8.0	16.9	15.1	8.60	11.8
Escherichia coli	cfu/100mL	0	0	ND(0)	ND(0)	ND(0) J	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.076	0.065	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--
pH, lab	s.u.	--	--	--	--	--	--	--	7.63
Phenol	mg/L	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.0121 J	0.0079 J	0.0065	0.0066	0.0148 J	0.0113 J	0.0207	0.0230
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total sulfurn bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--
Turbidity	NTU	--	--	--	--	--	--	--	58.4
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.000692
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.601	--	0.607	--	1.82	--	1.07	1.45
Dissolved oxygen (DO), field	mg/L	0	--	0	--	2.87	--	0.35	0.01
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	33	--	-50	--	49	--	-166	-96
pH, field	s.u.	7.13	--	7.12	--	7.26	--	7.31	6.42
Temperature, field	Deg C	10.06	--	12.53	--	11.48	--	13.56	10.0
Turbidity, field	NTU	30.9	--	6.9	--	2	--	8.3	14.2

GHD 045804 (8)

004097

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09	MW103-09
Sample ID:		GW-45804-112917-TS-002	GW-45804-112917-TS-003	GW-45804-051618-TS-007	GW-45804-051618-TS-008	GW-45804-110718-TS-001	GW-45804-110718-TS-002	GW-45804-051619-JC-019	GW-45804-112619-JC-004
Sample Date:		11/29/2017	11/29/2017	5/16/2018	5/16/2018	11/7/2018	11/7/2018	5/16/2019	11/26/2019
Sample Type:			Duplicate		Duplicate		Duplicate		
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	-	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	-	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(c)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	-	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	-	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030512013-TS-007	GW-45804-052313-TS-002	GW-45804-090713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-RB-006	GW-45804-052114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002
Sample Date:			3/5/2013	5/23/2013	9/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015
Sample Type:											
Parameters	**Units**	**TLP2**									
Metals											
Arsenic (dissolved)	mg/L		0.0027	ND(0.010)	0.0062	0.0027	0.0017	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0010)
Boron (dissolved)	mg/L		ND(0.050)	ND(0.10)	ND(0.050)	0.058	ND(0.050)	ND(0.10)	ND(0.10)	ND(0.10)	0.068
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00090)	0.00017	ND(0.00010)	ND(0.00010)	ND(0.00090)	ND(0.00090)	ND(0.00090)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0050)	0.0040	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)
Cobalt (dissolved)	mg/L		0.00204	0.0055	0.00481	0.00345	0.00164	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00129
Copper (dissolved)	mg/L		0.0043	ND(0.010)	ND(0.0010)	ND(0.0010)	0.0022	ND(0.010)	ND(0.010)	ND(0.010)	0.0020
Iron (dissolved)	mg/L	10.5	0.932	15.0	29.9	4.96	4.82	6.20	13.2	2.74	0.765
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0050)	ND(0.0010)	0.0010	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	1.62	19.3	17.8	7.70	6.97	12.4	14.8	11.5	2.26
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.186	0.0164	0.0172	0.0614	0.0232	0.0191	0.0139	0.0177	0.0136
Nickel (dissolved)	mg/L		0.0073	ND(0.010)	0.0023	0.0102	0.0028	ND(0.010)	ND(0.010)	ND(0.010)	0.0027
Zinc (dissolved)	mg/L		0.0043	ND(0.030)	0.0043	0.0035	0.0261	ND(0.030)	ND(0.030)	ND(0.030)	0.0040
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	986	280	368	263	308	267	575	483 J	536	485
Ammonia-N	mg/L	0.2	7.95	9.68	9.27	14.3	9.88	0.22	0.12 J	7.03	7.35
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		16.1	2.2	10.2	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		99	72	68	95	ND(54)	74	76 J	55	56
Chloride	mg/L		170	219	162	147	185	189	128 J	129	193
Color (apparent)	TCU		62.9	173 J	362	76.7	120 J	153 J	85.8 J	210	198
Dissolved organic carbon (DOC) (dissolved)	mg/L	16.4	35.3	51.2	15.5	9.19	10.3	11.1	14.3 J	13.9	8.8
Escherichia coli	cfu/100mL	5	0	4	ND(2)	ND(2)	0	0	0 J	0	ND(2)
Fecal coliform bacteria	cfu/100mL		ND(0) J	6	10	ND(2)	0	0	0 J	0	ND(2)
Nitrate (as N)	mg/L	0.5	0.15	ND(0.10)	ND(0.50)	ND(0.10)	0.35	ND(0.10)	0.13 J	ND(0.10)	0.37
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	0.22	ND(0.10)	ND(0.10) J	ND(0.10)	ND(0.10)
pH, lab	s.u.		7.86	7.73	7.50	7.57	7.55	7.56	7.34 J	7.52	7.46
Phenol	mg/L		0.0015	ND(0.0020)	ND(0.0090)	ND(0.0010)	0.0025	0.0017	ND(0.0010) J	ND(0.0010)	0.0032
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.060	0.082	0.070	0.090	0.066	0.111	0.083 J	0.059	0.095
Sulfate	mg/L		582	531	800	713	462	507	539 J	512	546
Total coliform bacteria	cfu/100mL		100	1700	10400	10	1	0	ND(10) J	2	30 J
Total dissolved solids (TDS)	mg/L		1770	1800	2030	1660	1170	1580	1270 J	1470	1620
Total kjeldahl nitrogen (TKN)	mg/L		9.95	9.85	9.80	14.8	9.87	13.6	15.0 J	9.81	8.06
Total suspended solids (TSS)	mg/L		72.0	78.0	106	584	32.0	202	647 J	91.0	1240
Turbidity	NTU		61.0	162	43.0	75.0	54.0	132	57.8 J	124	20.8
Un-ionized ammonia	mg/L		0.0198	0.0292	0.0214	0.0536	0.0261	0.101	0.056 J	0.0259	0.000844
Field Parameters											
Color	TCU		--	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm		2.15	2.17	2.53	2.5	2.41	2.55	2.53	0.628	--
Dissolved oxygen (DO), field	mg/L		3.61	3.57	7.86	7.24	6.62	2	6.26	8.19	--
Odor	none		--	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		+176	--	-122	--	-116	+145	+134	+60	--
pH, field	s.u.		7.14	7.20	6.65	7.12	7.02	7.3	8.13	7.15	5.98
Temperature, field	Deg C		8.0	17.3	21.59	13.1	9.32	17.06	22.61	11.56	7.4
Turbidity, field	NTU		76.4	150	150	104	148	444	684	--	--

GHD 045564 (8)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:			MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:			GW-45804-030513-TS-007	GW-45804-052313-TS-002	GW-45804-090713-TS-002	GW-45804-111413-TS-001	GW-45804-042114-TS-001	GW-45804-052914-RB-006	GW-45804-082114-TS-004	GW-45804-112614-TS-011	GW-45804-040915-TS-002
Sample Date:			3/5/2013	5/23/2013	9/7/2013	11/14/2013	4/21/2014	5/29/2014	8/21/2014	11/26/2014	4/9/2015
Sample Type:											
Parameters	Units	TLP2									
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	420	560	ND(250)	ND(250)	610 J	ND(250)	300
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	420	560	ND(250)	ND(250)	600 J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	1380	1940	ND(250)	ND(250)	2430 J	ND(250)	1110
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	--	--	--	--	12900 J	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	1800	2500	ND(380)	ND(380)	3040 J	ND(380)	1410
Semi-Volatiles											
1-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Acridine	µg/L		--	--	--	--	ND(4.0)	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.20) J	ND(0.020)	ND(0.20)
Benzo(a)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(a)pyrene	µg/L		0.024	ND(0.0050)	0.0679	0.391	0.0212	0.0435	0.426 J	0.0183	0.311
Benzo(b)fluoranthene	µg/L		--	--	--	--	0.028	--	--	--	--
Benzo(c)pyridine (Quinoline)	µg/L		--	--	--	--	ND(0.040)	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	ND(0.060)	--	--	--	--
Chrysene	µg/L		--	--	--	--	0.023	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	0.041	--	--	--	--
Fluorene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Naphthalene	µg/L		--	--	--	--	ND(0.050)	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	ND(0.020)	--	--	--	--
Pyrene	µg/L		--	--	--	--	0.035	--	--	--	--
Misc											
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111615-TS-003	GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010	GW-45804-060117-TS-004	GW-45804-083017-TS-001
Sample Date:		5/28/2015	8/13/2015	11/16/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:										
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	0.0013	0.0018	0.0014	0.0035	0.00226	--	--
Boron (dissolved)	mg/L	0.199	0.11	0.13	ND(0.10)	0.11	0.10	0.128	--	--
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00050)	--	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.0040	0.0032	0.0022	0.0020	0.0029	0.00090	--	-
Copper (dissolved)	mg/L	0.0024	0.0107	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00304	--	--
Iron (dissolved)	mg/L	0.071	9.28	7.79	7.75	9.27	10.2	6.05	3.43	2.24 J
Lead (dissolved)	mg/L	ND(0.0010)	0.00056	ND(0.00050)	0.00066	ND(0.00050)	ND(0.00050)	ND(0.000050)	--	--
Manganese (dissolved)	mg/L	0.548	12.6	9.30	7.35	9.02	8.78	4.01	1.73	1.99 J
Mercury (dissolved)	mg/L	ND(0.000010)	0.000023	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	--
Molybdenum (dissolved)	mg/L	0.0174	0.0172	0.0152	ND(0.0101)	0.0146	0.0139	0.0132	--	--
Nickel (dissolved)	mg/L	0.0045	0.0060	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00165	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	0.012	ND(0.0010)	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	361	480	341	ND(373)	380	415	364	344	543 J
Ammonia-N	mg/L	1.83	33.3	6.13	1.73	3.87	5.43	1.25	3.65	3.63 J
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--
Chemical oxygen demand (COD)	mg/L	23	47	44	ND(25)	27	ND(48)	25	--	--
Chloride	mg/L	197	114	66.1	ND(87.6)	134	61.2	54.3	--	-
Color (apparent)	TCU	66.9	130	142	162	102	141	103	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.5	9.4	9.5	ND(5.9)	8.7	9.2	7.3	5.5	7.6 J
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0	0	0 J
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0	--	--
Nitrate (as N)	mg/L	23.6	1.42	0.68	2.26	ND(0.10)	2.8	2.06	0.91	0.109 J
Nitrite (as N)	mg/L	0.261	0.090	ND(0.050)	0.011	ND(0.050)	ND(0.050)	0.037	--	--
pH, lab	s.u.	7.71	7.90	7.78	7.75	7.68	7.58	7.18	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0020	0.0020	0.0032	0.0010	ND(0.0012)	0.0042	ND(0.0023)	--	--
Phosphorus	mg/L	0.042	0.041	0.068	ND(0.030)	0.0291	0.0449	0.0066	0.0193	0.0141 J
Sulfate	mg/L	693	621	385	ND(552)	958	519	454	--	-
Total coliform bacteria	cfu/100mL	0	40	5	ND(10)	ND(10)	100	0	--	--
Total dissolved solids (TDS)	mg/L	1470	1180	1130	ND(1370)	1760	1300	1130	--	--
Total kjeldahl nitrogen (TKN)	mg/L	2.12	10.9	5.89	2.18	4.56	5.97	2.30	--	--
Total suspended solids (TSS)	mg/L	92.4	35.1	52.8	28.5	40.3	104	23.5	--	-
Turbidity	NTU	38.0	8.07	68.1	80.9 J	77.5	91.5	57.3	--	--
Un-ionized ammonia	mg/L	0.0170	0.258	0.190	0.00835	0.0906	0.0766	0.0198	--	--
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.12	1.46	1.82	0.886	1.94	1.87	1.21	1.85	1.56
Dissolved oxygen (DO), field	mg/L	10.14	0.17	3.54	2.75	0	0.76	1.21	1.44	1.39
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-24	+120	+136	91	+73	+128	93	+84	+106
pH, field	s.u.	7.38	7.65	8.15	8.77	7.8	7.48	7.69	7.13	7.16
Temperature, field	Deg C	16.43	17.49	9.85	14.96	16.4	21.68	9.26	18.72	22.16
Turbidity, field	NTU	132	260	89	28.5	20.1	0	129	15.1	0

GHD 045804 (8)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-052815-TS-009	GW-45804-081315-TS-007	GW-45804-111615-TS-003	GW-45804-021016-TS-005	GW-45804-051816-TS-013	GW-45804-081616-TS-004	GW-45804-111616-TS-010	GW-45804-060117-TS-004	GW-45804-083017-TS-001
Sample Date:		5/28/2015	8/13/2015	11/16/2015	2/10/2016	5/18/2016	8/16/2016	11/16/2016	6/1/2017	8/30/2017
Sample Type:										
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330	ND(250)	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GRH)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	--	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.0510	0.0199	0.0186	0.0051	0.0127	0.0054	ND(0.0050)	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc										
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-045804-113017-TS-009	GW-045804-051618-TS-006	GW-045804-081518-TS-005	GW-045804-110818-TS-004	GW-045804-081819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:		11/30/2017	5/16/2018	8/15/2018	11/8/2018	8/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Metals										
Arsenic (dissolved)	mg/L	--	--	--	--	--	0.00417	0.00438	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	0.077	0.073	--	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	ND(0.000010)	ND(0.000010)	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	0.00193	0.00131	--	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	0.00118	0.00120	--	--
Copper (dissolved)	mg/L	--	--	--	--	--	0.00058	0.00033	--	--
Iron (dissolved)	mg/L	0.573	6.80	0.151	0.128	6.83	8.96	10.6	0.051	0.052
Lead (dissolved)	mg/L	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--
Manganese (dissolved)	mg/L	2.26	6.87	0.945	1.89	2.80	5.33	5.38	1.98	1.95
Mercury (dissolved)	mg/L	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	0.00241	0.00231	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	0.0020	0.0010	--	--
General Chemistry										
Alkalinity, total (as CaCO3)	mg/L	536	586	495	496	491	--	--	413	415
Ammonia-N	mg/L	2.50	3.75	2.68	5.13	1.56	--	--	3.4	3.60
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	ND(3.0)	ND(3.0)	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	33	35	--	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	10.7	11.4	10.3	10.2	9.23	--	--	7.70	8.19
Escherichia coli	cfu/100mL	0	NDO	2	ND(0) 0	0	3	1	4	2
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.37	0.090	ND(0.020)	5.45	0.15	--	--	0.42	10.1
Nitrite (as N)	mg/L	--	--	--	--	--	ND(0.050)	0.053	--	--
pH, lab	s.u.	--	--	--	--	--	7.45	7.44	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--
Phosphorus	mg/L	0.0089	0.0197	0.197	ND(0.0030)	0.0108	--	--	0.0186	0.0198
Sulfate	mg/L	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	12.9	13.9	--	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	67	41	--	--
Turbidity	NTU	--	--	--	--	--	--	--	17.1	15.2
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00587	0.00490
Field Parameters										
Color	TCU	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.559	1.9	1.8	1.71	1.44	1.640	1.640	1.63	1.63
Dissolved oxygen (DO), field	mg/L	0.44	0	0.84	2.13	1.05	0.29	--	1.8	--
Odor	none	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-96	-148	-17	-137	-89	--	16	--
pH, field	s.u.	7.33	7.33	7.22	7.5	7.14	6.87	6.87	6.46	6.46
Temperature, field	Deg C	11.42	13.25	21.78	11.45	18.78	20.97	20.97	12.3	12.3
Turbidity, field	NTU	72.2	22.1	4.4	17.3	35.2	950	--	58.4	--

GHD 045804 (8)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13	MW104-13
Sample ID:		GW-45804-112017-TS-009	GW-45804-051618-TS-006	GW-45804-081518-TS-005	GW-45804-110818-TS-004	GW-45804-081819-JC-013	GW-045804-090519-JC-010	GW-045804-090519-JC-011	GW-045804-112719-JC-009	GW-045804-112719-JC-010
Sample Date:		11/30/2017	5/16/2018	8/15/2018	11/8/2018	8/18/2019	9/5/2019	9/5/2019	11/27/2019	11/27/2019
Sample Type:								Duplicate		Duplicate
Parameters	**Units**									
Petroleum Products										
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--
Semi-Volatiles										
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--
Misc.										
Oil and grease	mg/L	--	--	--	--	--	ND(5.0)	ND(5.0)	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:			MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13	MW19S-13
Sample ID:			GW-45804-03052013-TS-008	GW-45804-052313-TS-010	GW-45804-050713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45804-042114-TS-005	GW-45804-052914-MB-007	GW-45804-052914-MB-008	GW-45804-082114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
Sample Type:							Duplicate		Duplicate		Duplicate	
Parameters	**Units**	**TLP2**										
Metals												
Arsenic (dissolved)	mg/L		0.0059	0.0142	0.0078	0.0029	0.0028	0.0092	0.0078	0.0040	0.0049	ND(0.0010)
Boron (dissolved)	mg/L		0.073	0.057	0.063	0.076	0.074	0.062	0.061	0.065	0.067	0.066
Cadmium (dissolved)	mg/L		ND(0.00010)	0.00011	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.8	2.09	5.21	4.58	2.67	2.11	0.216	0.212	0.080	0.065	0.296
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.467	0.650	0.620	0.512	0.516	0.443	0.413	0.442	0.532	0.566
Mercury (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0060	0.0141	0.0100	0.0087	0.0086	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Nickel (dissolved)	mg/L		ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0024	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)
Zinc (dissolved)	mg/L		ND(0.0030)	0.0037	ND(0.0030)	ND(0.0030)	0.0068	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	668	462	385	382	429	427	911	880	600	608	438 J
Ammonia-N	mg/L	0.2	34.7	29.3	28.2	25.6	27.2	76.0	76.5	57.8	57.4	36.2 J
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--	--
Biodimmed oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	9.0	10.1	8.1	8.6	3.0 J
Chemical oxygen demand (COD)	mg/L		46	15	13	32	36	ND(54)	65	34	30	19 J
Chloride	mg/L		173	128	199	194	164	248	245	216	217	114 J
Color (apparent)	TCU		27.1	56.8 J	52.9	83.5	73.7	49.8 J	53.9 J	55.5 J	70.7 J	12.4 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	16.4	7.9	ND(5.0)	5.1	4.5	4.1	8.3	8.4	5.2	5.2	4.4 J
Escherichia coli	cfu/100mL	0	1	ND(2)	ND(2)	0	0	220	222	0	0	0 J
Fecal coliform bacteria	cfu/100mL		50 J	ND(2)	ND(2)	0	0	460	430	0	0	0 J
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10) J	0.22 J	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10) J
pH, lab	s.u.		7.82	7.76	7.41	7.54	7.51	7.25	7.28	7.55	7.55	7.41 J
Phenol	mg/L		ND(0.0010)	ND(0.0020)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0023	0.0103	0.0074	0.0060	0.0023 J
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.048	0.045	0.035	0.051	ND(0.030)	0.087	0.087	0.134	0.107	0.072 J
Sulfate	mg/L		370	364	1050	574	575	429	427	649	649	509 J
Total coliform bacteria	cfu/100mL		160	110	2	2	ND(10)	4400	4800	2	1	ND(10) J
Total dissolved solids (TDS)	mg/L		2100	1880	2140	1810	1800	1610	1600	1740	1730	1290 J
Total kjeldahl nitrogen (TKN)	mg/L		36.2	24.5	30.0	25.2	27.2	74.3	75.0	45.4	51.2	19.3 J
Total suspended solids (TSS)	mg/L		16.0	31.0	44.4	6.4	6.4	20.0 J	4.4 J	11.6 J	4.0 J	16.8 J
Turbidity	NTU		19.0	32.0	39.0	16.2	22.7	51.0	59.0	16.2	26.0	2.47 J
Unionized ammonia	mg/L		0.141	0.0783	0.0665	0.0615	0.0316	0.174	0.173	0.366	0.396	17.0 J
Field Parameters												
Odor	TCU		--	--	--	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm		3.01	2.59	2.75	2.43	--	2.12	--	3.02	--	2.02
Dissolved oxygen (DO), field	mg/L		2.86	1.21	4.33	8.78	--	4.03	--	5.33	--	0.28
Odor	none		--	--	--	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		+215	--	-101	--	--	-75	--	+316	--	+276
pH, field	s.u.		7.11	8.60	8.83	8.47	8.47	7.4	7.03	7.19	--	8.37
Temperature, field	Deg C		14.5	15.1	22.55	17.3	10.47	9.3	16.91	--	--	21.66
Turbidity, field	NTU		170	119	94.2	11.2	--	31.5	--	24.6	--	106
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100) J
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	550	ND(250)	560	ND(250)	ND(250)	ND(250)	ND(250)	ND(250) J
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	330 J
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(350)	ND(350)	550	ND(350)	560	ND(350)	ND(350)	ND(350)	ND(350)	ND(350) J

GHD 3164130

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:			GW-45804-030512013-TS-008	GW-45804-052313-TS-010	GW-45504-050713-TS-003	GW-45804-111413-TS-002	GW-45804-111413-TS-003	GW-45804-042114-TS-004	GW-45504-042114-TS-005	GW-45804-052514-MB-007	GW-45504-052514-MB-008	GW-45804-082114-TS-005
Sample Date:			3/5/2013	5/23/2013	8/7/2013	11/14/2013	11/14/2013	4/21/2014	4/21/2014	5/29/2014	5/29/2014	8/21/2014
Sample Type:							Duplicate		Duplicate		Duplicate	
Parameters	**Units**	**TLP2**										
Semi-Volatiles												
1-Methylnaphthalene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Acridine	µg/L		--	--	--	--	--	ND(4.0)	ND(4.0)	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J
Benz(a)anthracene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(a)pyrene	µg/L		ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050) J
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(b)quinoline (Quinoline)	µg/L		--	--	--	--	--	ND(0.040)	ND(0.040)	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	ND(0.060)	ND(0.060)	--	--	--
Chrysene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Fluorene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Naphthalene	µg/L		--	--	--	--	--	ND(0.050)	ND(0.050)	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Pyrene	µg/L		--	--	--	--	--	ND(0.020)	ND(0.020)	--	--	--
Misc.												
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	--

Notes

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 3164134 (6)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804-040215-TS-001	GW-45804-052715-TS-010	GW-45804-081515-TS-001	GW-45804-110915-TS-006	GW-45804-021616-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-021616-TS-002	GW-45804-111616-TS-001	GW-45804-050117-TS-001
Sample Date:		11/25/2014	4/8/2015	5/27/2015	8/15/2015	11/5/2015	2/10/2016	5/18/2016	8/16/2016	2/15/2016 Duplicate	11/15/2016	5/1/2017
Sample Type:												
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	0.0011	ND(0.0010)	ND(0.010)	0.0011	ND(0.0010)	ND(0.0014)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Boron (dissolved)	mg/L	0.073	0.050	ND(0.10)	ND(0.10)	0.11	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	--
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000090)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Cobalt (dissolved)	mg/L	ND(0.00050)	0.00078	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.0020)	ND(0.0020)	0.0045	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0055	--
Iron (dissolved)	mg/L	2.75	1.39	7.40	4.59	7.61	5.77	4.45	4.08	4.13	2.20	2.19
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	--
Manganese (dissolved)	mg/L	0.560	0.669	1.06	0.699	0.669	0.567	0.637	0.536	0.524	0.652	0.382
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000100	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.0000010	--
Molybdenum (dissolved)	mg/L	0.0070	0.0181	0.0150	0.0146	0.0161	ND(0.0167)	0.0101	0.00807	0.00831	0.00710	--
Nickel (dissolved)	mg/L	ND(0.0020)	0.0035	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Zinc (dissolved)	mg/L	0.0211	ND(0.0030)	ND(0.030)	ND(0.010)	ND(0.010)	0.011	ND(0.010)	ND(0.010)	0.412	ND(0.010)	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	406	270	268	329	379	ND(371)	376	440	451	408	500
Ammonia-N	mg/L	15.6	10.9	12.7	15.0	5.71	5.96	9.84	10.2	10.0	11.9	5.45
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	11	27	16	14	14	ND(15)	16	ND(18)	ND(18)	20	--
Chloride	mg/L	111	135	175	225	155	ND(129)	141	81.3	87.7	94.1	--
Color (apparent)	TCU	97.7	21.4	49.9	133	94.0	100	79.3	107	86.0	56.2	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.2	3.6	3.8	4.4	4.6	ND(5.6)	4.2	5.4	5.1	3.8	4.2
Escherichia coli	cfu/100mL	0	0	0	0	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL	0	0	0	0	0	0	0	4	0	0	--
Nitrate (as N)	mg/L	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.50)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--
pH, lab	s.u.	7.78	7.76	7.53	7.85	7.48	7.72	7.88	7.80	7.90	8.04	--
Phenol	mg/L	ND(0.0010)	ND(0.0053)	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	0.0057	ND(0.0010)	0.0026	0.0011	ND(0.0015)	ND(0.0016) J	0.0034 J	0.0015	--
Phosphorus	mg/L	0.069	0.253	0.158	0.082	0.073	ND(0.030)	0.0224	0.0381	0.0393	0.0206	0.0042 J
Sulfate	mg/L	738	1350	1360	1240	799	ND(822)	965	671	722	947	--
Total coliform bacteria	cfu/100mL	10	1720	2	130	1	ND(10)	ND(10)	100	100	200	--
Total dissolved solids (TDS)	mg/L	1480	2460	2200	2250	1530	ND(1720)	1840	1530	1520	1790	--
Total kjeldahl nitrogen (TKN)	mg/L	20.7	15.5	14.9	13.2	5.81	5.79	5.35	16.4	16.4	12.5	--
Total suspended solids (TSS)	mg/L	21.3	492	255	16.0	15.0	ND(10.5)	22.7	15.5	6.1	8.3	--
Turbidity	NTU	20.8	8.71	21.0	17.0	110	88.1 J	50.0	62.8	49.8	28.5	--
Un-ionized ammonia	mg/L	0.0553	0.131	0.135	0.372	0.135	0.0226	0.0741	0.0475	0.0475	0.0458	--
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.695	2.212	3.15	3.26	2.39	2.13	2.25	1.93	--	2.1	1.7
Dissolved oxygen (DO), field	mg/L	2.72	--	4.94	0.48	0.91	0	2.07	0	--	0	3.33
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	+71	--	-6	+142	+150	+103	+115	+92	--	+107	+122
pH, field	s.u.	8.03	7.47	7.29	7.6	7.73	7.07	8.22	8.72	--	8.7	7.06
Temperature, field	Deg C	15.4	12.62	20.8	24.91	16	14.71	18.12	21.69	--	16.57	15.97
Turbidity, field	NTU	--	--	412	41.8	11.9	30.5	0.4	0	-	41.3	4.1
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	ND(100)	ND(100)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	ND(250)	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	ND(360)	--

GHD 3164130

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-112514-TS-003	GW-45804-040215-TS-001	GW-45804-052715-TS-010	GW-45804-081515-TS-001	GW-45804-110915-TS-006	GW-45804-021616-TS-010	GW-45804-051816-TS-010	GW-45804-081616-TS-001	GW-45804-021616-TS-002	GW-45804-111616-TS-001	GW-45804-050117-TS-001
Sample Date:		11/25/2014	4/2/2015	5/27/2015	8/13/2015	11/5/2015	2/10/2016	5/18/2016	8/16/2016	2/15/2016 Duplicate	11/16/2016	5/1/2017
Sample Type:												
Parameters	**Units**											
Semi-Volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.00ED)	ND(0.0050)	ND(0.00ED)	ND(0.0050)	ND(0.0050)	ND(0.00ED)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00ED)	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-061117-TS-002	GW-45804-063017-TS-002	GW-45564-112917-TS-001	GW-45804-051515-TS-001	GW-45804-051518-TS-002	GW-45804-061512-TS-001	GW-45564-051518-TS-002	GW-45804-110615-TS-006	GW-45804-061719-JC-001	GW-045804-050418-JC-003	GW-045804-112719-JC-008
Sample Date:		6/1/2017	5/30/2017	11/29/2017	5/15/2018	5/15/2018	5/15/2018	5/15/2018	11/6/2018	6/17/2019	5/4/2019	11/27/2019
Sample Type:		Duplicate				Duplicate		Duplicate				
Parameters	**Units**											
Metals												
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00041	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.075	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000010)	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00126	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000010)	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	2.28	1.41 J	4.46	3.82 J	3.82 J	4.91	4.98	2.66	3.80	3.95	2.10
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000050)	--
Manganese (dissolved)	mg/L	0.365	0.145 J	0.256	0.234 J	0.233 J	0.676	0.655	0.717	0.722	0.728	0.990
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00085	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.0017	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	442	781 J	857	842 J	872 J	457	486	423	296	--	489
Ammonia-N	mg/L	5.49	34.2 J	45.8	33.6 J	33.9 J	16.6	15.5	10.6	5.6	--	15.2
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	--	65	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	4.4	18.0 J	11.2	10.1 J	10.7 J	7.01	7.29	ND(5.4)	9.02	--	8.75
Escherichia coli	cfu/100mL	0	0 J	0	ND(0) J	ND(0) J	ND(0)	ND(0)	ND(0) J	--	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020) J	ND(0.020) J	ND(0.020)	ND(0.020)	0.035	ND(0.020)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.050)	--
pH, lab	s.u.	--	--	--	--	--	--	--	--	--	7.26	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	0.0020	--
Phosphorus	mg/L	0.0211 J	0.0481 J	0.0570	0.144 J	0.145 J	0.0730	0.0752	0.0285	0.0422	--	0.0519
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	--	11.5	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	--	10.4	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	--	19.2
Unionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	--	0.0213
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	--	1.84	2.12	2.05	--	1.99	--	1.84	1.4	1.690	2.26
Dissolved oxygen (DO), field	mg/L	--	1.7	0.91	0.64	--	0.11	--	0.18	0.77	1.26	0.21
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	--	-105	-93	-120	--	-128	--	-73	-112	-51	-118
pH, field	s.u.	--	6.08	6.77	7.06	--	6.78	--	6.85	6.53	6.89	6.48
Temperature, field	Deg C	--	22.17	16.47	16.64	--	22	--	16.21	21.76	20.88	16.92
Turbidity, field	NTU	--	8.7	81	15.9	--	2.2	--	0	5	0	0.5
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--

GHD 2019-0541 (6)

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewal Canada Ltd.
Ottawa, Ontario

Sample Location:		MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13	MW105-13
Sample ID:		GW-45804-050117-TS-002	GW-45804-053017-TS-002	GW-45564-112917-TS-001	GW-45804-051515-TS-001	GW-45804-051518-TS-002	GW-45804-051518-TS-001	GW-45564-051518-TS-002	GW-45804-110815-TS-006	GW-45804-061719-JC-001	GW-45804-050418-JC-003	GW-45804-112719-JC-008
Sample Date:		5/1/2017	5/30/2017	11/29/2017	5/15/2018	5/15/2018	5/15/2018	5/15/2018	11/8/2018	6/17/2019	5/4/2018	11/27/2018
Sample Type:		Duplicate				Duplicate		Duplicate				
Parameters	**Units**											
Semi-volatiles												
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenzo(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	1.1	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:			MW108-15	MW108-15	MW108-15	MW108-15	MW108-15	MW108-15	MW108-15	MW108-15	MW2108-15
Sample ID:			GW-45804-052815-TS-005	GW-45804-061215-TS-006	GW-45804-111015-TS-014	GW-45804-111015-TS-001	GW-45804-021016-TS-009	GW-45804-051516-TS-011	GW-45804-081616-TS-008	GW-45804-111616-TS-013	GW-45804-060217-TS-013
Sample Date:			5/28/2015	6/12/2015	11/10/2015	11/10/2015	2/10/2016	5/15/2016	8/16/2016	11/16/2016	6/2/2017
Sample Type:						Duplicate					
Parameters	**Units**	**TLP2**									
Metals											
Arsenic (dissolved)	mg/L		0.0011	0.00190	0.0011	0.0012	ND(0.0010)	0.00107	0.00074	0.00092	--
Boron (dissolved)	mg/L		0.095	0.165	0.16	0.16	ND(0.10)	0.129	0.180	0.198	--
Cadmium (dissolved)	mg/L		ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	0.000018	--
Chromium (dissolved)	mg/L		ND(0.0010)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00066)	ND(0.00050)	ND(0.00052)	--
Cobalt (dissolved)	mg/L		ND(0.00050)	0.00052	ND(0.0010)	ND(0.00010)	ND(0.00010)	0.00025	0.00029	0.00099	--
Copper (dissolved)	mg/L		ND(0.0010)	0.00884	ND(0.0020)	ND(0.0020)	ND(0.00020)	ND(0.00020)	ND(0.00068)	ND(0.00068)	--
Iron (dissolved)	mg/L	10.8	2.54	1.50	3.20	3.09	3.80	4.88	0.838	2.19	5.05
Lead (dissolved)	mg/L		ND(0.0010)	ND(0.000050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000090)	ND(0.000050)	ND(0.000050)	--
Manganese (dissolved)	mg/L	2.1	2.32	1.35	1.82	1.58	1.84	1.96	1.06	2.06	1.52
Mercury (dissolved)	mg/L		ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L		0.0102	0.0164	0.0127	0.0125	ND(0.0121)	0.0106	0.0178	0.0180	--
Nickel (dissolved)	mg/L		ND(0.0020)	0.00205	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00124	0.00222	0.00174	--
Zinc (dissolved)	mg/L		ND(0.0030)	ND(0.0040)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0015)	0.0057	0.0023	--
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	566	413	445	499	461	ND(474	443	467	497	477
Ammonia-N	mg/L	0.2	1.00	2.53	3.01	2.90	4.72	4.16	2.32	1.91	1.96
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L		27	34	41	38	ND(35)	36	ND(30)	48	--
Chloride	mg/L		103	113	119	114	ND(100)	101	107	112	--
Color (apparent)	TCU		95.7	77.8	143	186	150 J	132	83.1	114	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	8.0	9.8	10.7	12.7	ND(10.1)	9.0	12.7	13.0	11.3
Escherichia coli	cfu/100mL	5	0	0	0	0	0	0	0	0	ND(10)
Fecal coliform bacteria	cfu/100mL		0	0	0	0	0	0	15	0	--
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	0.24	ND(0.020)	ND(0.10)
Nitrite (as N)	mg/L		ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.010)	--
pH, lab	s.u.		7.92	7.94	7.88	7.86	7.88	7.89	7.89	7.26	--
Phenolics (total)	mg/L		0.0060	ND(0.0017)	0.0033	0.0024	ND(0.0010)	ND(0.0010)	0.0039	ND(0.00050)	--
Phosphorus	mg/L	0.5	0.068	0.067	0.074	0.060	0.055	0.101	0.0584	0.0041	0.350
Sulfate	mg/L		709	425	479	444	ND(465)	542	502	387	--
Total coliform bacteria	cfu/100mL		0	ND(1)	0	0	0	0	200	0	--
Total dissolved solids (TDS)	mg/L		1270	1100	1180	1170	ND(1350)	1080	1270	1230	--
Total kjeldahl nitrogen (TKN)	mg/L		11.9	3.30	3.81	3.38	4.48	4.12	3.43	2.27	--
Total suspended solids (TSS)	mg/L		6.8	11.5	7.8	7.3	21.0	30.0	22.8	4.8	--
Turbidity	NTU		25.0	14.1	47.7	50.2	69.0 J	84.5	30.5	34.5	--
Un-ionized ammonia	mg/L		0.171	0.0516	0.109	0.0922	0.0178	0.159	0.0180	0.00827	--
Field Parameters											
Conductivity, field	mS/cm		2.07	3.92	1.32	--	1.04	1.52	1.57	1.63	1.69
Dissolved oxygen (DO), field	mg/L		1.66	0.51	3.12	--	0	1.42	0	0.33	0
Oxidation reduction potential (ORP), field	millivolts		43	-122	-134	--	-114	-97	-58	-13	-102
pH, field	s.u.		7.75	7.35	8.01	8.01	7.25	8.22	7.26	7.14	7.06
Temperature, field	Deg C		12.75	18.06	12.59	12.9	6.88	10.53	14.5	14.3	11.41
Turbidity, field	NTU		0	142	13.8	--	212	41.2	0	8.7	676
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	420	540	400	290	ND(250)	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	420	540	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	ND(250)	ND(250)	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(360)	ND(360)	420	540	400	ND(380)	ND(360)	ND(360)	--
Semi-Volatiles											
Anthracene	µg/L		ND(0.020)	0.021	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Misc											
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Reneri Canada Ltd.
Ottawa, Ontario

Sample Location:		MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15	MW106-15
Sample ID:		GW-4580-003017-TS-003	GW-4580-112017-TS-007	GW-4580-051018-TS-004	GW-4580-081518-TS-008	GW-4580-110915-TS-013	GW-4580-031819-JC-018	GW-4580-053019-JC-052	GW-4580-112719-JC-013
Sample Date:		3/30/2017	11/20/2017	5/16/2018	8/15/2018	11/8/2018	3/18/2019	5/6/2019	11/27/2019
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	0.00155	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	0.152	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	ND(0.000010)	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	0.00110	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	0.00017	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	4.24 J	3.57	1.83	3.98	2.06	4.03	2.36	1.08
Lead (dissolved)	mg/L	--	--	--	--	--	--	ND(0.000050)	--
Manganese (dissolved)	mg/L	1.19 J	1.48	1.62	1.82	1.24	1.33	1.07	1.63
Mercury (dissolved)	mg/L	--	--	--	--	--	--	ND(0.0000095)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	0.00060	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	ND(0.0010)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	536 J	511	486	563	468	483	--	503
Ammonia-N	mg/L	0.07 J	0.05	0.11	0.07	0.07	<0.05	--	1.02
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	3.2	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	36	--
Chloride	mg/L	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	11.7 J	11.4	9.4	9.99	10.3	10.2	--	12.6
Escherichia coli	cfu/100mL	0 J	0	ND(0)	ND(0)	ND(0) J	0	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	0.025	ND(0.10)	--	0.24
Nitrite (as N)	mg/L	--	--	--	--	--	--	ND(0.050)	--
pH, lab	s.u.	--	--	--	--	--	--	7.97	--
Phenolics (total)	mg/L	--	--	--	--	--	--	0.0016	--
Phosphorus	mg/L	0.100 J	0.0671	0.0493	0.155	0.0811	0.0539	--	0.0158
Sulfate	mg/L	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	4.04	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	2.8	--
Turbidity	NTU	--	--	--	--	--	--	--	18.6
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	0.00241
Field Parameters									
Conductivity, field	mS/cm	1.86	1.78	1.75	2	1.98	1.51	1.729	1.93
Dissolved oxygen (DO), field	mg/L	0.74	0	0	0	1.88	0.43	0.33	0
Oxidation reduction potential (ORP), field	millivolts	-119	-72	-92	-119	-92	-147	-91	-54
pH, field	s.u.	7.19	7.36	7.13	7.51	7.47	7.49	6.96	6.8
Temperature, field	Deg C	17.49	12.02	9.55	16.27	14.33	17.53	16.85	10.12
Turbidity, field	NTU	9	22.1	21.2	66.4	0	24.4	0	7.5
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34+C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--
Semi-Volatiles									
Anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--
Misc									
Oil and grease	mg/L	--	--	--	--	--	--	6.2	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012
Sample Type:				Duplicate					
Parameters	**Units**	**TLP2**							
Metals									
Arsenic (dissolved)	mg/L		ND(0.010)	ND(0.010)	--	0.0056	0.0061	0.0052	--
Boron (dissolved)	mg/L		--	--	--	--	--	ND(0.050)	--
Cadmium (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	--
Chromium (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Cobalt (dissolved)	mg/L		--	--	--	--	--	0.00146	--
Copper (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Iron (dissolved)	mg/L	10.6	18.8	17.2	3.56	1.50	0.897	1.92	--
Lead (dissolved)	mg/L		--	--	--	--	--	ND(0.0010)	--
Magnesium (dissolved)	mg/L		82.9	79.6	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	11.0	10.6	1.14	0.640	0.539	0.956	--
Mercury (dissolved)	mg/L		--	--	--	--	--	ND(0.00010)	--
Molybdenum (dissolved)	mg/L		0.0124	0.0118	0.0530	0.0344	0.0056	0.0057	--
Nickel (dissolved)	mg/L		--	--	--	--	--	ND(0.0020)	--
Silver (dissolved)	mg/L		--	--	ND(0.00010)	--	--	--	--
Zinc (dissolved)	mg/L		ND(0.030)	0.148	0.0052	ND(0.0030)	ND(0.0030)	ND(0.0030)	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	956	490	490	207	197	177	254	--
Ammonia-N	mg/L	0.2	0.569	0.622	0.193	0.328	0.419	1.06	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	2.5	3.6	--
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	51	--
Chloride	mg/L		66.1	66.6	109	47.5	37.9	99.2	--
Color (apparent)	TCU		220	240	69.2	151	29.5	--	107
Conductivity	umhos/cm		1750	1760	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	16.4	9.7	9.9	6.4	7.0	8.5	9.5	--
Escherichia coli	cfu/100mL	5	0	0	3	0	ND(2)	--	13
Fecal coliform bacteria	cfu/100mL		0	0	11	14	2	--	6
Nitrate (as N)	mg/L	0.5	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	--
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.10)	--
pH, lab	s.u.		7.65	7.59	--	--	--	7.76	--
Phenol	mg/L		--	--	--	--	--	ND(0.0010)	--
Phenolics (total)	mg/L		--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.127	0.067	1.56	5.49	3.13	2.98	--
Sulfate	mg/L		--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	0	700	50	70	--	470
Total dissolved solids (TDS)	mg/L		1310	1320	1010	896	482	700	--
Total Kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	2.29	--
Total suspended solids (TSS)	mg/L		--	--	--	--	--	3970	--
Turbidity	NTU		63.0	64.0	--	--	--	--	24.0
Un-ionized ammonia	mg/L		0.000415	0.000382	0.00645	0.000111	0.00367	--	--
Field Parameters									
Color	TCU		--	--	--	--	--	--	--
Conductivity, field	mS/cm		1.09	1.09	0.5	1.62	0.701	1.16	1.24
Dissolved oxygen (DO), field	mg/L		2.29	2.29	--	6.87	--	--	--
Odor	none		--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		-85	-85	--	-143	--	--	--
pH, field	s.u.		6.59	6.59	7.47	6.13	7.62	6.85	6.24
Temperature, field	Deg C		3.7	3.7	10.5	11.1	9.5	12.98	12.73
Turbidity, field	NTU		297	297	--	--	-5	--	--

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:			GW-45804-011410-MB-003	GW-45804-011410-MB-004	GW-45804-052710-MMD-016	GW-45804-110210-TS-007	GW-45804-111011-TS-013	GW-45804-051412-MB-006	GW-45804-052312-MB-001
Sample Date:			1/14/2010	1/14/2010	5/27/2010	11/2/2010	11/10/2011	5/14/2012	5/23/2012
Sample Type:				Duplicate					
Parameters	**Units**	**TLP2**							
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		ND(250)	ND(250)	690	440	930	700	--
Petroleum hydrocarbons F3 minus PAH	µg/L		ND(250)	ND(250)	690	440	930	700	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	2840	1520	3410	2650	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		--	--	8000	4100	10900	9000	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		ND(250)	ND(250)	3530	1960	4340	3350	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--
Anthracene	µg/L		ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		ND(0.0050)	ND(0.0050)	0.0180	0.0357	0.0276	0.0086	--
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111212-MB-003	GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016
Sample Date:		11/12/2012	5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/10/2015
Sample Type:							Duplicate		
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.0054	0.0048	0.0031	0.0041	0.0016	0.0015	0.0024	0.00149
Boron (dissolved)	mg/L	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.017
Cadmium (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Chromium (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00061
Cobalt (dissolved)	mg/L	0.00228	0.00077	0.00070	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00020)
Iron (dissolved)	mg/L	5.78	3.03	1.86	2.78	2.54	2.54	3.42	3.00
Lead (dissolved)	mg/L	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.17	1.43	1.09	1.23	0.918	0.901	1.07	0.988
Mercury (dissolved)	mg/L	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0058	0.0109	0.0042	0.0045	0.0026	0.0027	0.0017	0.00160
Nickel (dissolved)	mg/L	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	ND(0.0030)	0.0036	0.0045	ND(0.0030)	0.0058	ND(0.0030)	0.0024
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	356	206	185	234 J	224	235	259	222
Ammonia-N	mg/L	1.56	1.12	0.440	3.05 J	1.22	1.33	0.644	0.483
Biochemical oxygen demand (carbonaceous)	mg/L	7.5	ND(2.0)	ND(2.0)	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	55	49	52	45 J	24	15	36	21
Chloride	mg/L	70.7	90	59.2	85.2 J	59	60	75.5	52.2
Color (apparent)	TCU	43.1 J	27.8	34.9	146 J	146	136	49.5	103
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.2	6.2	7.6	6.4 J	7.4	7.3	10.7	7.6
Escherichia coli	cfu/100mL	5	20	11	0 J	0	2	1	0
Fecal coliform bacteria	cfu/100mL	10	40	15	0 J	0 J	4 J	1	0
Nitrate (as N)	mg/L	ND(0.10)	ND(0.50)	0.10	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.020)
Nitrite (as N)	mg/L	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10) J	ND(0.50)	ND(0.50)	ND(0.050)	ND(0.010)
pH, lab	s.u.	7.78	7.74	7.31	7.77 J	7.90	7.88	7.74	7.72
Phenol	mg/L	ND(0.0010)	ND(0.0010)	0.0017	ND(0.0010) J	ND(0.0010)	ND(0.0010)	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	0.0101	0.0022
Phosphorus	mg/L	1.67	3.27	1.12	0.174 J	0.208	0.208	1.67	0.162
Sulfate	mg/L	397	337	231	194 J	141	137	86.7	80.8
Total coliform bacteria	cfu/100mL	100	20	900	5 J	290	320	600	150
Total dissolved solids (TDS)	mg/L	1110	812	557	644 J	513	511	458	441
Total kjeldahl nitrogen (TKN)	mg/L	2.95	2.53	1.37	2.88 J	1.44	1.54	1.95	0.99
Total suspended solids (TSS)	mg/L	4820	2690	3220	5.6 J	7.5	6.4	2800	23.1
Turbidity	NTU	7.50 J	58.0	48.8	15.7 J	29.4	26.2	40.0	40.4
Un-ionized ammonia	mg/L	0.194	0.000445	0.000151	0.0173 J	0.00696	0.00753	0.00483	0.0287
Field Parameters									
Color	TCU	--	--	ND()	--	--	--	--	--
Conductivity, field	mS/cm	1.32	1.3	0.957	1.17	0.307	--	0.607	0.554
Dissolved oxygen (DO), field	mg/L	3.01	4.46	7.02	0	3.32	--	8.32	0
Odor	none	--	--	ND()	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-113	--	--	-175	-53	--	-92	-119
pH, field	s.u.	8.58	8.05	8.18	7.38	7.47	7.47	7.24	8.39
Temperature, field	Deg C	12.3	15.9	10.0	15.85	8.11	8.1	14.97	11.3
Turbidity, field	NTU	<5	<5	957	3.1	--	--	0	33.8

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-111212-MB-003	GW-45804-052213-TS-004	GW-45804-111413-TS-009	GW-45804-053014-MB-014	GW-45804-112514-TS-007	GW-45804-112514-TS-008	GW-45804-052815-TS-003	GW-45804-111015-TS-016
Sample Date:		11/12/2012	5/22/2013	11/14/2013	5/30/2014	11/25/2014	11/25/2014	5/28/2015	11/10/2015
Sample Type:							Duplicate		
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	-	ND(100)	ND(100)	ND(100) J	ND(100)	ND(100)	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)	530	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	460	530	780	ND(250) J	ND(250)	ND(250)	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	1710	1920	3160	ND(250) J	ND(250)	ND(250)	2470	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	8300	13600	20000	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	-	--	--	--	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	ND(100)	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	-	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	-	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	2170	2450	3840	ND(380) J	ND(380)	ND(380)	3000	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	0.034	0.049	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	0.068	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	0.034	0.028	--	--	--	--	--	--
Acenaphthene	µg/L	0.024	ND(0.020)	--	--	--	--	--	--
Acenaphthylene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Acridine	µg/L	-	ND(4.0)	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	0.029	ND(0.020)	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	0.034	0.0149	0.0117 J	ND(0.0050) J	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	0.041	0.033	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	-	ND(0.040)	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	0.055	0.027	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	-	ND(0.050)	--	--	--	--	--	--
Chrysene	µg/L	0.113	0.070	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Fluoranthene	µg/L	0.034	0.039	--	--	--	--	--	--
Fluorene	µg/L	0.040	ND(0.30)	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Naphthalene	µg/L	0.047	0.049	--	--	--	--	--	--
Phenanthrene	µg/L	0.056	0.061	--	--	--	--	--	--
Pyrene	µg/L	0.056	0.040	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008	GW-45804-051618-TS-010	GW-45804-110818-TS-009	GW-45804-061819-TS-012	GW-045804-112719-JC-011
Sample Date:		5/17/2016	11/15/2016	6/1/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Metals								
Arsenic (dissolved)	mg/L	0.00186	0.00161	--	--	--	--	--
Boron (dissolved)	mg/L	0.032	0.026	--	--	--	--	--
Cadmium (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	--	--	--	--	--
Chromium (dissolved)	mg/L	0.00068	ND(0.00050)	--	--	--	--	--
Cobalt (dissolved)	mg/L	0.00011	ND(0.00010)	--	--	--	--	--
Copper (dissolved)	mg/L	ND(0.00020)	0.00058	--	--	--	--	--
Iron (dissolved)	mg/L	6.28	8.11	6.21	3.46	1.73	2.00	0.280
Lead (dissolved)	mg/L	ND(0.000050)	ND(0.000050)	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	1.28	2.09	1.19	0.825	0.913	0.729	0.453
Mercury (dissolved)	mg/L	ND(0.000010)	ND(0.000010)	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.00113	0.00180	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00054	0.00065	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0010	ND(0.0010)	--	--	--	--	--
General Chemistry								
Alkalinity, total (as CaCO3)	mg/L	322	273	410	408	307	352	289
Ammonia-N	mg/L	0.565	0.617	1.42	2.67	3.24	2.6	2.16
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	35	33	--	--	--	--	--
Chloride	mg/L	97.1	101	--	--	--	--	--
Color (apparent)	TCU	260	448	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.7	7.3	7.9	8.8	9.05	8.07	9.55
Escherichia coli	cfu/100mL	0	0	0	ND(0)	ND(0) J	0	0
Fecal coliform bacteria	cfu/100mL	0	0	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	ND(0.10)	ND(0.020)	ND(0.020)	0.056	0.036	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.050)	--	--	--	--	--
pH, lab	s.u.	7.85	8.96	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0022	0.0024	--	--	--	--	--
Phosphorus	mg/L	0.116	0.147	0.167	0.202	0.427	0.220	0.282
Sulfate	mg/L	149	689	--	--	--	--	--
Total coliform bacteria	cfu/100mL	1	109	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	727	1360	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	1.62	0.79	--	--	--	--	--
Total suspended solids (TSS)	mg/L	11.3	12.1	--	--	--	--	--
Turbidity	NTU	78.1	107	--	--	--	--	6.34
Un-ionized ammonia	mg/L	0.00945	0.00227	--	--	--	--	0.0116
Field Parameters								
Color	TCU	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.795	1.59	0.911	0.877	1.1	0.951	0.962
Dissolved oxygen (DO), field	mg/L	0	6.35	5.49	0	3.79	0	0
Odor	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-102	-95	-122	-119	-72	-175	-142
pH, field	s.u.	7.67	7	7.11	7.1	7.33	7.02	7.32
Temperature, field	Deg C	11.51	11.23	13.83	14.17	10.02	15.35	6.83
Turbidity, field	NTU	9.6	0	0	1.6	0	0	3.9

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08	MW1-08
Sample ID:		GW-45804-051716-TS-006	GW-45804-111516-TS-005	GW-45804-060117-TS-008	GW-45804-051618-TS-010	GW-45804-110818-TS-009	GW-45804-061819-TS-012	GW-045804-112719-JC-011
Sample Date:		5/17/2016	11/15/2016	6/1/2017	5/16/2018	11/8/2018	6/18/2019	11/27/2019
Sample Type:								
Parameters	**Units**							
Petroleum Products								
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	--	--	--	--	--
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	--	--	--	--	--
Semi-Volatiles								
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-111011-TS-007-1	GW-45804-051512-MB-007
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012
Sample Type:									
Parameters	**Units**	**TLP2**							
Metals									
Arsenic (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		--	--	--	--	--	--	ND(0.050)
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	0.00012	ND(0.00010)
Chromium (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	0.00122
Copper (dissolved)	mg/L		--	--	--	--	--	--	0.0028
Iron (dissolved)	mg/L	10.6	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.050)
Lead (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L		28.5	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	0.0070	0.0091	0.0077	0.0110	--	0.177	0.0352
Mercury (dissolved)	mg/L		--	--	--	--	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.0064	0.0120	0.0077	0.0104	--	0.0122	0.0098
Nickel (dissolved)	mg/L		--	--	--	--	--	--	0.0052
Zinc (dissolved)	mg/L		0.103	0.0253	0.0127	0.0414	--	0.0126	0.0090
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	996	209	261	314	251	294	--	273
Ammonia-N	mg/L	0.2	ND(0.050)	0.071	0.090	ND(0.050)	ND(0.050)	--	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	ND(10)
Chloride	mg/L		ND(2.0)	3.0	ND(2.0)	ND(2.0)	ND(6.0)	--	ND(2.0)
Color (apparent)	TCU		32.7	56.3	15.1	25.2	9.9	--	11.5
Conductivity	umhos/cm		465	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	3.5	1.5	3.2	4.8	10.0	--	3.8
Escherichia coli	cfu/100mL	5	0	0	0	0	ND(2)	--	ND(2)
Fecal coliform bacteria	cfu/100mL		0	0	0	0	ND(2)	--	ND(2)
Nitrate (as N)	mg/L	0.5	0.12	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	--	ND(0.10)
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.30)	--	ND(0.10)
pH, lab	s.u.		8.00	--	--	--	--	--	8.00
Phenol	mg/L		--	--	--	--	--	--	ND(0.0010)
Phenolics (total)	mg/L		--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.110	0.039	0.033	0.032	0.038	--	ND(0.030)
Sulfate	mg/L		--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		1	2	30	210	2	--	ND(2)
Total dissolved solids (TDS)	mg/L		258	456	576	518	554	--	518
Total kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	0.43
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	24.4
Turbidity	NTU		8.10	--	--	--	--	--	4.30
Un-ionized ammonia	mg/L		ND(0.000057)	0.00045	0.0096	ND(0.000076)	ND(0.00058)	--	--
Field Parameters									
Color	TCU		--	--	--	--	--	--	--
Conductivity, field	mS/cm		0.801	0.678	0.971	0.95	0.77	--	--
Dissolved oxygen (DO), field	mg/L		--	5.69	4.3	9.19	--	--	--
Odor	none		--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		--	14	-77	213	--	--	--
pH, field	s.u.		6.78	7.38	8.68	6.96	7.68	--	--
Temperature, field	Deg C		7.8	12.12	10.9	6.14	10.8	--	--
Turbidity, field	NTU		255	--	--	3.5	94.4	--	--

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:			GW-45804-011310-TS-004	GW-45804-051910-MB-007	GW-45804-110210-TS-006	GW-45804-051811-MMD-012	GW-45804-110911-TS-007	GW-45804-110911-TS-007-1	GW-45804-051512-MB-007
Sample Date:			1/13/2010	5/19/2010	11/2/2010	5/18/2011	11/9/2011	11/10/2011	5/15/2012
Sample Type:									
Parameters	**Units**	**TLP2**							
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		380	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		380	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		ND(100)	ND(100)	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		380	ND(250)	ND(250)	ND(250)	--	--	ND(250)
Semi-Volatiles									
1-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--
Acenaphthene	µg/L		--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	--	--	--	--	--	--
Anthracene	µg/L		--	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		--	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	--	--	--	--	--	--
Chrysene	µg/L		--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	--	--	--	--	--	--
Fluoranthene	µg/L		--	--	--	--	--	--	--
Fluorene	µg/L		--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	--	--	--	--	--	--
Naphthalene	µg/L		--	--	--	--	--	--	--
Phenanthrene	µg/L		--	--	--	--	--	--	--
Pyrene	µg/L		--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111212-MB-008	GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011	GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010
Sample Date:		11/12/2012	11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	0.00025
Boron (dissolved)	mg/L	ND(0.050)	--	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	0.018
Cadmium (dissolved)	mg/L	ND(0.00010)	--	0.00022	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	0.000035
Chromium (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	0.00102
Cobalt (dissolved)	mg/L	0.00058	--	0.00295	ND(0.00050)	ND(0.00050)	--	ND(0.00050)	ND(0.00010)
Copper (dissolved)	mg/L	0.0036	--	0.0031	0.0038	0.0039	--	0.0027	0.00375
Iron (dissolved)	mg/L	ND(0.050)	--	ND(0.050)	ND(0.050)	ND(0.050)	--	ND(0.050)	ND(0.010)
Lead (dissolved)	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.000050)
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.0074	--	0.0381	0.0035	0.0019	--	0.0047	0.00072
Mercury (dissolved)	mg/L	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.000010)
Molybdenum (dissolved)	mg/L	0.0085	--	0.0173	0.0067	0.0123	--	0.0051	0.00905
Nickel (dissolved)	mg/L	0.0050	--	0.0064	0.0046	0.0048	--	0.0036	0.00453
Zinc (dissolved)	mg/L	0.0190	--	0.0153	0.0071	0.0105	--	0.0047	0.0094
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	329	--	265	310	282	--	325	324
Ammonia-N	mg/L	ND(0.050)	--	ND(0.050)	0.105	ND(0.050)	--	ND(0.050)	ND(0.050)
Biochemical oxygen demand (carbonaceous)	mg/L	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L	19	--	ND(10)	34	19	--	13	ND(10)
Chloride	mg/L	2.6	--	2.7	ND(2.0)	ND(2.0)	--	ND(10)	ND(2.5)
Color (apparent)	TCU	--	17.1	24.2 J	14.5	9.8	--	7.0	58.5
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.0	--	ND(3.8)	5.0	2.2	--	5.6	5.2
Escherichia coli	cfu/100mL	ND(2)	--	ND(2)	0	0	--	0	0
Fecal coliform bacteria	cfu/100mL	ND(2)	--	ND(2)	0	0	--	0	0
Nitrate (as N)	mg/L	0.31	--	ND(0.10)	ND(0.10)	ND(0.10)	--	ND(0.50)	ND(0.10)
Nitrite (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	--	ND(0.50)	ND(0.050)
pH, lab	s.u.	7.83	--	7.98	7.79	7.71	--	7.90	7.79
Phenol	mg/L	ND(0.0010)	--	ND(0.0010)	0.0019	0.0015	--	ND(0.0010)	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	0.0027
Phosphorus	mg/L	0.054	--	0.073	ND(0.030)	0.052	--	0.031	0.041
Sulfate	mg/L	216	--	147	119	108	--	106	226
Total coliform bacteria	cfu/100mL	10	--	ND(100)	1	5	--	270	30
Total dissolved solids (TDS)	mg/L	--	588	446	446	402	--	437	589
Total kjeldahl nitrogen (TKN)	mg/L	0.43	--	0.19	0.41	ND(0.43)	--	0.29	0.53
Total suspended solids (TSS)	mg/L	--	59.2	194	65.2	17.2	--	ND(2.0)	74.2
Turbidity	NTU	--	19.1	8.88	0.56	2.22	--	0.62	31.9
Un-Ionized ammonia	mg/L	ND(0.000040)	--	ND(0.0000028)	0.000084	ND(0.00048)	--	--	ND(0.0070)
Field Parameters									
Color	TCU	--	--	--	ND()	--	--	--	--
Conductivity, field	mS/cm	1.21	--	1.96	0.832	--	0.886	0.681	0.878
Dissolved oxygen (DO), field	mg/L	6.66	--	6.41	8.16	--	6.91	6.02	3.1
Odor	none	--	--	--	ND()	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	248	--	--	--	--	94	67	55
pH, field	s.u.	6.59	--	5.39	6.16	--	7.53	7.51	6.74
Temperature, field	Deg C	11.6	--	13.0	10.1	--	15.12	9.16	13.06
Turbidity, field	NTU	953	--	325	230	--	35.6	--	44.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-111212-MB-008	GW-45804-111312-MB-009	GW-45804-052313-TS-001	GW-45804-111413-TS-006	GW-45804-052914-MB-011	GW-45804-053014-MB-011	GW-45804-112514-TS-010	GW-45804-111015-TS-010
Sample Date:		11/12/2012	11/13/2012	5/23/2013	11/14/2013	5/29/2014	5/30/2014	11/25/2014	11/10/2015
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	ND(100)	ND(100)	ND(100)	--	ND(100) J	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	ND(100)	ND(100)	--	ND(100) J	ND(100)	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	ND(250)	ND(250)	ND(250)	--	ND(250) J	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	ND(250)	ND(250)	--	ND(250) J	ND(250)	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	ND(250)	ND(250)	ND(250)	--	ND(250) J	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	ND(100)
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	ND(250)
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	ND(250)	ND(250)	--	--	ND(380)	ND(380)
Semi-Volatiles									
1-Methylnaphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	ND(0.028)	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Acenaphthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Acenaphthylene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	--	ND(0.020)	ND(0.020)	--	ND(0.020) J	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.010)	--	ND(0.0050)	ND(0.0050)	--	ND(0.0050) J	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	0.027	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Chrysene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Fluoranthene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Fluorene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Naphthalene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Phenanthrene	µg/L	ND(0.020)	--	--	--	--	--	--	--
Pyrene	µg/L	ND(0.020)	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-051716-TS-003	GW-45804-111616-TS-011	GW-45804-060217-TS-010	GW-45804-113017-TS-010	GW-45804-051618-TS-015	GW-45804-110818-TS-007	GW-45804-061719-JC-015	GW-45804-112619-JC-001
Sample Date:		5/17/2016	11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/17/2019	11/26/2019
Sample Type:									
Parameters	**Units**								
Metals									
Arsenic (dissolved)	mg/L	0.00024	0.00050	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.011	ND(0.010)	--	--	--	--	--	--
Cadmium (dissolved)	mg/L	0.000035	0.000018	--	--	--	--	--	--
Chromium (dissolved)	mg/L	0.00063	ND(0.00050)	--	--	--	--	--	--
Cobalt (dissolved)	mg/L	ND(0.00010)	0.00023	--	--	--	--	--	--
Copper (dissolved)	mg/L	0.00369	0.0705	--	--	--	--	--	--
Iron (dissolved)	mg/L	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
Lead (dissolved)	mg/L	0.000129	0.000149	--	--	--	--	--	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	0.00171	0.00270	0.207	0.00059	0.00112	0.00107	0.00566	0.00068
Mercury (dissolved)	mg/L	ND(0.0000010)	ND(0.0000010)	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L	0.00905	0.0218	--	--	--	--	--	--
Nickel (dissolved)	mg/L	0.00434	0.00526	--	--	--	--	--	--
Zinc (dissolved)	mg/L	0.0139	0.0084	--	--	--	--	--	--
General Chemistry									
Alkalinity, total (as CaCO3)	mg/L	284	188	242	219	238	181	250	197
Ammonia-N	mg/L	0.054	ND(0.020)	ND(0.035)	ND(0.151)	ND(0.192)	ND(0.171)	ND(1.0)	ND(0.010)
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	ND(2.0)	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	18	36	--	--	--	--	--	--
Chloride	mg/L	0.88	2.81	--	--	--	--	--	--
Color (apparent)	TCU	86.6	143	--	--	--	--	--	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	5.1	10.0	6.4	ND(6.4)	4.6	7.57	5.28	9.21
Escherichia coli	cfu/100mL	0	ND(2)	0	0	ND(0)	ND(0) J	0	ND(2)
Fecal coliform bacteria	cfu/100mL	0	ND(2)	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.020)	0.226	ND(0.020)	ND(0.020)	ND(0.020)	0.028	0.038	ND(0.020)
Nitrite (as N)	mg/L	ND(0.010)	ND(0.010)	--	--	--	--	--	--
pH, lab	s.u.	7.89	7.66	--	--	--	--	--	--
Phenol	mg/L	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	0.0024	ND(0.0013)	--	--	--	--	--	--
Phosphorus	mg/L	0.0891	0.0517	0.0276	0.0388	0.0353	0.0162	0.0111	0.106
Sulfate	mg/L	119	135	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	20	300	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	502	413	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L	0.27	1.00	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L	567	81.7	--	--	--	--	--	--
Turbidity	NTU	84.5	26.6	--	--	--	--	--	72.1
Un-ionized ammonia	mg/L	0.0064	ND(0.000080)	--	--	--	--	--	ND(0.000016)
Field Parameters									
Color	TCU	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	0.527	--	0.528	0.247	0.331	0.616	1.05	0.385
Dissolved oxygen (DO), field	mg/L	4.96	--	1.57	2.15	2.7	4.24	5.09	3.39
Odor	none	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	110	--	125	107	5	-74	-93	161
pH, field	s.u.	8.74	--	7.45	7.79	7.84	7.44	7.16	8.94
Temperature, field	Deg C	10.58	--	11.2	8.08	11.42	11.98	15.97	8.7
Turbidity, field	NTU	177	--	90.4	37.3	544	36.6	220	32.7

Unconfined Shallow Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08	MW2-08
Sample ID:		GW-45804-051716-TS-003	GW-45804-111616-TS-011	GW-45804-060217-TS-010	GW-45804-113017-TS-010	GW-45804-051618-TS-015	GW-45804-110818-TS-007	GW-45804-061719-JC-015	GW-45804-112619-JC-001
Sample Date:		5/17/2016	11/16/2016	6/2/2017	11/30/2017	5/16/2018	11/8/2018	6/17/2019	11/26/2019
Sample Type:									
Parameters	**Units**								
Petroleum Products									
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	ND(250)	ND(250)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	ND(380)	ND(380)	--	--	--	--	--	--
Semi-Volatiles									
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--
Anthracene	µg/L	ND(0.020)	ND(0.020)	--	--	--	--	--	--
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	ND(0.0050)	ND(0.0050)	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2012 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-05	MW5-02	MW5-08	MW5-09	MW5-08	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-459804-011910-TS-002	GW-459804-518110-MB-001	GW-459804-110210-TS-003	GW-459804-518114-MMD-005	GW-459804-110911-TS-004	GW-459804-110911-TS-005	GW-459804-021512-MB-003	GW-459804-021512-MB-004	GW-459804-052112-MB-005	GW-459804-052112-MB-006	GW-459804-052112-MB-007	GW-459804-051412-MB-008
Sample Date:			1/19/2010	5/18/2010	11/2/2010	5/18/2011	11/9/2011	11/9/2011	2/15/2012	2/15/2012	5/21/2012	5/21/2012	5/21/2012	5/14/2012
Sample Type:								Duplicate		Duplicate				
Parameters	**Units**	**TLP2**												
Metals														
Aluminum (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L		ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00010)	ND(0.00010)	ND(0.0010)	0.0016	ND(0.0010)	--	--	--	ND(0.00010)
Barium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L		--	--	--	--	--	--	0.054	0.056	--	--	--	0.067
Cadmium (dissolved)	mg/L		ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	--	--	ND(0.00010)
Calcium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	--	ND(0.0010)
Cobalt (dissolved)	mg/L		--	--	--	--	--	--	ND(0.00020)	ND(0.00020)	--	--	--	ND(0.00050)
Copper (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	--	ND(0.0010)
Iron (dissolved)	mg/L	19.8	1.99	4.88	4.12	5.18	3.82	3.82	6.27	6.24	--	--	--	5.88
Lead (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	--	ND(0.0010)
Magnesium (dissolved)	mg/L		116	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	2.66	2.76	2.80	2.72	2.72	2.67	2.75	2.70	--	--	--	2.62
Mercury (dissolved)	mg/L		--	--	--	--	--	--	ND(0.00010)	ND(0.00010)	--	--	--	ND(0.00010)
Molybdenum (dissolved)	mg/L		0.024	0.018	0.022	0.0085	0.0133	0.0126	0.0088	0.0088	--	--	--	0.0093
Nickel (dissolved)	mg/L		--	--	--	--	--	--	ND(0.0020)	ND(0.0020)	--	--	--	ND(0.0020)
Phosphorus (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		0.129	ND(0.020)	ND(0.030)	0.0069	ND(0.0030)	ND(0.0030)	ND(0.0020)	0.0087	--	--	--	0.0030
Zirconium (dissolved)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry														
Alkalinity, bicarbonate	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	996	369	406	457	455	541	534	527	517	477	--	442	--
Ammonia-N	mg/L	0.2	0.088	0.060	0.030	0.06	0.07	0.08	0.05	0.05	0.09	0.03	0.1	0.1
Biochemical oxygen demand (BOD)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	--	ND(2.0)
Chemical oxygen demand (COD)	mg/L		--	--	--	--	--	--	45	35	--	--	--	39
Chloride	mg/L		94.4	147	66.5	103	106	109	--	--	104	--	--	116
Color (apparent)	TCU		23.1	25.9	126	102	28.2	23.8	10.8	13.0	26.6	--	--	--
Conductivity	umhos/cm		2150	--	--	--	--	--	--	--	2170	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	19.4	7.6	5.5	6.5	10.0	10.0	10.0	10.0	9.4	8.0	--	9.4	--
Escherichia coli	cfu/100mL	5	0	0	0	0	ND(2)	ND(2)	0	0	0	0	-	--
Fecal coliform bacteria	cfu/100mL		0	0	0	0	ND(2)	ND(2)	0	0	0 J	0 J	--	--
Nitrate (as N)	mg/L	0.5	ND(1.0)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	--	ND(0.10)	
Nitrite (as N)	mg/L		ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.30)	ND(0.30)	ND(0.50)	ND(0.50)	ND(0.5)	--	ND(0.10)	
Nitrite/Nitrate	mg/L		--	--	--	--	--	--	ND(1.0)	ND(1.0)	--	--	--	--
pH, lab	s.u.		7.56	--	--	--	--	--	7.56	7.53	7.09	--	7.56	
Phenol	mg/L		--	--	--	--	--	--	0.0010	0.0010	--	--	ND(0.0010)	
Phenolics (total)	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	0.11	0.09	0.258	0.197	0.462	0.418	0.422	0.421	0.405	--	0.409	
Sulfate	mg/L		--	--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		3	0	6	10	4	ND(2)	0	0	1	0	-	
Total dissolved solids (TDS)	mg/L		1750	1620	1350	1740	1610	1610	1600	1760	1760	--	1730	
Total Kjeldahl nitrogen (TKN)	mg/L		--	--	--	--	--	--	10.8	9.87	--	--	11.8	
Total suspended solids (TSS)	mg/L		--	--	--	--	--	--	2010 J	770 J	--	-	589	
Turbidity	NTU		4.10	--	--	--	--	--	116	156	16.6	--	--	
Unionized ammonia	mg/L		0.0000530	0.00144	0.0000553	0.00225	0.0202	0.0202	--	--	0.000337	0.000348	--	

G:\60060324\[Ta

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2012 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:			MW5-06	MW5-07	MW5-08	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09
Sample ID:			GW-4580-4-011010-TS-002	GW-45804-51610-WB-001	GW-45804-110210-TS-003	GW-45804-51611-MMD-005	GW-45804-110911-TS-004	GW-45804-110911-TS-005	GW-45804-021512-WB-003	GW-45804-021512-WB-004	GW-45804-052112-WB-005	GW-45804-052112-WB-006	GW-45804-051412-WB-005
Sample Date:			1/13/2010	5/16/2010	11/2/2010	5/16/2011	11/9/2011	11/9/2011 Duplicate	2/15/2012	2/15/2012 Duplicate	5/21/2012	5/21/2012	5/14/2012
Sample Type:													
Parameters	**Units**	**TLP2**											
Field Parameters													
Color	TCU		--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		2.56	0.957	2.15	2.57	2.48	--	2.51	2.51	2.59	2.56	2.45
Dissolved oxygen (DO), field	mg/L		--	--	4.82	--	--	--	--	--	--	--	--
Odor	none		--	--	--	--	--	--	--	--	--	--	--
Oxygen reduction potential (ORP), field	millivolts		--	--	-57	--	--	--	--	--	--	--	--
pH, field	s.u.		5.54	6.03	5.72	6.52	7.15	7.15	6.57	6.57	5.22	5.22	6.26
Temperature, field	Deg C		9.6	11.6	14.9	8.8	13.7	13.7	7.52	7.52	6.4	6.4	10.23
Turbidity, field	NTU		0	--	--	999	NR	--	-5	-5	-5	-5	--
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(25)	ND(25)	ND(100)	--	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		ND(1000)	ND(1000)	100	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(1000)	--	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		--	--	--	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		12500	ND(2500)	720	ND(250)	500	380	720 J	ND(259) J	ND(2500)	--	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		10400	ND(2500)	720	ND(250)	500	380	720 J	ND(259) J	--	--	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		36000	4400	2010	550	1170	1640	2470 J	610 J	4700	--	589
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L		104000	13800	4500	--	4500	4100	6300	--	10300	--	ND(2500)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16, F2 less naphthalene	µg/L		ND(1000)	ND(1000)	ND(100)	--	--	--	ND(100)	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		48300	4400	2830	550	2370	2220	3190 J	610 J	4700	--	589
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L		--	ND(0.28)	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene;2-Methylnaphthalene	µg/L		--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		--	0.27	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		--	0.24	--	--	--	--	--	--	--	--	--
Acridine	µg/L		--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		--	0.25	0.141	0.023	0.100	0.151	0.074	0.060	--	--	ND(0.025)
Benzo(a)anthracene	µg/L		--	0.80	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		--	0.846	0.530	0.0435	0.244 J	0.470 J	0.284	0.218	--	--	0.0551 J
Benzo(b)fluoranthene	µg/L		--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene;Benzo(j)fluoranthene	µg/L		--	0.55	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		--	0.54	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		--	0.57	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		--	0.88	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		--	ND(0.25)	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		--	1.04	--	--	--	--	--	--	--	--	--
Fluorene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		--	0.51	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L		--	ND(0.20)	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		--	0.79	--	--	--	--	--	--	--	--	--
Pyrene	µg/L		--	1.41	--	--	--	--	--	--	--	--	--
Misc													
Oil and grease	mg/L		--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-05	MW5-05	MW5-08	MW5-08	MW5-05	MW5-08	MW5-08	MW5-08	MW5-08	MW5-09	MW5-09
Sample ID:		GW-4580-051412-MB-001	GW-4580-052312-MB-004	GW-4580-060612-MB-001	GW-4580-111212-MB-005	GW-4580-022713-TS-002	GW-4580-022713-TS-004	GW-4580-052213-TS-010	GW-4580-060713-TS-004	GW-4580-111413-TS-011	GW-4580-042114-TS-005	GW-4580-052814-MB-012
Sample Date:		5/14/2012	5/23/2012	6/6/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	6/7/2013	11/14/2013	4/21/2014	5/28/2014
Sample Type:		Duplicate					Duplicate					
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	ND(0.10)	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	ND(0.020)	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	0.0018	0.0012	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Barium (dissolved)	mg/L	--	--	0.15	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	0.064	--	ND(0.50)	0.073	0.067	0.055	0.064	0.074	0.080	ND(0.050)	0.063
Cadmium (dissolved)	mg/L	ND(0.000010)	--	ND(0.00040)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Calcium (dissolved)	mg/L	--	--	220	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	0.0015	--	ND(0.0050)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0033	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L	ND(0.00050)	--	ND(0.00050)	0.00033	0.00063	0.00056	0.00121	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0019)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	5.85	--	5.55	5.78	7.31	7.34	7.47	4.75	5.00	5.73	5.53
Lead (dissolved)	mg/L	ND(0.0010)	--	ND(0.010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Magnesium (dissolved)	mg/L	--	--	96.0	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.00	--	2.05	2.00	1.90	2.00	2.00	2.06	2.00	2.02	2.03
Mercury (dissolved)	mg/L	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L	0.0094	--	0.014	0.0118	0.0110	0.0108	0.0163	0.0102	0.0100	0.0061	0.0066
Nickel (dissolved)	mg/L	ND(0.0020)	--	ND(0.020)	0.0027	ND(0.0020)	ND(0.0020)	0.0024	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)
Phosphorus (dissolved)	mg/L	--	--	ND(0.50)	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	19	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	ND(0.0040)	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	15	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	ND(0.0010)	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	191	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	3.31	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	ND(0.0020)	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	ND(0.020)	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	ND(0.10)	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	ND(0.050)	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	ND(0.010)	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	ND(0.0030)	--	ND(0.030)	0.0046	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)	ND(0.0030)
Zirconium (dissolved)	mg/L	--	--	ND(0.040)	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	455	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	ND(10)	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	ND(10)	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	336	--	462	323	366	464	453	486	506	360	--
Ammonia-N	mg/L	10.8	--	9.85	9.80	10.1	10.2	10.1	9.52	10.4	10.0	10.2
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L	25	--	36	44	59	57	36	30	55	ND(43)	41
Chloride	mg/L	118	--	178	143	148	149	320	144	149	209	--
Color (apparent)	TCU	--	100	57.4	52.1 J	66.0	46.4	28.0	66.5	130	165 J	--
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	9.4	--	8.1	8.3	12.1	11.1	8.3	9.5	8.8	7.5	7.1
Escherichia coli	cfu/100mL	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Fecal coliform bacteria	cfu/100mL	--	1	0	ND(2)	ND(2)	ND(2)	ND(2)	ND(2)	0	0	0
Nitrate (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	--
Nitrite (as N)	mg/L	ND(0.10)	--	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.50)	ND(0.10)	ND(0.10)	--
Nitrite+Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.56	--	7.75	7.57	7.54	7.56	7.56	7.41	7.51	7.31	--
Phenol	mg/L	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.0012	0.0079	0.0011
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.405	--	0.551	0.183	0.474	0.558	0.332	0.148	0.404	0.153	0.168
Sulfate	mg/L	--	--	--	424	872	812	561	773	630	287	--
Total coliform eccherio	cfu/100mL	--	ND(10)	0	2	ND(2)	2	100	10	ND(10)	0	0
Total dissolved solids (TDS)	mg/L	1710	--	1740	1430	2030	2020	1910	1920	1760	1480	--
Total kjeldahl nitrogen (TKN)	mg/L	12.2	--	10.8	3.99	13.5	14.1	10.8	16.6	20.5	26.9	28.0
Total suspended solids (TSS)	mg/L	346	--	304	88.0	799 J	1400 J	950	16.4	291	21.5	--
Turbidity	NTU	--	26.1	26.0	8.90 J	39.0 J	29.7 J	19.2	38.0	50.3	67.0	51.0
Un-ionized ammonia	mg/L	--	--	--	0.242	0.0467	0.0484	0.00147	0.0210	0.00928	0.0631	0.133

O:\61060324\[Ex]

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Reneva Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-05	MW5-05	MW5-08	MW5-08	MW5-05	MW5-08	MW5-08	MW5-08	MW5-08	MW5-09	MW5-09
Sample ID:		GW-4580405121412-MB-001	GW-4580405232012-MB-004	GW-4580406062012-MB-001	GW-4580411121212-MB-005	GW-4580402227213-TS-002	GW-4580402227213-TS-004	GW-4580405222213-TS-010	GW-4580408070113-TS-004	GW-4580411141113-TS-011	GW-4580402121114-TS-005	GW-4580405221214-MB-012
Sample Date:		5/14/2012	5/23/2012	6/6/2012	11/12/2012	2/27/2013	2/27/2013	5/22/2013	8/7/2013	11/14/2013	4/21/2014	5/22/2014
Sample Type:		Duplicate					Duplicate					
Parameters	Units											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	ND(4	--	--
Conductivity, field	mS/cm	--	3.06	2.31	1.93	2.85	--	2.84	2.54	3.55	2.57	2.86
Dissolved oxygen (DO), field	mg/L	--	--	5.69	3.34	5.71	--	5.71	5.69	7.16	4.58	0
Odor	none	--	--	--	--	--	--	--	--	ND(4	--	--
Oxidation reduction potential (ORP), field	millivolts	--	--	--	-87	--	--	-87	-101	--	-132	-198
pH, field	s.u.	--	6.17	7.67	6.37	7.31	7.31	5.75	6.66	6.24	7.15	7.31
Temperature, field	Deg C	--	10.17	16.54	14.8	7.9	7.6	11.5	17.4	13.2	9.85	9.44
Turbidity, field	NTU	--	--	453	199	618	--	816	9.2	243	22.9	6.7
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	ND(100)	--	ND(25)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	120	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	ND(100)	-	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L	ND(250)	--	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	ND(250)	--	540	ND(250)	ND(250)	ND(250)	260	ND(250)	270	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L	540	-	1500	510	ND(420)	ND(250)	730	ND(250)	1010	ND(250)	ND(250)
Petroleum Hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	2700	--	4400	ND(2500)	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	-	-	ND(100)	ND(100)	-	--	--	--	--	-	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	540	-	2149	510	ND(420)	ND(250)	990	ND(250)	1280	ND(380)	ND(380)
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	ND(0.020)	ND(0.020)	--	--	ND(0.0007)	--	--	ND(0.020)	--
1+2-Methylnaphthalene (2-Methylnaphthalene)	µg/L	--	--	ND(0.028)	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	ND(0.020)	ND(0.020)	--	--	ND(0.020)	--	--	ND(0.020)	--
Acenaphthene	µg/L	-	-	0.26	0.096	-	--	0.142	--	--	0.164	--
Acenaphthylene	µg/L	--	--	0.23	0.083	--	--	0.162	--	--	ND(0.187)	--
Acridine	µg/L	--	--	--	--	--	--	ND(4.0)	--	--	ND(4.0)	--
Anthracene	µg/L	0.023	-	ND(0.20)	0.069	ND(0.20)	ND(0.20)	0.048	ND(0.020)	0.029	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	0.31	0.229	--	--	0.181	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L	0.0082 J	--	0.26	0.187	0.11 J	0.31 J	0.159	ND(0.0010)	0.0654	ND(0.0010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	-	-	0.33	0.184	-	--	0.199	--	--	ND(0.020)	--
Benzo(b)fluoranthene/Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	ND(0.040)	--	--	ND(0.040)	--
Benzo(g,h,i)perylene	µg/L	--	--	0.23	0.117	--	--	0.113	--	--	ND(0.020)	--
Benzo(k)fluoranthene	µg/L	-	-	0.20	0.152	-	--	0.167	--	--	ND(0.020)	--
Carcinogenic potency equivalent	µg/L	--	-	--	--	--	--	0.257	--	--	ND(0.020)	--
Chrysene	µg/L	--	--	0.36	0.228	--	--	0.196	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L	-	-	ND(0.20)	0.038	-	--	0.029	--	--	ND(0.020)	--
Fluoranthene	µg/L	--	--	1.02	0.548	--	--	0.525	--	--	0.121	--
Fluorene	µg/L	--	--	ND(0.20)	0.094	--	--	ND(0.010)	--	--	0.043	--
Indeno(1,2,3-cd)pyrene	µg/L	-	-	ND(0.20)	0.129	-	--	0.117	--	--	ND(0.020)	--
Naphthalene	µg/L	--	--	ND(0.20)	ND(0.020)	--	--	0.024 J	--	--	ND(0.050)	--
Phenanthrene	µg/L	--	--	0.29	0.153	--	--	0.132	--	--	ND(0.020)	--
Pyrene	µg/L	--	--	0.85	0.489	--	--	0.458	--	--	0.079	--
Misc												
Oil and grease	mg/L	-	-	--	--	-	--	--	--	--	--	--

Notes:

NO Not detected at the associated reporting limit.
J Estimated concentration.

G:\6106\6324\[Ta

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Reneva Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-02	MW5-09	MW5-09	MW5-09	MW5-09	MW5-02	MW5-09	MW5-09	MW5-09	MW5-09	MW5-09	MW5-02
Sample ID:		GW-4596-04-0530114-MW5-012	GW-4596-04-092114-TS-009	GW-4596-04-112614-TS-015	GW-4596-04-040615-TS-007	GW-4596-04-092815-TG-004	GW-4596-04-091215-TS-008	GW-4596-04-111015-TS-007	GW-4596-04-021016-TS-003	GW-4596-04-051616-TS-015	GW-4596-04-091616-TS-007	GW-4596-04-111616-TS-012	
Sample Date:		5/30/2014	9/21/2014	11/26/2014	4/6/2015	9/28/2015	9/12/2015	11/10/2015	2/10/2016	5/16/2016	9/16/2016	11/16/2016	
Sample Type:													
Parameters	Units												
Metals													
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	ND(0.0010)	0.0027	ND(0.010)	ND(0.010)	0.0027	ND(0.0010)	ND(0.0010)	0.00018	0.0020	0.00069	
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	0.096	0.066	ND(0.10)	ND(0.10)	0.10	0.12	ND(0.10)	0.089	0.12	0.087	
Cadmium (dissolved)	mg/L	--	ND(0.00010)	ND(0.00010)	ND(0.00060)	ND(0.00030)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.000015	ND(0.00010)	ND(0.00010)	
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.00063)	ND(0.0050)	ND(0.00050)	
Cobalt (dissolved)	mg/L	--	ND(0.00050)	0.00173	ND(0.0050)	ND(0.0050)	0.0013	ND(0.0010)	ND(0.0010)	0.00014	ND(0.0010)	0.00024	
Copper (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.010)	ND(0.010)	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.00034	ND(0.0020)	ND(0.00075)	
Iron (dissolved)	mg/L	--	4.68	7.82	12.5	7.55	10.2	4.88	5.58	5.02	10.3	4.66	
Lead (dissolved)	mg/L	--	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.000050)	ND(0.00050)	ND(0.000050)	
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	--	2.29	2.46	6.33	3.97	7.66	2.04	2.97	2.86	3.65	2.92	
Mercury (dissolved)	mg/L	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.00010)	ND(0.000010)	
Molybdenum (dissolved)	mg/L	--	0.0144	0.0338	0.0125	0.0071	0.0204	0.00690	ND(0.00071)	0.00435	0.0174	0.00883	
Nickel (dissolved)	mg/L	--	ND(0.0020)	0.0037	ND(0.010)	ND(0.010)	ND(0.0050)	ND(0.0050)	ND(0.0050)	0.00154	ND(0.0050)	0.00154	
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	ND(0.0030)	ND(0.0030)	ND(0.030)	ND(0.030)	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.0040)	ND(0.010)	ND(0.0010)	
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
General Chemistry													
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	742 J	673 J	445	446	517	586	304	ND(459)	463	533	583	
Ammonia-N	mg/L	--	26.0 J	0.06	0.71	11.0	3.12	3.21	19.7	10.0	12.0	10.7	
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L	ND(2.0) J	ND(2.0) J	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	
Chemical oxygen demand (COD)	mg/L	--	34 J	33	65	34	45	32	ND(6)	27	74	34	
Chloride	mg/L	231 J	207 J	244	1160	174	693	166	ND(135)	129	656	140	
Color (apparent)	TCU	260 J	102 J	101	74.4	34.2	161	151	245 J	115	243	184	
Conductivity	umhos/cm	--	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	--	8.4 J	9.2	9.4	7.7	8.5	7.8	ND(5.0)	6.7	10.4	8.7	
Escherichia coli	cfu/100mL	--	0 J	0	ND(2)	0	0	0	0	0	1	0	
Fecal coliform bacteria	cfu/100mL	--	1 J	0	ND(2)	0	0	0	0	0	23	0	
Nitrate (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	
Nitrite (as N)	mg/L	ND(0.10) J	ND(0.10) J	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.10)	
Nitrite+Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--	--
pH, lab	s.u.	7.52 J	7.49 J	7.46	7.37	7.75	7.61	7.62	7.76	7.66	7.54	7.18	
Phenol	mg/L	--	0.0011 J	0.0010	ND(0.0015)	--	--	--	--	--	--	--	
Phenolics (total)	mg/L	--	--	--	--	0.0065	ND(0.0022)	0.00018	ND(0.00010)	ND(0.00019)	0.0065	ND(0.0026)	
Phosphorus	mg/L	--	0.181 J	0.105	0.213	0.355	0.131	0.133	0.135	0.126	0.135	0.141	
Sulfate	mg/L	429 J	411 J	172	227	880	505	675	ND(635)	749	405	504	
Total coliform bacteria	cfu/100mL	--	2 J	0	96	ND(100)	100	0	0	0	600	0	
Total dissolved solids (TDS)	mg/L	1640 J	1420 J	1130	2470	1560	2300	1710	ND(1490)	1700	2350	1510	
Total Kjeldahl nitrogen (TKN)	mg/L	--	25.9 J	9.31	9.19	37.9	26.3	26.3	19.6	16.2	16.4	15.1	
Total suspended solids (TSS)	mg/L	17.6 J	8.6 J	20.5	1020	535	25.3	10.6	ND(7.4)	29.2	20.2	8.9	
Turbidity	NTU	--	48.7 J	1.16	43.0	47.0	130	63.3	65.8 J	76.2	136	57.2	
Un-ionized ammonia	mg/L	--	3.50 J	0.0133	0.0907	0.203	0.292	0.923	0.0588	0.159	0.0669	0.0450	

G:\60096324\Tbl

Unconfined Shallow Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Reneva Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-02	MW5-09	MW5-09	MW5-09	MW5-09	MW5-02	MW5-09	MW5-09	MW5-09	MW5-09	MW5-22
Sample ID:		GW-4590-04530144B5-012	GW-4590-04082114-TS-000	GW-45804-112014-TS-015	GW-45804-040815-TS-007	GW-45804-052815-TG-004	GW-45804-091215-TS-008	GW-45804-111015-TS-007	GW-45804-021016-TS-003	GW-45804-051816-TS-015	GW-45804-091616-TS-007	GW-45804-111616-TS-012
Sample Date:		5/30/2014	8/21/2014	11/26/2014	4/8/2015	5/28/2015	8/12/2015	11/10/2015	2/10/2016	5/18/2016	9/16/2016	11/16/2016
Sample Type:												
Parameters	Units											
Field Parameters												
Color	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm	2.88	2.57	1.107	2.679	2.49	2.64	2.54	2.11	2.01	2.01	2.01
Dissolved oxygen (DO), field	mg/L	0	1.06	3.93	--	--	6.44	0.1	0	0	0	0
Odor	none	--	--	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts	-140	-139	-63	--	--	-125	-144	-115	-75	-82	-101
pH, field	s.u.	7.4	8.52	8.82	7.36	7.38	7.56	8.06	7.25	7.64	6.95	7.06
Temperature, field	Deg C	9.5	16.99	10.36	9.69	11.54	22.72	15.28	5.82	10.31	18.56	14.14
Turbidity, field	NTU	322	44	--	--	384	113	43	65.4	0.6	0	29.9
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	NO(100) J	ND(100)	ND(100)	ND(100)	NO(100)	ND(100)	NO(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	ND(100) J	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	ND(100) J	ND(100)	ND(100)	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	ND(250) J	ND(250)	510	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L	--	ND(250) J	ND(250)	500	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	ND(250) J	ND(250)	1500	530	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	NO(100)	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16), F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	NO(250)	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	NO(250)	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	ND(380) J	ND(380)	2010	530	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)	ND(380)
Semi-Volatiles												
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
1+Methylnaphthalene; 2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--
Anthracene	µg/L	--	ND(0.020) J	ND(0.020)	ND(0.29)	0.047	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L	--	ND(0.0050) J	ND(0.0050)	0.371	0.127	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0050)	ND(0.00050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene; Benzo(j)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--
Misc.												
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.1

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-22	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08
Sample ID:		GW-4580A-060217-TS-011	GW-4580A-080317-TS-004	GW-4580A-112817-TS-006	GW-4580A-051618-TS-013	GW-4580A-051618-TS-014	GW-4580A-091518-TS-007	GW-4580A-112818-TS-012	GW-4580A-061919-TS-005	GW-4580A-061919-JC-000	GW-4580A-080519-JC-009	GW-4580A-112719-JC-012
Sample Date:		6/2/2017	8/3/2017	11/28/2017	5/16/2018	5/16/2018	9/18/2018	11/8/2018	6/19/2019	6/19/2019	8/5/2019	11/27/2019
Sample Type:						Duplicate				Duplicate		
Parameters	**Units**											
Metals												
Aluminum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Antimony (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Arsenic (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.000025	--
Barium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Beryllium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Bismuth (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.114	--
Cadmium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0000010)	--
Calcium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00103	--
Cobalt (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00010)	--
Copper (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00020)	--
Iron (dissolved)	mg/L	5.40	3.38 J	4.29	5.06	5.97	3.20	4.25	5.05	5.01	3.51	3.22
Lead (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.000050)	--
Magnesium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.01	1.68 J	1.09	1.00	1.97	1.64	1.67	1.66	1.65	1.58	1.45
Mercury (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.00000050)	--
Molybdenum (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	0.00085	--
Phosphorus (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Potassium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Selenium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silicon (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Sodium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Strontium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Thallium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tin (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Titanium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Tungsten (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Uranium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Vanadium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.0010)	--
Zirconium (dissolved)	mg/L	--	--	--	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, bicarbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, carbonate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, hydroxide	mg/L	--	--	--	--	--	--	--	--	--	--	--
Alkalinity, total (as CaCO3)	mg/L	420	600 J	749	998	995	936	810	989	987	--	974
Ammonia-N	mg/L	13.0	9.06 J	14.0	16.1	17.5	16.7	16.2	16.1	16.1	--	17.0
Biochemical oxygen demand (BOD)	mg/L	--	--	--	--	--	--	--	--	--	ND(3.0)	--
Biochemical oxygen demand (carbonaceous)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L	--	--	--	--	--	--	--	--	--	23	--
Chloride	mg/L	--	--	--	--	--	--	--	--	--	--	--
Color (apparent)	TCU	--	--	--	--	--	--	--	--	--	--	--
Conductivity	umho/cm	--	--	--	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	6.5	13.0 J	11.2	7.5	8.4	12.4	8.70	8.33	8.74	--	8.53
Escherichia coli	cfu/100mL	ND(2)	0 J	0	ND(0)	ND(0)	ND(0)	ND(0) J	--	--	0	0
Fecal coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	ND(0.10)	ND(0.020) J	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	0.053	ND(0.10)	ND(0.020)	--	ND(0.10)
Nitrite (as N)	mg/L	--	--	--	--	--	--	--	--	--	ND(0.050)	--
Nitrite/Nitrate	mg/L	--	--	--	--	--	--	--	--	--	--	--
pH, lab	S.U.	--	--	--	--	--	--	--	--	--	7.44	--
Phenol	mg/L	--	--	--	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L	--	--	--	--	--	--	--	--	--	0.0034	--
Phosphorus	mg/L	0.210	0.209 J	0.143	0.143	0.144	0.114	0.148	0.135	0.133	--	0.206
Sulfate	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL	--	--	--	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L	--	--	--	--	--	--	--	--	--	--	--
Total Kjeldahl nitrogen (TKN)	mg/L	--	--	--	--	--	--	--	--	--	14.2	--
Total suspended solids (TSS)	mg/L	--	--	--	--	--	--	--	--	--	4.8	--
Turbidity	NTU	--	--	--	--	--	--	--	--	--	--	40.2
Un-ionized ammonia	mg/L	--	--	--	--	--	--	--	--	--	--	0.0132

Unconfined Shallow Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:		MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08	MW5-08
Sample ID:		GW-4580-080217-TS-011	GW-4580-083017-TS-004	GW-4580-112817-TS-006	GW-4580-051618-TS-013	GW-4580-051618-TS-014	GW-4580-091518-TS-007	GW-4580-110818-TS-012	GW-4580-061819-TS-005	GW-4580-061819-JC-000	GW-4580-090519-JC-009	GW-4580-112718-JC-012	
Sample Date:		8/2/2017	8/30/2017	11/28/2017	5/16/2018	5/16/2018	9/15/2018	11/8/2018	6/18/2019	6/18/2019	9/5/2019	11/27/2019	
Sample Type:						Duplicate				Duplicate			
Parameters	Units												
Field Parameters													
Color	TCU	--	--	--	--	--	--	--	--	--	--	--	
Conductivity, field	mS/cm	1.94	1.59	1.03	1.72	--	1.86	1.91	1.53	1.53	1.589	1.87	
Dissolved oxygen (DO), field	mg/L	3.87	0.04	0.84	0	--	0	0.43	0.43	--	2.46	0	
Odor	none	--	--	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts	-87	-106	-71	-111	--	-124	-113	-132	--	--	-141	
pH, field	s.u.	6.61	7.22	7.11	7.09	--	7.15	7.42	7.13	7.12	6.62	6.61	
Temperature, field	Deg C	10.8	16.62	12.16	11.86	--	17.75	14.13	6.81	6.81	16.57	8.46	
Turbidity, field	NTU	0	0	42.2	2.6	--	0.4	0	0	--	1.2	0.6	
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 minus PAH	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 gravimetric - silica gel (GHH)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C16-C34)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Semi-Volatiles													
1+2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
1-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
1-Methylacenaphthalene/2-Methylanthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acenaphthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Acridine	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(a)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(a)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(b)fluoranthene/Benzo(k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(b)pyridine (Quinoline)	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Benzo(j,k)fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Carcinogenic potency equivalent	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Chrysene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Dibenz(a,h)anthracene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Fluoranthene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Fluorene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Naphthalene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Pyrene	µg/L	--	--	--	--	--	--	--	--	--	--	--	
Misc													
Oil and grease	mg/L	--	--	--	--	--	--	--	--	--	ND(5.0)	--	

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

G:\610\062\04\[Ta

Table 6.2

Deep Bedrock Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Reswel Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-111210-MB-007	GW-45804-051810-MB-005	GW-45804-110210-TS-008	GW-45804-051611-MBD-004	GW-45804-110911-TS-005	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007	GW-45804-052312-TS-011
Sample Date:					12/6/2010	5/18/2010	11/2/2010	5/16/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/23/2013
Sample Type:													
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Metals													
Arsenic (dissolved)	mg/L		0.010	IMAC	--	0.0010	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	--	0.111	0.078	0.108
Cadmium (dissolved)	mg/L		0.005	MAC	--	0.00015	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00050)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	--	0.0016	0.0036	0.0030
Iron (dissolved)	mg/L	10.6	0.30	AO	--	0.08[a]	0.20[a]	0.0051[a]	0.08[a]	--	0.051[a]	1.4[a]	0.46[a]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	--	ND(0.0010)	ND(0.00010)	ND(0.00010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	--	0.022[a]	0.420[a]	0.104[a]	0.217[a]	--	0.14[a]	1.92[a]	0.44[a]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		/	/	--	0.0439	0.0048	0.0058	0.0066	--	0.0050	0.0044	0.0043
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	--	0.0036	0.0033	0.0066
Zinc (dissolved)	mg/L		5.0	AO	--	0.0115	0.006	ND(0.0030)	0.0060	--	0.0085	0.0065	0.0064
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	--	422	555[a]	555[a]	555[a]	--	555[a]	541[a]	552[a]
Ammonia-N	mg/L	0.2	/	/	--	0.218[a]	0.252[a]	0.215[a]	0.128[a]	--	1.80[a]	0.423[a]	0.508[a]
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	--	19	50	34
Chloride	mg/L		250	AO	--	72.8	338[a]	104	108	--	--	149	143
Color (apparent)	TCU		/	/	--	27.2	130	45.0	7.5	--	64.0	332.0	30.1 J
Dissolved organic carbon (DOC) (dissolved)	mg/L	19.4	5.0	AO	--	4.5	30[a]	7.6[a]	8.8[a]	--	5.0	23[a]	ND:5.2
Escherichia coli	cfu/100mL	5	0	MAC	0	0	0	0	ND(2)	--	0	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	ND(10)	--	0	ND(2)	ND(2)
Nitrate (as N)	mg/L	0.5	10.0	MAC	--	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	--	ND(0.10)	ND(0.10)	0.20
Nitrite (as N)	mg/L		1.0	MAC	--	ND(0.10)	ND(0.10)	ND(0.30)	ND(0.30)	--	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	--	7.74	7.88	7.82
Phenol	mg/L		/	/	--	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0030)
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	--	0.033	ND(0.030)	ND(0.030)	ND(0.030)	--	0.037	ND(0.030)	ND(0.030)
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	445	325
Total coliform bacteria	cfu/100mL		0	MAC	0	0	0	0	ND(2)	--	0	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L		500	AO	--	826	1692[a]	1324[a]	1380[a]	--	1460[a]	1460[a]	1270[a]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	--	0.86	0.69	0.86
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	--	5.6	240	4.8
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	--	1.00[a]	0.91[a]	0.27[a]
Un-ionized ammonia	mg/L		/	/	--	0.0057	0.00152	0.00303	0.00171	--	--	0.0217	0.000156
Field Parameters													
Color	TCU		5	AO	--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.972	1.228	1.58	2.05	2.26	0.831	2.02	1.8	1.97
Dissolved oxygen (DO), field	mg/L		/	/	--	--	10.92	--	0.81	--	--	8.5	8.32
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	--	--	--	--	--	--	-65	--
pH, field	s.u.		6.5-8.5	OG	5.68	6.02	7.41	7.76	7.21	6.55	6.57	8.26	7.62[a]
Temperature, field	Deg C		15	AO	0.33	8.98	10.6	10.82	8.7	13.8	11.48	11.2	13.5
Turbidity, field	NTU		5.0	AO/MAC	125[a]	--	--	15.7[a]	40.7[a]	--	--	115[a]	19[a]
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	ND(100)	--	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)

GHD 2018-6541 (6)

Table 6.2

Deep Bedrock Groundwater Historical Analytical Results
2013 Groundwater and Surface Water Monitoring Report
Reinel Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:				GW-45804-111210-MB-007	GW-45804-051610-MB-005	GW-45804-110210-TS-008	GW-45804-051611-MBD-004	GW-45804-110511-TS-005	GW-45804-051412-mb-007	GW-45804-052312-MB-007	GW-45804-111212-MB-007	GW-45804-052312-TS-011
Sample Date:				12/10/2010	5/16/2010	11/2/2010	5/16/2011	11/9/2011	5/14/2012	5/23/2012	11/12/2012	5/23/2013
Sample Type:												
Parameters	Units	TLP2 a	ODWS Limit b	Criterianame								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	ND(0.020)	--
Misc													
Oil and grease	mg/L		/	/	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table 6.2

Deep Bedrock Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016	GW-45804-052815-TS-015	GW-45804-052815-TS-014	GW-45804-111515-TS-008	GW-45804-051716-TS-005	GW-45804-111516-TS-016	GW-45804-060217-TS-016
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/28/2015	5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/2/2017
Sample Type:									Duplicate				
Parameters	**Units**	**TLP2 a**	**CIDWS Limit b**	**CriteriaName**									
Metals													
Arsenic (dissolved)	mg/L		0.010	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00013	--
Boron (dissolved)	mg/L		5.0	MAC	0.111	0.079	0.080	0.106	0.103	0.14	0.12	0.132	--
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Chromium (dissolved)	mg/L		0.05	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0050)	ND(0.00E0)	ND(0.00050)	--
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.0010)	ND(0.0010)	0.00019	--
Copper (dissolved)	mg/L		1.0	AO	0.0310	0.0124	0.0091	0.0154	0.0173	0.0112	0.0147	0.00571	--
Iron (dissolved)	mg/L	10.8	0.30	AO	0.220[1]	1.21[1]	ND(0.050)	0.411[1]	0.522[1]	0.29	0.351[1]	0.025	0.016
Lead (dissolved)	mg/L		0.01	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00050)	ND(0.00050)	0.000069	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.115[1]	0.228[1]	0.203[1]	0.206[1]	0.224[1]	0.1[1]	0.144[1]	0.0225[1]	0.02[1]
Mercury (dissolved)	mg/L		0.001	MAC	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--
Molybdenum (dissolved)	mg/L		/	/	0.0045	0.00411	0.0046	0.0038	0.0051	0.00551	0.00435	0.00404	--
Nickel (dissolved)	mg/L		/	/	0.0031	0.0022	0.0026	0.0033	0.0031	ND(0.0050)	0.0075	0.00581	--
Zinc (dissolved)	mg/L		5.0	AO	0.0146	0.0044	0.0065	0.0113 J	0.0054 J	ND(0.010)	0.013	0.0043	--
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	996	30-500	OG	553[1]	570[1]	553[1]	552[1]	574[1]	551[1]	580[1]	537[1]	557[1]
Ammonia-N	mg/L	0.2	/	/	1.21[1]	1.72[1]	1.15[1]	0.952[1]	0.954[1]	0.875[1]	0.797[1]	0.823[1]	1.03[1]
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--
Chemical oxygen demand (COD)	mg/L		/	/	34	29	19	25	25	25	26	26	--
Chloride	mg/L		250	AO	164	170	166	252[1]	247	82.7	228[1]	212[1]	--
Odor (apparent)	TOU		/	/	65.4	45.7	7.8	36.6	37.8	49.1	34.2	25.1	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	7.1[1]	4.4	7.6[1]	5.6[1]	5.4[1]	5.1[1]	7.2[1]	4.8	5.4[1]
Escherichia coli	cfu/100mL	5	0	MAC	0	0	0	0	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	0	0	0	0	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	0.15	ND(0.10)	0.22[1]	0.24	0.31	0.251	ND(0.10)	0.14	0.18
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.050)	ND(0.050)	ND(0.010)	ND(0.050)	ND(0.050)	--
pH, lab	s.u.		6.5-8.5	OG	7.43	7.48	7.37	7.67	7.62	7.50	7.71	6.89	--
Phenol	mg/L		/	/	ND(0.0010)	0.0023	ND(0.0010)	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0018 J	0.0037 J	0.0027	0.0025	ND(0.0004)	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.0037	0.0041	0.0030
Sulfate	mg/L		500	AO	355	355	345	313	284	62.0	312	308	--
Total coliform bacteria	cfu/100mL		0	MAC	0	0	0	0	0	0	0[1]	0	--
Total dissolved solids (TDS)	mg/L		500	AO	1360[1]	1460[1]	1340[1]	1350[1]	1380[1]	1340[1]	1660[1]	1520[1]	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	2.04	3.52	1.76	0.98	0.95	0.91	1.08	1.05	--
Total suspended solids (TSS)	mg/L		/	/	7.2	5.4	4.8	3.0	ND(2.0)	4.0	5.5	4.1	--
Turbidity	NTU		5.0	AO/MAC	0.55[1]	14.0[1]	ND(0.50)	0.83[1]	0.77[1]	1.4[1]	0.70[1]	0.57[1]	--
Un-ionized ammonia	mg/L		/	/	0.000746	0.0126	0.00423	0.00321	0.00328	0.0147	0.0107	0.00145	--
Field Parameters													
Color	TCU		5	AO	ND()	ND()	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	2.1	2.27	0.525	1.76	--	2.7	2.43	2.61	2.7
Dissolved oxygen (DO), field	mg/L		/	/	10.4	6.58	8.32	4.47	--	2.49	8.23	4.21	2.88
Odor	none		Inoffensive	AO	ND()	ND()	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-41	124	196	--	-2	51	149	129
pH, field	s.u.		6.5-8.5	OG	6.12[1]	7.13	7.08	7.13	7.23	7.89	7.7	6.85	6.77
Temperature, field	Deg C		15	AO	12.3	11.89	14.25	13.58	13.6	13.44	12.35	12.02	10.88
Turbidity, field	NTU		5.0	AO/MAC	1	4.3	--	0	--	0.8	1.4	0.78	0.7
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	ug/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 (C10-C16)	ug/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	--
Petroleum hydrocarbons F2 minus Naphthalene	ug/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	ug/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Petroleum hydrocarbons F3 minus PAH	ug/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	ug/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	--
Total Petroleum Hydrocarbons (C10-C16)	ug/L		/	/	--	--	--	--	--	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	ug/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	ug/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	ug/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	ug/L		/	/	ND(250)	ND(360)	ND(360)	ND(320)	ND(360)	ND(350)	ND(320)	ND(360)	--

GHD 3164861 (6)

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2018 Groundwater and Surface Water Monitoring Report
Retrieval Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-111413-TS-015	GW-45804-052814-MB-002	GW-45804-112614-TS-016	GW-45804-052515-TS-013	GW-45804-052815-TS-014	GW-45804-111515-TS-008	GW-45804-051716-TS-009	GW-45804-111516-TS-016	GW-45804-060217-TS-016
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/26/2015	5/28/2015	11/10/2015	5/17/2016	11/15/2016	6/2/2017
Sample Type:									Duplicate				
Parameters	Units	TLP2 a	CDWS Limit b	Criterianame									
Semi-Volatiles													
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
1+2-Methylnaphthalene(2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--
Benzo[a]anthracene	µg/L		/	/	-	ND(0.020)	-	--	--	--	--	--	--
Benzo[a]pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.040)	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.060)	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Dibenz[a,h]anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	-	ND(0.020)	-	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Indeno[1,2,3-cd]pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	ND(0.050)	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Misc													
Oil and grease	mg/L		/	/	--	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

004136

Table 6.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Reinel Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-113047-TS-013	GW-45804-051618-TS-018	GW-45804-051618-TS-020	GW-45804-110915-TS-017	GW-45804-061819-TS-004	GW-045804-090519-JC-003	GW-045804-090519-JC-005	GW-045804-112819-JC-017	GW-045804-112819-JC-018	
Sample Date:					11/30/2017	5/16/2018	5/16/2018	11/9/2015	6/18/2019	9/5/2019	9/5/2019	11/28/2019	11/28/2019	
Sample Type:							Duplicate				Duplicate		Duplicate	
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**										
Metals														
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	0.13	0.12	--	--	
Cadmium (dissolved)	mg/L		0.005	IMAC	--	--	--	--	--	ND(0.000050)	ND(0.000050)	--	--	
Chromium (dissolved)	mg/L		0.05	IMAC	--	--	--	--	--	ND(0.0050)	ND(0.0050)	--	--	
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	--	--	
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	0.0735	0.0753	--	--	
Iron (dissolved)	mg/L	10.8	0.30	AO	ND(0.10)	0.650	0.592	2.30	0.11	2.42	2.45	0.944	0.864	
Lead (dissolved)	mg/L		0.01	IMAC	--	--	--	--	--	ND(0.00050)	ND(0.00050)	--	--	
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.018	0.051	0.047	0.108	0.017	0.0707	0.0662	0.058	0.051	
Mercury (dissolved)	mg/L		0.001	IMAC	--	--	--	--	--	ND(0.0000050)	ND(0.0000050)	--	--	
Molybdenum (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	0.0052	0.0054	--	--	
Zinc (dissolved)	mg/L		5.0	AO	--	--	--	--	--	0.077	0.062	--	--	
General Chemistry														
Alkalinity, total (as $CaCO_3$)	mg/L	996	30-500	OG	240	345	343	492	205	--	--	205	317	
Ammonia-N	mg/L	0.2	/	/	0.053	ND(0.015)	ND(0.071)	0.12	0.11	--	--	0.045	0.060	
Biochemical oxygen demand (BOD)	mg/L		/	/	--	--	--	--	--	ND(3.0)	ND(3.0)	--	--	
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	21	22	--	--	
Chloride	mg/L		250	AO	--	--	--	--	--	--	--	--	--	
Color (apparent)	TCU		/	/	--	--	--	--	--	--	--	--	--	
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	ND(6.4)	5.0	5.2	10.1	6.82	--	--	3.26	7.58	
Escherichia coli	cfu/100mL	5	0	IMAC	0	ND(0)	ND(0)	12	--	0	0	0	0	
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--	--	--	--	--	--	--	
Nitrate (as N)	mg/L	0.5	10.0	IMAC	0.937	0.112	0.112	0.029	0.24	--	--	0.657	0.657	
Nitrite (as N)	mg/L		1.0	IMAC	--	--	--	--	--	ND(0.050)	ND(0.050)	--	--	
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.28	7.23	--	--	
Phenol	mg/L		/	/	--	--	--	--	--	--	--	--	--	
Phenolics (total)	mg/L		/	/	--	--	--	--	--	0.0010	0.0030	--	--	
Phosphorus	mg/L	0.5	/	/	ND(0.0030)	ND(0.0030)	0.0030	0.129	0.0038	--	--	ND(0.0030)	ND(0.0030)	
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	--	--	
Total coliform bacteria	cfu/100mL		0	IMAC	--	--	--	--	--	--	--	--	--	
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--	--	--	--	--	--	--	
Total hydrolyzed nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	0.75	0.78	--	--	
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	15.4	5.4	--	--	
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	--	--	20.1	27.0	
Un-ionized ammonia	mg/L		/	/	--	--	--	--	--	--	--	0.00122	0.00122	
Field Parameters														
Color	TCU		5	AO	--	--	--	--	--	--	--	--	--	
Conductivity, field	mS/cm		/	/	2.46	2.52	--	2.51	3.5	2.270	2.270	2.44	2.44	
Dissolved oxygen (DO), field	mg/L		/	/	3.22	3.8	--	4.46	6.78	5.7	--	3.13	--	
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--	--	
Oxidation reduction potential (ORP), field	millivolts		/	/	206	--	--	-10	96	26	--	-41	--	
pH, field	s.u.		6.5-8.5	OG	7.39	7.05	--	7.35	6.88	7	7	6.75	6.75	
Temperature, field	Deg C		15	AO	14.79	12.15	--	12.79	15.03	15.05	15.05	13.4	13.4	
Turbidity, field	NTU		5.0	AO/MAC	30.3	7.9	--	13.5	1.17	2.84	--	20.3	--	
Petroleum Products														
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C10-C16, F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C15-C34)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--	--	--	--	--	--	--	

GHD 3168618 (6)

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4	TW-4
Sample ID:					GW-45804-113047-TS-013	GW-45804-051618-TS-018	GW-45804-051618-TS-020	GW-45804-110515-TS-017	GW-45804-051618-TS-004	GW-045804-090519-JC-005	GW-045804-090519-JC-006	GW-045804-112819-JC-017	GW-045804-112819-JC-018
Sample Date:					11/30/2017	5/16/2018	5/16/2018	11/6/2015	5/16/2018	5/5/2019	5/5/2019	11/28/2019	11/28/2019
Sample Type:							Duplicate				Duplicate		Duplicate
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**									
Semi-Volatiles													
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(b)quinoline (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Misc													
Oil and grease	mg/L		/	/	--	--	--	--	--	ND(5.0)	ND(5.0)	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

GHD 3/4/5/6 (0)

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Rothesay Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011	GW-45804-111011-TS-010	GW-45804-051512-MS-006	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/12/2012	5/22/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Metals												
Arsenic (dissolved)	mg/L		0.010	MAC	--	0.0032	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	MAC	--	--	--	--	--	ND(0.050)	ND(0.050)	ND(0.050)
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	0.00011
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	0.0017	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.00050)	ND(0.00050)	ND(0.00053)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.6	0.30	AO	9.05[1]	5.38[1]	--	5.82[1]	7.21[1]	6.54[1]	7.31[1]	7.47[1]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.98[1]	1.51[1]	--	1.91[1]	1.92[1]	1.97[1]	1.71[1]	1.95[1]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	ND(0.00010)	ND(0.00010)	ND(0.00010)
Molybdenum (dissolved)	mg/L		/	/	0.0059	0.0042	--	0.0049	0.0057	0.0044	0.0062	0.0053
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L		/	/	ND(0.00010)	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.110	ND(0.0030)	--	0.0078	ND(0.0030)	0.0023	ND(0.0030)	0.0057
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	998	30-500	OG	274[1]	309	--	327[1]	367[1]	342[1]	286[1]	343[1]
Ammonia-N	mg/L	0.2	/	/	0.157	0.104	--	0.117	0.108	0.127	0.134	0.141
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	8.5	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	27	34	30
Chloride	mg/L		250	AO	64.0	63.0	--	58.1	56.7	76.7	62.1	94
Color (apparent)	TCU		/	/	137	--	109	232	59.1	258	38.4 J	31.7
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	9.3[1]	9.9[1]	--	11.0[1]	11.4[1]	10.6[1]	8.5[1]	10.1[1]
Escherichia coli	cfu/100mL	5	0	MAC	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(10)
Fecal coliform bacteria	cfu/100mL		/	/	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(10)
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.10)	ND(0.50)
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.10)	ND(0.20)	ND(0.10)	ND(0.10)	ND(0.50)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.91	7.67	7.48
Phenol	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	0.0020
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	0.462	--	0.031	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfate	mg/L		500	AO	--	--	--	--	--	--	199	213
Total coliform bacteria	cfu/100mL		0	MAC	0	--	3[1]	0	ND(2)	32[1]	ND(2)	ND(10)
Total dissolved solids (TDS)	mg/L		500	AO	1060[1]	809[1]	--	1020[1]	1200[1]	1050[1]	1060[1]	1000[1]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	0.52	0.60	0.50
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	15.0	16.0	42.0
Turbidity	NTU		5.0	AO/MAC	--	--	--	--	--	51.0[1]	2.80[1]	22.0[1]
Unionized ammonia	mg/L		/	/	0.00083	0.00022	--	0.000126	0.00026	--	0.00072	0.000032
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.6	1.32	1.36	1.98	1.82	1.83	2	1.87
Dissolved oxygen (DO), field	mg/L		/	/	--	2.84	0.5	--	2.95	1.27	0.87	1.71
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-88	-88	--	-98	-77	-156	--
pH, field	s.u.		6.5-8.5	OG	7.2	8.00	8.02[1]	8.89	8.97	8.4[1]	7.22	8.64[1]
Temperature, field	Deg C		15	AO	15.3[1]	12.2	12	9.74	12.6	11.55	12.8	14.9
Turbidity, field	NTU		5.0	AO/MAC	--	--	--	23.7[1]	70.7[1]	52.0[1]	15.1[1]	7.9[1]
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(100)
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	ND(100)	ND(100)	--	--	--	--	ND(100)	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Rothesay Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-052710-MMD-017	GW-45804-110510-TS-012	GW-45804-111110-TS-002	GW-45804-051711-MMD-011	GW-45804-111011-TS-010	GW-45804-051512-MS-006	GW-45804-111212-MB-002	GW-45804-052213-TS-005
Sample Date:					5/27/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/12/2012	5/22/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.028)	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Acridine	µg/L		/	/	--	--	--	--	--	--	--	ND(4.0)
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.010)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(b)quinoline (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	ND(0.040)
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	ND(0.060)
Chrysene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Fluorene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Naphthalene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)
Pyrene	µg/L		/	/	--	--	--	--	--	--	ND(0.020)	ND(0.020)

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052514-MB-003	GW-45804-112514-TS-005	GW-45804-052615-TS-001	GW-45804-110815-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015	11/9/2015	5/17/2016	11/15/2016
Sample Type:											
Parameters	**Units**	**TLP2 a**	**GDWS Limit b**	**CriteriaName**							
Metals											
Arsenic (dissolved)	mg/L		0.010	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00015	ND(0.00010)	0.00017
Boron (dissolved)	mg/L		5.0	MAC	ND(0.050)	ND(0.050)	ND(0.050)	ND(0.050)	0.072	0.052	0.025
Cadmium (dissolved)	mg/L		0.005	MAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Chromium (dissolved)	mg/L		0.05	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	0.00053	0.00058	ND(0.00050)
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Copper (dissolved)	mg/L		1.0	AC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.00029)	0.00047	0.0539
Iron (dissolved)	mg/L	10.5	0.30	AO	0.052	11.4[b]	1.2[b]	5.4[b]	0.133	0.045[b]	0.186
Lead (dissolved)	mg/L		0.01	MAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.000050)	ND(0.000050)	0.000078
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.0838[b]	1.02[b]	0.0892[b]	0.401[b]	0.0470	0.238[b]	0.0488
Mercury (dissolved)	mg/L		0.001	MAC	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L		/	/	0.0042	0.0027	0.0010	ND(0.0010)	0.00124	0.000422	0.00131
Nickel (dissolved)	mg/L		/	/	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.0020)	ND(0.00050)	ND(0.00050)	ND(0.00050)
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	ND(0.0030)	ND(0.0030)	0.0034	0.0035	0.0013	0.0031	0.0021
General Chemistry											
Alkalinity, total (as CaCO3)	mg/L	986	30-500	OG	74	309	84	186	195	173	182
Ammonia-N	mg/L	0.2	/	/	0.091	0.055	ND(0.050)	ND(0.050)	ND(0.050)	0.063	0.033
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	5.2
Chemical oxygen demand (COD)	mg/L		/	/	76	34	ND(10)	12	12	13	21
Chloride	mg/L		250	AO	86.8	78.9	80	306[b]	87.0	75.0	86.5
Color (apparent)	TCU		/	/	23.7	25.3	31.7	29.2	48.2	48.2	31.6
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	6.0[b]	4.0	3.5	2.6	5.2	3.8	4.5
Escherichia coli	cfu/100mL	5	0	MAC	0	ND(2)	0	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	ND(2)	0	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.10)	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.50)	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.		6.5-8.5	OG	8.23[b]	7.67	8.30	8.08	8.26[b]	8.33	8.22[b]
Phenol	mg/L		/	/	0.0133	0.0032	0.0015	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0030	0.0027	0.0035	0.0025
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)	0.034[b]	0.0096	0.0060
Sulfate	mg/L		500	AO	61.4	191	62	393	77.4	42.1	0.34
Total coliform bacteria	cfu/100mL		0	MAC	ND(10)	10[b]	0	ND(10)	11	3	100[b]
Total dissolved solids (TDS)	mg/L		500	AO	284	702[b]	299	340	240	349	241
Total kjeldahl nitrogen (TKN)	mg/L		/	/	0.40	0.80	ND(0.15)	0.21	0.26	ND(0.15)	0.23
Total suspended solids (TSS)	mg/L		/	/	177	262	9.6	ND(2.0)	2.7	45.2	5.1
Turbidity	NTU		5.0	AO/MAC	5.60[b]	145[b]	0.83[b]	2.8[b]	10.8[b]	16.1[b]	12.8[b]
Un-ionized ammonia	mg/L		/	/	0.000035	0.00016	ND(0.0012)	0.0018	ND(0.045)	0.0018	0.0029
Field Parameters											
Color	TCU		5	AO	ND()	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	1.98	--	0.329	0.474	0.404	0.422	0.379
Dissolved oxygen (DO), field	mg/L		/	/	11.04	--	4.3	0.56	9	1.85	0
Odor	none		Inoffensive	AO	ND()	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	--	-154	-166	-187	-260	-146
pH, field	s.u.		6.5-8.5	OG	8.09[b]	--	7.98	7.94	8.08[b]	8.08[b]	8.02[b]
Temperature, field	Deg C		15	AO	11.3	--	11.6	14.57	14.06	10.47	11.96
Turbidity, field	NTU		5.0	AO/MAC	130[b]	--	--	0	2	3[b]	12.8[b]
Petroleum Products											
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	ND(100)	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	ND(250)	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(350)	ND(380)	ND(350)	ND(350)	ND(350)	ND(350)	ND(350)

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Reliewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7	TW-7	TW-7	TW-7	TW-7
Sample ID:					GW-45804-111413-TS-007	GW-45804-052514-MB-003	GW-45804-112514-TS-005	GW-45804-052815-TS-001	GW-45804-110815-TS-004	GW-45804-051716-TS-004	GW-45804-111516-TS-003
Sample Date:					11/14/2013	5/28/2014	11/25/2014	5/28/2015	11/9/2015	5/17/2016	11/15/2016
Sample Type:											
Parameters	**Units**	**TLP2 a**	**GDWS Limit b**	**CriteriaName**							
Semi-Volatiles											
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.040)	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.050)	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Naphthalene	µg/L		/	/	ND(0.050)	ND(0.050)	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-060117-TS-006	GW-45804-112917-TS-004	GW-45804-051618-TS-008
Sample Date:					6/1/2017	11/29/2017	5/16/2018
Sample Type:							
Parameters	**Units**	**TLPZ a**	**ODWS Limit b**	**CriteriaName**			
Metals							
Arsenic (dissolved)	mg/L		0.010	tMAC	--	--	--
Boron (dissolved)	mg/L		5.0	tMAC	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--
Iron (dissolved)	mg/L	10.6	0.30	AO	1.02[c]	ND(0.010)	0.291[c]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.109[c]	0.0352	0.109[c]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	998	30-500	OG	169	86	152
Ammonia-N	mg/L	0.2	/	/	0.065	0.225[c]	ND(0.282)
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--
Chloride	mg/L		250	AO	--	--	--
Color (apparent)	TCU		/	/	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	2.1	3.2	2.7
Escherichia coli	cfu/100mL	5	0	MAC	0	0	ND(0)
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	--
Phenol	mg/L		/	/	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0031	0.0061	0.0054
Sulfate	mg/L		500	AO	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--
Turbidity	NTU		5.0	AO/MAC	--	--	--
Unionized ammonia	mg/L		/	/	--	--	--
Field Parameters							
Color	TCU		5	AO	--	--	--
Conductivity, field	mS/cm		/	/	0.423	0.25	0.409
Dissolved oxygen (DO), field	mg/L		/	/	4.81	6	1.14
Odor	none		Inoffensive	AO	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-200	62	-209
pH, field	s.u.		6.5-8.5	OG	7.86	8.11	8.21
Temperature, field	Deg C		15	AO	10.12	12.08	12.62
Turbidity, field	NTU		5.0	AO/MAC	72.9	10.56	33[c]
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-45804-060117-TS-006	GW-45804-112917-TS-004	GW-45804-051618-TS-008
Sample Date:					6/1/2017	11/29/2017	5/16/2018
Sample Type:							
Parameters	**Units**	**TLPZ a**	**ODWS Limit b**	**CriteriaName**			
Semi-Volatiles							
1-Methylnaphthalene	µg/L		/	/	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--
Acenaphthene	µg/L		/	/	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--
Acridine	µg/L		/	/	--	--	--
Anthracene	µg/L		/	/	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--
Chrysene	µg/L		/	/	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--
Fluoranthene	µg/L		/	/	--	--	--
Fluorene	µg/L		/	/	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--
Naphthalene	µg/L		/	/	--	--	--
Phenanthrene	µg/L		/	/	--	--	--
Pyrene	µg/L		/	/	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E-2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-458804-110718-TS-003	GW-458804-061818-JC-011	GW-458804-112518-JC-006
Sample Date:					11/7/2018	6/18/2019	11/26/2019
Sample Type:							
Parameters	**Units**	**TLPZ a**	**ODWS Limit b**	**CriteriaName**			
Metals							
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--
Iron (dissolved)	mg/L	10.6	0.30	AO	ND(0.010)	0.222	ND(0.010)
Lead (dissolved)	mg/L		0.01	MAC	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.0428	0.0647	0.0322
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--
General Chemistry							
Alkalinity, total (as CaCO3)	mg/L	998	30-500	OG	109	159	94
Ammonia-N	mg/L	0.2	/	/	ND(0.126)	ND(1.0)	0.019
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--
Chloride	mg/L		250	AO	--	--	--
Color (apparent)	TCU		/	/	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	0.18	2.02	4.37
Escherichia coli	cfu/100mL	5	0	MAC	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.020)	ND(0.020)	ND(0.020)
Nitrite (as N)	mg/L		1.0	MAC	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	8.07
Phenol	mg/L		/	/	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0035	0.0030	0.0252
Sulfate	mg/L		500	AO	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--
Turbidity	NTU		5.0	AO/MAC	--	--	41.1
Unionized ammonia	mg/L		/	/	--	--	0.00127
Field Parameters							
Color	TCU		5	AO	--	--	--
Conductivity, field	mS/cm		/	/	0.46	1.521	0.455
Dissolved oxygen (DO), field	mg/L		/	/	0.63	0.2	0
Odor	none		Inoffensive	AO	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-2	-245	-68
pH, field	s.u.		6.5-8.5	OG	8.25	8.93	8.42
Temperature, field	Deg C		15	AO	13.34	12.6	12.04
Turbidity, field	NTU		5.0	AO/MAC	0.0	3.9	22.17
Petroleum Products							
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--

O:\2019\458804\Tables\

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Rothwell Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-7	TW-7	TW-7
Sample ID:					GW-458804-110718-TS-003	GW-458804-061818-JC-011	GW-458804-112518-JC-006
Sample Date:					11/7/2018	6/18/2019	11/26/2019
Sample Type:							
Parameters	**Units**	**TLPZ a**	**ODWS Limit b**	**CriteriaName**			
Semi-Volatiles							
1-Methylnaphthalene	µg/L		/	/	--	--	--
1-Methylnaphthalene/2-Methylnaphthalene	µg/L		/	/	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--
Acenaphthene	µg/L		/	/	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--
Acridine	µg/L		/	/	--	--	--
Anthracene	µg/L		/	/	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--
Chrysene	µg/L		/	/	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--
Fluoranthene	µg/L		/	/	--	--	--
Fluorene	µg/L		/	/	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--
Naphthalene	µg/L		/	/	--	--	--
Phenanthrene	µg/L		/	/	--	--	--
Pyrene	µg/L		/	/	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW4-8	TW4-8	TW4-8	TW4-8	TW4-2	TW4-8	TW4-8	TW4-8
Sample ID:					GW-45804-052610-MMD-012	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010	GW-45804-110111-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011	11/10/2011	5/15/2012	11/13/2012	5/23/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**Criteriakeme**								
Metals												
Arsenic (dissolved)	mg/L		0.010	IMAC	--	0.0003	--	0.0018	ND(0.0010)	0.0012	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	0.068	0.078	0.074
Cadmium (dissolved)	mg/L		0.005	MAC	0.00022	0.00020	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	0.0021	ND(0.0010)	ND(0.0010)
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.00050)	0.00078	ND(0.00050)
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Iron (dissolved)	mg/L	10.0	0.30	AO	3.08[a]	2.80[a]	--	5.2[a]	ND(0.050)	3.72[a]	6.02[a]	5.55[a]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Manganese (dissolved)	mg/L	2.1	0.05	AO	1.53[a]	1.39[a]	--	1.27[ab]	0.932[a]	2.55[a]	2.31[a]	0.64[a]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L		/	/	0.0095	0.0527	--	0.0188	0.164	0.0158	0.0197	0.0204
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	ND(0.0020)	ND(0.0020)	ND(0.0020)
Silver (dissolved)	mg/L		/	/	ND(0.00010)	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.0743	ND(0.0030)	--	0.0123	0.0041	ND(0.0030)	0.0119	ND(0.0030)
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	666	30-500	OG	427	490	--	512[c]	201	570[c]	536[c]	557[c]
Ammonia-N	mg/L	0.2	/	/	0.0724[a]	0.311[a]	--	0.457[a]	ND(0.050)	1.69[a]	0.559[a]	2.45[a]
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	23	51	36
Chloride	mg/L		250	AO	83.5	70.6	--	106	42.8	116	140	94.2
Color (apparent)	TCU		/	/	143	--	90[c]	203	5.0	112	73.0	35.0
Dissolved organic carbon (DOC) (dissolved)	mg/L	16.4	5.0	AO	6.2[a]	6.2[a]	--	10.3[a]	3.1	10.5[a]	7.4[a]	ND(5.0)
Escherichia coli	cfu/100mL	5	0	MAC	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)
Fecal coliform bacteria	cfu/100mL		/	/	0	--	0	0	ND(2)	ND(2)	ND(2)	ND(2)
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.30)	0.44	ND(0.10)	ND(0.10)	0.23
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	--	ND(0.30)	ND(0.30)	ND(0.10)	ND(0.10)	ND(0.10)
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	7.86	7.50	7.82
Phenol	mg/L		/	/	--	--	--	--	--	ND(0.0010)	ND(0.0010)	ND(0.0010)
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	ND(0.030)	ND(0.030)	--	0.072	ND(0.030)	ND(0.030)	ND(0.030)	ND(0.030)
Sulfide	mg/L		500	AO	--	--	--	--	--	--	745[a]	373
Total coliform bacteria	cfu/100mL		0	MAC	0	--	10[c]	0	2[c]	1[c]	10[c]	120[c]
Total dissolved solids (TDS)	mg/L		500	AO	1020[a]	1060[a]	--	1360[a]	600[a]	1500[a]	1400[a]	1510[a]
Total Kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	2.18	2.43	2.66
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	12.5	14.0	38.7
Turbidity	NTU		5.0	AO/IMAC	--	--	--	--	--	10.0[a]	12.0[a]	21.0[a]
Un-ionized ammonia	mg/L		/	/	0.000407	0.00152	--	0.0145	ND(0.000331)	--	0.005	0.00202
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.52	1.53	1.85	2.31	0.961	2.37	1.95	2.17
Dissolved oxygen (DO), field	mg/L		/	/	--	2.81	2.12	0.02	--	1.7	0	5.62
Odor	mons		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-124	-31	-60	--	-73	-194	--
pH, field	s.u.		6.5-8.5	OG	6.62	7.24	6.23[a]	8.13	7.48	7.48[a]	6.75	7.19[a]
Temperature, field	Deg C		15	AO	11.9	12.9	7.72	10.59	9.0	8.92	9.8	14.6
Turbidity, field	NTU		5.0	AO/IMAC	--	--	--	4.2	85.3[a]	10.5[a]	25.5[a]	93[a]
Petroleum Products												
Petroleum Hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum Hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum Hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	ND(100)
Petroleum Hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum Hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum Hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	ND(100)	ND(100)	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)	ND(250)

GHD 54E3H-16)

Deep Bedrock GroundWater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW4-8	TW4-8	TW4-8	TW4-8	TW4-8	TW4-8	TW4-8	TW4-8
Sample ID:					GW-45804-052610-MMD-012	GW-45804-110510-TS-010	GW-45804-111110-TS-001	GW-45804-051711-MMD-010	GW-45804-110111-TS-014	GW-45804-051512-MB-010	GW-45804-111312-MB-012	GW-45804-052313-TS-012
Sample Date:					5/26/2010	11/5/2010	11/11/2010	5/17/2011	11/1/2011	5/15/2012	11/13/2012	5/23/2013
Sample Type:												
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Deep Bedrock GroundWater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-5	TW-6	TW-6	TW-6	TW-6	TW-2	TW-5	TW-2	TW-2
Sample ID:					GW-45804-111413-TS-005	GW-45804-052814-WB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011	GW-45804-052815-TS-011	GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:					11/14/2013	5/28/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015	5/17/2016	5/17/2016	11/15/2016
Sample Type:												Duplicate	
Parameters	Units	TLP2 a	ODWS Limit b	CriteriaName									
Metals													
Arsenic (dissolved)	mg/L		0.010	IMAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Boron (dissolved)	mg/L		5.0	IMAC	0.061	0.058	0.204	0.185	--	0.29	0.13	0.14	0.27
Cadmium (dissolved)	mg/L		0.005	IMAC	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)	--	ND(0.00010)	ND(0.00010)	ND(0.00010)	ND(0.00010)
Chromium (dissolved)	mg/L		0.05	IMAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Cobalt (dissolved)	mg/L		/	/	ND(0.00050)	ND(0.00050)	0.00142	ND(0.00050)	--	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)
Copper (dissolved)	mg/L		1.0	AO	ND(0.0010)	ND(0.0010)	0.0016	ND(0.0010)	--	ND(0.0020)	ND(0.0020)	ND(0.0020)	0.0807
Iron (dissolved)	mg/L	10.0	0.30	AO	0.027[a]	0.067[a]	ND(0.050)	0.178	--	ND(0.10)	1.48[a]	1.55[a]	ND(0.10)
Lead (dissolved)	mg/L		0.01	IMAC	ND(0.0010)	ND(0.0010)	ND(0.0010)	ND(0.0010)	--	ND(0.00050)	ND(0.00050)	ND(0.00010)	ND(0.00050)
Manganese (dissolved)	mg/L	0.1	0.05	AO	0.238[a]	0.345[a]	0.338[a]	0.0875[a]	--	0.0439	0.455[a]	0.454[a]	0.0255
Mercury (dissolved)	mg/L		0.001	IMAC	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)	--	ND(0.000010)	ND(0.000010)	ND(0.000010)	ND(0.000010)
Molybdenum (dissolved)	mg/L		/	/	0.0211	0.0133	0.0301	0.0251	--	0.0616	0.242	0.247	0.0847
Nickel (dissolved)	mg/L		/	/	ND(0.0020)	ND(0.0020)	0.0079	ND(0.0020)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	0.0034	0.0075	0.0075	ND(0.0030)	--	ND(0.010)	ND(0.010)	ND(0.010)	ND(0.010)
General Chemistry													
Alkalinity, total (as CaCO3)	mg/L	806	30-500	OG	246[a]	55.6	48.0	305	--	24.1	259	257	301
Ammonia-N	mg/L	0.2	/	/	0.227[a]	0.228[a]	0.213[a]	0.099	--	0.0228[a]	0.581[a]	0.0218[a]	0.057
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	--	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)
Chemical oxygen demand (COD)	mg/L		/	/	46	19	ND(10)	ND(10)	--	14	58 J	18 J	13
Chloride	mg/L		250	AO	157	103	12.7	48.9	--	52.5	92.7	91.6	51.2
Color (apparent)	TCU		/	/	55.7	54.6 J	61.8	15.4	--	59.8	47.7	66.3	36.4
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	13.1[a]	4.2	2.5	2.4	--	4.3	4.4	3.8	1.9
Escherichia coli	cfu/100mL	5	0	MAC	5	0	0	0	--	0	0	0	0
Fecal coliform bacteria	cfu/100mL		/	/	0	0	0	0	--	0	0	0	0
Nitrate (as N)	mg/L	0.5	10.0	MAC	ND(0.10)	0.15	0.40	0.0385[a]	--	0.527[a]	ND(0.020)	ND(0.020)	0.487
Nitrite (as N)	mg/L		1.0	MAC	ND(0.10)	ND(0.10)	ND(0.10)	ND(0.010)	--	ND(0.050)	ND(0.010)	ND(0.010)	ND(0.010)
pH, lab	s.u.		6.5-8.5	OG	7.53	7.78	7.54	8.02	--	7.72	7.88	7.90	7.98
Phenol	mg/L		/	/	ND(0.0010)	0.0030	0.0015	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	0.0014	--	0.0019	0.0020 J	0.0034 J	0.0048
Phosphorus	mg/L	0.5	/	/	ND(0.020)	ND(0.030)	ND(0.030)	0.030	--	ND(0.030)	0.0498	0.0290	0.0160
Sulfate	mg/L		500	AO	306[a]	279	353	172	--	256	213	211	271
Total coliform bacteria	cfu/100mL		0	MAC	0	10[a]	0	1[a]	--	0	45[a]	50[a]	100[a]
Total dissolved solids (TDS)	mg/L		500	AO	1290[a]	1060[a]	1100[a]	1220[a]	--	880[a]	1400[a]	1310[a]	1770[a]
Total kjeldahl nitrogen (TKN)	mg/L		/	/	5.09	2.65	0.42	0.43	--	1.04	0.70	0.28	0.90
Total suspended solids (TSS)	mg/L		/	/	26.4	10.0	28.4	28.1	--	6.0	23.3 J	86.0 J	6.7
Turbidity	NTU		5.0	AO/MAC	8.24[a]	4.64[a]	11.4[a]	8.44	--	4.96	22.4[a]	39.2[a]	43.2[a]
Un-ionized ammonia	mg/L		/	/	0.00187	0.0104	0.00355	0.0020	--	0.177	0.0571	0.0543	0.00036
Field Parameters													
Color	TCU		5	AO	ND(--	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	2.52	1.89	0.557	--	0.681	0.301	0.902	--	0.926
Dissolved oxygen (DO), field	mg/L		/	/	7.89	8.74	10.46	--	8.5	2.36	1.56	--	0
Odor	none		Inoffensive	AO	ND(-	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	--	-64	24	--	144	126	-49	--	-29
pH, field	s.u.		6.5-8.5	OG	8.21[a]	7.22	7.9	7.73	7.73	8.14[a]	8.34[a]	--	7.43
Temperature, field	Deg C		15	AO	11.1	16.44	7.15	17.1[a]	17.02[a]	11.05	13.8	--	10.98
Turbidity, field	NTU		5.0	AO/MAC	0	5.55[a]	--	--	0	2.6	3.7	--	10.7[a]
Petroleum Products													
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	ND(100)	ND(100)	ND(100)	ND(100)	--	ND(100)	ND(100)	ND(100)	ND(100)
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	ND(100)	ND(100)	ND(100)	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	ND(250)	ND(250)	ND(250)	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	ND(250)	ND(250)	ND(250)	ND(250)	--	ND(250)	ND(250)	ND(250)	ND(250)
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	ND(100)	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	ND(250)	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	ND(250)	ND(380)	ND(380)	ND(380)	--	ND(380)	ND(380)	ND(380)	ND(380)

GHD 54/23/-165)

Deep Bedrock GroundWater Historical Analytical Results
2015 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-5	TW-8	TW-8	TW-8	TW-8	TW-2	TW-5	TW-2	TW-2
Sample ID:				GW-45804-111413-TS-005	GW-45804-052814-MB-001	GW-45804-112614-TS-013	GW-45804-052715-TS-011	GW-45804-052815-TS-011	GW-45804-110915-TS-012	GW-45804-051716-TS-001	GW-45804-051716-TS-002	GW-45804-111516-TS-002
Sample Date:				11/14/2013	5/28/2014	11/26/2014	5/27/2015	5/27/2015	11/9/2015	5/17/2016	5/17/2016	11/15/2016
Sample Type:											Duplicate	
Parameters	Units	TLP2 a	ODWS Limit b	CriteriaName								
Semi-Volatiles												
1-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	ND(4.0)	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	--	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)
Benzo(a)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)	--	ND(0.0050)	ND(0.0050)	ND(0.0050)	ND(0.0050)
Benzo(b)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	ND(0.040)	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	ND(0.060)	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	ND(0.050)	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	ND(0.020)	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.

Table E.2

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:					TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:					GW-458804-060117-TS-005	GW-458804-113017-TS-011	GW-458804-051618-TS-017	GW-458804-051618-TS-018	GW-458804-051618-TS-017	GW-458804-110218-TS-005	GW-458804-061719-TS-005	GW-458804-112719-JC-014
Sample Date:					6/1/2017	11/30/2017	5/16/2018	5/16/2018	5/16/2018	11/2/2018	6/17/2019	11/27/2019
Sample Type:								Duplicate				
Parameters	**Units**	**TLP2 a**	**ODWS Limit b**	**CriteriaName**								
Metals												
Arsenic (dissolved)	mg/L		0.010	IMAC	--	--	--	--	--	--	--	--
Boron (dissolved)	mg/L		5.0	IMAC	--	--	--	--	--	--	--	--
Cadmium (dissolved)	mg/L		0.005	MAC	--	--	--	--	--	--	--	--
Chromium (dissolved)	mg/L		0.05	MAC	--	--	--	--	--	--	--	--
Cobalt (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Copper (dissolved)	mg/L		1.0	AO	--	--	--	--	--	--	--	--
Iron (dissolved)	mg/L	10.8	0.30	AO	0.09[c]	0.103	0.04J[c]	0.05J[c]	--	0.024	0.041	0.08[c]
Lead (dissolved)	mg/L		0.01	MAC	--	--	--	--	--	--	--	--
Manganese (dissolved)	mg/L	2.1	0.05	AO	0.014[c]	0.015[c]	0.003[c]	0.003[c]	--	0.00640	0.00252	0.003[c]
Mercury (dissolved)	mg/L		0.001	MAC	--	--	--	--	--	--	--	--
Molybdenum (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Nickel (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Silver (dissolved)	mg/L		/	/	--	--	--	--	--	--	--	--
Zinc (dissolved)	mg/L		5.0	AO	--	--	--	--	--	--	--	--
General Chemistry												
Alkalinity, total (as CaCO3)	mg/L	986	30-500	OG	340	256	267	261	--	232	305	351
Ammonia-N	mg/L	0.2	/	/	0.04[c]	ND(0.050)	ND(0.025)	ND(0.025)	--	ND(0.063)	0.13[c]	0.078[c]
Biochemical oxygen demand (carbonaceous)	mg/L		/	/	--	--	--	--	--	--	--	--
Chemical oxygen demand (COD)	mg/L		/	/	--	--	--	--	--	--	--	--
Chloride	mg/L		250	AO	--	--	--	--	--	--	--	--
Color (apparent)	TCU		/	/	--	--	--	--	--	--	--	--
Dissolved organic carbon (DOC) (dissolved)	mg/L	18.4	5.0	AO	2.2	ND(2.0)	3.7 J	2.1 J	--	ND(2.0)	2.77	3.61
Escherichia coli	cfu/100mL	5	0	MAC	0	0	ND(0)	ND(0)	--	ND(0) J	--	0
Fecal coliform bacteria	cfu/100mL		/	/	--	--	--	--	--	--	--	--
Nitrate (as N)	mg/L	0.5	10.0	MAC	0.071	0.014[c]	0.049	0.058	--	0.010[c]	1.01[c]	0.21[c]
Nitrite (as N)	mg/L		1.0	MAC	--	--	--	--	--	--	--	--
pH, lab	s.u.		6.5-8.5	OG	--	--	--	--	--	--	--	--
Phenol	mg/L		/	/	--	--	--	--	--	--	--	--
Phenolics (total)	mg/L		/	/	--	--	--	--	--	--	--	--
Phosphorus	mg/L	0.5	/	/	0.0135	0.0150	0.0195	0.0263	--	0.0075	0.0458	0.0185
Sulfate	mg/L		500	AO	--	--	--	--	--	--	--	--
Total coliform bacteria	cfu/100mL		0	MAC	--	--	--	--	--	--	--	--
Total dissolved solids (TDS)	mg/L		500	AO	--	--	--	--	--	--	--	--
Total kjeldahl nitrogen (TKN)	mg/L		/	/	--	--	--	--	--	--	--	--
Total suspended solids (TSS)	mg/L		/	/	--	--	--	--	--	--	--	--
Turbidity	NTU		5.0	AO/IMAC	--	--	--	--	--	--	--	49.1[c]
Un-ionized ammonia	mg/L		/	/	--	--	--	--	--	--	--	0.000263
Field Parameters												
Color	TCU		5	AO	--	--	--	--	--	--	--	--
Conductivity, field	mS/cm		/	/	0.844	0.93	--	--	0.881	0.937	0.842	1.08
Dissolved oxygen (DO), field	mg/L		/	/	4.16	0	--	--	3.68	6.72	5.88	7.76
Odor	none		Inoffensive	AO	--	--	--	--	--	--	--	--
Oxidation reduction potential (ORP), field	millivolts		/	/	-49	33	--	--	-36	6	64	62
pH, field	s.u.		6.5-8.5	OG	7.55	7.31	--	--	7.31	7.59	7	7.45
Temperature, field	Deg C		15	AO	15.67	5.93	--	--	19.29	10.51	17.29[c]	6.19
Turbidity, field	NTU		5.0	AO/IMAC	19[c]	87.6[c]	--	--	333[c]	5.6[c]	3.6[c]	25.2[c]
Petroleum Products												
Petroleum hydrocarbons F1 (C6-C10)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F2 minus Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F3 minus PAH	µg/L		/	/	--	--	--	--	--	--	--	--
Petroleum hydrocarbons F4 (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C10-C16) F2 less naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C16-C34)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C34-C50)	µg/L		/	/	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbons (C6-C50)	µg/L		/	/	--	--	--	--	--	--	--	--

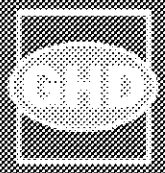
GHD 54E3H-165)

Deep Bedrock Groundwater Historical Analytical Results
2019 Groundwater and Surface Water Monitoring Report
Renewi Canada Ltd.
Ottawa, Ontario

Sample Location:				TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8	TW-8
Sample ID:				GW-45804-060117-TS-005	GW-45804-113017-TS-011	GW-45804-051618-TS-017	GW-45804-051618-TS-018	GW-45804-051618-TS-017	GW-45804-110818-TS-005	GW-45804-061719-TS-002	GW-045804-112719-JC-014
Sample Date:				6/1/2017	11/30/2017	5/16/2018	5/16/2018 Duplicate	5/16/2018	11/8/2018	6/17/2019	11/27/2019
Sample Type:											
Parameters	Units	TLP2 a	ODWS Limit b	Criteria Name							
Semi-Volatiles											
1-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
2-Methylnaphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthene	µg/L		/	/	--	--	--	--	--	--	--	--
Acenaphthylene	µg/L		/	/	--	--	--	--	--	--	--	--
Acridine	µg/L		/	/	--	--	--	--	--	--	--	--
Anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(a)pyrene	µg/L		0.01	MAC	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(b)pyridine (Quinoline)	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(g,h,i)perylene	µg/L		/	/	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Carcinogenic potency equivalent	µg/L		/	/	--	--	--	--	--	--	--	--
Chrysene	µg/L		/	/	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluoranthene	µg/L		/	/	--	--	--	--	--	--	--	--
Fluorene	µg/L		/	/	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	µg/L		/	/	--	--	--	--	--	--	--	--
Naphthalene	µg/L		/	/	--	--	--	--	--	--	--	--
Phenanthrene	µg/L		/	/	--	--	--	--	--	--	--	--
Pyrene	µg/L		/	/	--	--	--	--	--	--	--	--

Notes:

ND Not detected at the associated reporting limit.
J Estimated concentration.



about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental and construction services to private and public sector clients.

Ben Kempel
Ben.Kempel@ghd.com
519.340.4119

Ron Cherkewski
Ron.Cherkewski@ghd.com
519.340.3687

www.ghd.com

Ministry of the Environment

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D UM

29 July 2013

TO: K. Straberger
Senior Environmental Officer
Ottawa District Office
Eastern Region

FROM: B. W. Metcalfe
Senior Environmental Officer
Water Resources Unit, Surface Water Group
Technical Support Section
Eastern Region

RE: 2012 Groundwater/Surface Water Monitoring and Compliance Report
Orgaworld Organics Facility – SWM Pond
5123 Hawthorne Road, Lot 27, Concession 6, Geographic Township of Gloucester, City of Ottawa, Ontario
s.53, OWRA, Industrial Sewage Works Certificate of Approval (ECA)
7251-8GGKRPD

I have reviewed the noted report dated March 2013, prepared by Conestoga – Rovers & Associates (CRA) for Orgaworld Canada Limited (OCL). Additionally, I have also reviewed the previous report, "Groundwater/Surface Water Monitoring and Compliance Report", dated March 2012, which was identified to be CRA's first Annual Report prepared for OCL. The following comments are offered relative to surface water impact concerns.

Background Information

OCL, the Owner, operates a Source Separated Organics (SSO) Processing Facility (the Site) which is located at 5123 Hawthorne Road, Ottawa, Ontario. The Site is located within an industrial development area identified as the Hawthorne Industrial Park. The Site consists of an area of approximately 10 ha within the approximate 80 ha industrial park property.

The Facility is an aerobic composting operation, that is approved to receive and process organics including SSO, brush material, food wastes (solid or sludge), commercial waste (restaurant wastes, etc.) and other sludges. Following separation materials that are acceptable for the production of unrestricted use product (UUP) the materials are transported via conveyor belt to an enclosed compost curing building.

It is the reviewer's understanding that the OCL SWM Pond (s.53, OWRA, Industrial Sewage Works Certificate of Approval (ECA) 7251-8GGKRPD) became operational in 2009 and the surface water sampling program was subsequently initiated during 2010.

It is the reviewer's understanding that the collected stormwater in the on-Site SWM Pond is used for recirculation to the OCL composting operation and that the discharge of the SWM Pond water to the surface water regime would be anticipated to be minimal, if any, during normal operations of the OCL Facility.

Surface Water Regime

The OCL Site is situated within the South Nation River Basin. A series of ditches within the Site drains surface stormwater runoff to an on-Site SWM Pond. The SWM Pond effluent discharge, which is controlled by a valve, flows to a ditch that runs along the Industrial Park road (Somme Street) towards the east. The Site SWM pond discharge is conveyed by a regulated rate via local roadside ditches to the subdivision SWM facility, and which discharges to Findlay Creek (a tributary to Shields Creek), to the North Castor River, to the South Nation River.

Another ditch runs along Hawthorne Road, flowing towards and eventually along Rideau Road, connecting to Findlay Creek. The ditch does not connect to the OCL Site at Hawthorne Road or to Somme Street.

The South Nation River Basin (i.e., the river and all tributaries) is designated by the MOE as a Policy 2 surface water for Total Phosphorus. It is also the reviewer's understanding that the thermal regime of Findlay Creek has been identified by Ontario Ministry of Natural Resources (MNR) to be a cool to cold water habitat.

SWM Pond Effluent Monitoring

Surface stormwater runoff from the Site drains to an on-Site stormwater management pond (SWM pond). The contents of the SWM pond is retained for analysis and testing, and is released upon the receipt of suitable test results, in accordance with the s.53, OWRA, Industrial Sewage Works Certificate of Approval (ECA) 7251-8GGKRPD. The SWM Pond discharge outlet sluice gate valve is kept in the closed position during normal operation periods. Prior to any discharge from the SWM Pond to the natural environment, the Owner, is to collect grab samples from a designated sampling location at the SWM Pond and analyze the sample for a variety of water quality parameters (chemistry, E-coli, Oil & Grease, inorganics (metals), and field parameters (conductivity, dissolved oxygen, pH and temperature).

- Per ECA Condition 5. (1), the Owner is required to carry out an effluent monitoring program. The SWM Pond is to have grab samples collected on a monthly frequency and the samples are to be analyzed for the parameters listed in the ECA Table 1 – Effluent Monitoring SWM Pond.

As previously noted, the SWM Pond discharge outlet sluice gate valve is kept in the closed position during normal operation periods. Prior to any discharge from the SWM Pond to the natural environment, the Owner is to collect grab samples from a designated sampling location at the SWM Pond and analyze for the parameters listed in ECA Table 2 - Trigger Parameters. The Owner is to compare monitoring results for each and all grab samples with the corresponding trigger level concentration of each parameter listed in ECA Table 2 to identify any leachate contamination of stormwater before allowing any discharge from the SWM Pond.

- Per ECA Condition 6. (9), "Discharge of leachate contaminated sewage from the Works to receiving surface water is prohibited, except where it is necessary to avoid loss of life, personal injury, danger to public health or severe property damage".

Surface Water Monitoring Program

During 2012 surface water samples were collected at four locations (SW1-09 to SW4-09) on two occasions in May (spring) and November (fall). The collected surface water samples were analyzed for a comprehensive suite of general chemistry, metals, petroleum hydrocarbons (F1-F4), and the semi-volatiles PAH (anthracene, benzo(a)pyrene) parameters. Field parameters measured included conductivity, dissolved oxygen, pH, turbidity and water temperature.

Baseline Values – Surface Water Quality

As a condition to operations at the Site and as a part of the Monitoring Program, baseline conditions were developed by OCL as a basis against which to compare future groundwater and surface water quality.

In March 2012, baseline values for the groundwater/surface water monitoring program were developed by CRA using statistical methods [Ref. CRA's March 28, 2012 memorandum entitled "Development of Baseline Values for Groundwater/Surface Water Monitoring ", referenced in Appendix 'E' of CRA's first Annual Report (March 2012)].

The 75th percentile concentration of parameters of concern will be determined for defining the baseline values i.e. defining the upstream background surface water quality. As a first step for surface water quality impact assessment, the downstream parameter concentrations exceeding the upstream baseline values will be compared.

- CRA noted the baseline values for groundwater and surface water may be subject to further assessment both in magnitude of the baseline values and also in methodology / grouping, as additional groundwater and surface water data becomes available and is evaluated against existing interim / final baseline values. No changes to the baseline values were made in the 2012 monitoring / reporting year.

2012 Surface Water Sampling Results

SWM Pond (SW-4/SW4-09):

Sample station SW-4 monitors the water quality of the OCL on-Site SWM Pond. Samples were collected on May 14/12, May 23/12 (limited analysis) and November 12/12 and the water quality was characterized having CBOD5(8.3 – 14.0 mg/L), COD (72 – 86 mg/L), DOC (1.3 – 21.8 mg/L), Total Ammonia Nitrogen (0.05 – 0.171 mg/L), Un-ionized Ammonia (0.032 – 0.034 mg/L), TKN (1.66 - 2.01 mg/L), NO_3 (0.10 mg/L), NO_2 (0.10 mg/L), Phenols (1 µg/L), Total Phosphorus (0.164 – 0.319 mg/L), TSS (17.2 – 50 mg/L), field pH (7.14 – 9.09), field Conductivity (865 – 1020 µS/cm), Chloride (47.5 – 81 mg/L). The E-coli concentration ranged 60 – 156 cfu/100 mL.

- PWQO exceedance occurred for Un-ionized ammonia (0.032 – 0.034 mg/L, exceeded 0.02 mg/L), Iron (0.745 –0.830 mg/L, exceeded 0.30 mg/L) and Total Phosphorus (0.164 – 0.319 mg/L, exceeded 0.03 mg/L). It was noted that 'single' E-coli concentrations 142 – 156 cfu/100 mL exceeded the PWQO of 100 cfu/100 mL (However, it is also to be noted that the PWQO is based on a geometric mean of a minimum of five (5) samples.)

- ECA Table 2 Trigger Parameters concentrations were observed to be exceeded for TSS (17.2 – 50 mg/L, exceeded 15 mg/L), field pH (9.09, exceeded 8.5; Nov. 12/12), and E-coli (142 - 156/100 mL, exceeded 100 cfu/100 mL on May 23/12).

Findlay Creek - Downstream of OCL Site (SW-3/SW3-09):

Sample station SW-3 monitors the water quality of Findlay Creek downstream of the drainage ditch conveying the OCL SWM pond discharge. Sample station SW-3 is located approximately 1300 m (1.3 km) downstream of the OCL SWM pond outlet.

Samples were collected on May 14/12, May 23/12 (limited analysis) and November 13/12 and the water quality was characterized having CBOD5 (2 mg/L), COD (21 – 51 mg/L), DOC (7.8 – 13 mg/L), Total Ammonia Nitrogen (0.05 – 0.122 mg/L), Un-ionized Ammonia (0.00058 mg/L, Nov. 13/12), TKN (0.57–0.61 mg/L), NO_3 (0.14 – 0.49 mg/L), NO_2 (0.10 mg/L), Phenols (1 µg/L), Total Phosphorus (0.0408 – 0.0455 mg/L), TSS (19.2 – 20.8 mg/L), field pH (6.87 – 7.64), field Conductivity (999 – 7620µS/cm), Chloride (94 – 120 mg/L). The E-coli concentration ranged 11 – 77 cfu/100 mL.

- PWQO exceedance occurred for Cadmium (0.00039 mg/L, exceeded 0.0002 mg/L; May 14/12), Iron (0.471 – 0.512 mg/L, exceeded 0.30 mg/L), Molybdenum (0.117 mg/L, exceeded 0.040 mg/L; May 14/12), and Total Phosphorus (0.0408 – 0.0455 mg/L, exceeded 0.03 mg/L). There is no PWQO for chlorides, however the CCME Canadian Water Quality Guideline (CWQG) is 120 mg/L and this concentration was equalled for the Nov. 13/12 sample.

Findlay Creek - Upstream of the OCL Site (SW-2/SW2-09):

Sample station SW-2 monitors the water quality of Findlay Creek upstream of the drainage ditch conveying the OCL SWM pond discharge. Sample station SW-3 is located approximately 400 m upstream of sample station SW-3.

Samples were collected on May 14/12, May 23/12 (limited analysis) and November 13/12 and the water quality was characterized having CBOD5 (2 mg/L), COD (40 – 42 mg/L), DOC (8 – 17.6 mg/L), Total Ammonia Nitrogen (0.05 – 0.068 mg/L), Un-ionized Ammonia (0.00014 mg/L, Nov. 13/12), TKN (0.57 – 0.61 mg/L), NO_3 (0.14 – 0.49 mg/L), NO_2 (0.10 mg/L), Phenols (1 µg/L), Total Phosphorus (0.0286 – 0.0788 mg/L), TSS (4 – 26.4 mg/L), field pH (7.04 – 7.42), field Conductivity (812 – 973µS/cm), Chloride (88.2 – 121 mg/L). The E-coli concentration ranged 11 – 105 cfu/100 mL.

- PWQO exceedance occurred for Iron (0.717 mg/L, exceeded 0.30 mg/L; Nov. 13/12), and Total Phosphorus (0.0788 mg/L, exceeded 0.03 mg/L; May 14/12). It was noted that 'single' E-coli concentration 105 cfu/100 mL slightly exceeded the PWQO of 100 cfu/100 mL on May 23/12. (However, it is also to be noted that the PWQO is based on a geometric mean of a minimum of five (5) samples). There is no PWQO for chlorides, however the CCME Canadian Water Quality Guideline (CWQG) is 120 mg/L and the concentration of 121 mg/L slightly exceeded the CWQG for the Nov. 13/12 sample.

Drainage Ditch Hawthorne Road/Rideau Road Background (SW-1/SW1-09):

Sample station SW-1 monitors the water quality of the road ditch at the intersection of Hawthorne Road and Rideau Road approximately 500 m northwest of the OCL Facility. SW-1 provides background surface water quality of the drainage ditch upgradient of Findlay Creek station SW-2.

Samples were collected on May 14/12, May 23/12 (limited analysis) and November 13/12 and the water quality was characterized having CBOD5 (2 mg/L), COD (15 – 76 mg/L), DOC (32 – 42 mg/L), Total Ammonia Nitrogen (0.073 – 0.100 mg/L), Un-ionized Ammonia (0.000189 mg/L, Nov. 13/12), TKN (0.49 – 0.51 mg/L), NO_3 (0.34 – 1.1 mg/L), NO_2 (0.10 mg/L), Phenols (1 µg/L), Total Phosphorus (0.0093 – 0.0153 mg/L), TSS (56 – 116 mg/L), field pH (6.97 – 7.06), field Conductivity (1510 – 2110µS/cm), Chloride (94.2 – 164 mg/L). The E-coli concentration ranged 45 – 130 cfu/100 mL.

- PWQO exceedance occurred for Cadmium (0.00092 – 0.00113 mg/L, exceeded 0.0002 mg/L), Cobalt (0.00111 – 0.00233 mg/L, exceeded 0.0009 mg/L), and Molybdenum (0.275 – 0.556 mg/L, exceeded 0.040 mg/L). It was noted that 'single' E-coli concentration 130 cfu/100 mL slightly exceeded the PWQO of 100 cfu/100 mL on Nov. 13/12. (However, it is also to be noted that the PWQO is based on a geometric mean of a minimum of five (5) samples). There is no PWQO for

chlorides, however the CCME Canadian Water Quality Guideline (CWQG) is 120 mg/L and the concentration of 164 mg/L slightly exceeded the CWQG for the May 14/12 sample.

Contingency Plan Surface Water Trigger Mechanism

CRA developed a groundwater and surface water trigger level monitoring program for the Site that was provided in CRA's first Annual Report (March 2012). The three-tier trigger level mechanism was developed to assess groundwater and surface water quality impact at the Site. Based on the trigger level assessment, the need to implement contingency measurements will be determined.

The SWM Pond Trigger Parameters are Un-ionized Ammonia, Nitrate, CBOD5, Total Phosphorus, TSS, E-coli, pH, and Temperature and their associated trigger levels are listed in 'Table 2 - Trigger Parameters of the ECA'.

Surface water is monitored semi-annually and these monitoring events are part of the Tier 1 trigger and are considered to be an Alert Level of monitoring. At this tier, baseline values are used as trigger levels for Site- specific trigger parameters. If during two consecutive monitoring events a parameter concentration exceeds the corresponding baseline values (trigger level) for any of the trigger parameters, the Tier II Trigger – Confirmation Monitoring will be implemented. As a first step, the baseline values exceeding concentrations will be compared to the 75th percentile concentration criteria.

Notwithstanding the requisite evaluation of surface water quality impact downstream within the potentially affected surface water regime associated with the OCL Facility Site there is as a condition of the ECA for the requirement for SWM Pond sampling 'before' allowing any discharge from the SWM Pond. ECA conditions per Section 6, Operation and Maintenance, address the SWM Pond effluent monitoring Trigger Parameters and their associated Trigger Level concentrations (Table 2 Trigger Parameters). The discharge of leachate contaminated sewage from the 'Works' to receiving surface water is prohibited.

The SWM Pond water is sampled at sample station SW-4 (SW4-09) and the analytical water quality data for the 2012 operational year was presented in the 2012 Groundwater/Surface Water Monitoring and Compliance Report.

- The analytical results of the SWM Pond water quality samples collected on May 14, May 23, and November 12, 2012 were reported. Trigger parameter concentrations which exceeded Table 2 levels were identified to include TSS (17.2 – 50 mg/L, exceeded 15 mg/L; May 14 and Nov. 12, 2012), field pH (9.09, exceeded 8.5; Nov. 12/12), and E-coli (142 - 156/100 mL, exceeded 100 cfu/100 mL on May 23/12).

- CRA identified consecutive detections were observed at SW4-09 (inside the SWM Pond) for colour in May and November 2012, and CBOD5 and Phosphorus in November 2011 and May / November 2012. Single detections were observed at SW04-09 for DOC, pH (lab), pH (field) in May and Turbidity (field) in May and November.

Surface Water Quality Impact Assessment

CRA has based surface water quality impact assessment upon establishing baseline values for surface water. The monitoring results for each sampling location being compared to its interim/final baseline values to determine if a statistically significant change has occurred.

CRA noted that the baseline values for surface water may be subject to further assessment both in magnitude of the baseline values and also in methodology / grouping, as additional surface water data becomes available and is evaluated against the existing interim / final baseline values. CRA reported that no changes to the baseline values were made in the 2012 monitoring / reporting year.

- Normally, the 75th percentile is used to determine background quality and which requires a minimum 'n' (number of sample data events) of eight (8) to derive the statistic. Background determinations usually employ the entire database to determine the appropriate value for each variable assessed. Outliers in the data base may be eliminated, but justification for this must be presented. [Ref. Section 4.5, Page 19, Deriving Receiving-Water Based, Point-Source Effluent Requirements for Ontario Waters, MOE, July, 1994].

- It is appropriate to evaluate surface water quality impact relative to Provincial Water Quality Objectives (PWQO) and this has not been done by OCL. The reviewer recommends that in the future the surface water quality of the potentially affected surface water regime be evaluated relative to PWQO.

Surface Water Quality Impact Summary:

- The reviewer acknowledged CRA's conclusion that although consecutive concentrations above the current (interim) baseline trigger values for colour, CBOD5, and phosphorus and single Table 2 exceedances for the above identified trigger parameters were observed, the concentrations of the parameters at the downgradient monitoring well MW103-09 which is situated in the on-Site drainage ditch immediately adjacent the northeast corner of the SWM Pond did not indicate any adverse effects to the groundwater, and therefore these parameters did not represent a potential environmental impact concern to the downgradient surface water regime during 2012. The reviewer would note that where groundwater discharges to surface water it is appropriate to assess groundwater quality relative to

PWQO and therefore, in future, the water quality at the downgradient monitoring well MW103-09 should be compared to PWQO for impact assessment purposes.

- The reviewer is in agreement with CRA's assessment based on current surface water quality data for the 2012 operational year, that it does not appear that water from the OCL SWM Pond (SW4-09) is affecting the surface water quality of Findlay Creek downstream at sample station SW3-09. CRA suggests that the water quality of Findlay Creek at SW3-09 could be affected by the influence of upgradient off-Site surface water near sample station SW2-09.

- The reviewer would agree with CRA's assessment that the downstream Findlay Creek sample station SW3-09 would define surface water quality that is influenced by both the OCL Facility SWM Pond effluent discharge source and sources upstream of the OCL Site Facility. The surface water quality in Findlay Creek downstream of the OCL Facility at sample station SW3-09 did not show evidence of being adversely impacted during 2012.

Recommendations

- The surface water sampling component of the OCL Facility monitoring program should continue in 2013 as was conducted in 2012 and per compliance to the monitoring conditions of the s.53, OWRA, Industrial Sewage Works Certificate of Approval (ECA) 7251-8GGKRPD.

- CRA reported that upon receipt of subsequent sample results (May 2013) for the SWM Pond further interpretation will determine if the November 2012 detections of elevated parameter concentrations were an isolated incident or may be indicative of a potentially ongoing trend. It is the reviewer's understanding that monthly sampling of the SWM Pond was to be conducted by OCL, however, the 2012 Groundwater/Surface Water Monitoring and Compliance Report did not provide the historical and the current, record of the analytical data for the monthly sampling of the SWM Pond and this data should be provided in future Annual Monitoring Reports for the OCL Facility.

- It is appropriate to evaluate surface water quality impact relative to Provincial Water Quality Objectives (PWQO) and this has not been done by OCL. The reviewer recommends that in future annual monitoring reports for the OCL Site the surface water quality of the potentially affected surface water regime also be evaluated relative to PWQO where applicable.

- The reviewer would note that where groundwater discharges to surface water it is appropriate to assess groundwater quality relative to PWQO. The reviewer recommends that in future annual monitoring reports for the OCL Site the water quality at the downgradient monitoring well MW103-09 should be compared to PWQO for surface water impact assessment purposes.

- It was assumed by the reviewer there were SWM Pond effluent discharge(s) in 2012 associated with the May and November surface water sampling events. In future Annual Monitoring and Compliance Reports the reviewer recommends that OCL should clearly identify the dates(s) of the SWM Pond effluent discharge events to the receiving surface water regime.

- Sample stations SW-1, SW-2 and SW-3 were reported sampled on November 13, 2012, while the on-Site SWM pond sample station SW-4 was reported to have been sampled the day before on November 12, 2012. The reviewer recommends that in future the sampling of all surface water sampling stations SW1, SW2, SW3 and SW4 be conducted on the same day.



Bruce Metcalfe
BWM/gl

c: S. Kinney
B. Metcalfe (Aba2013\aba313.mem) 6124-96PPFP \ X-ref. 6311-96PP6V
File SW OT OT 03 08, Orgaworld Canada Ltd., Ottawa Composting Facility - SWM Pond, City of Ottawa
File SW 07 02 13 06 02, Findlay Creek, South Nation River Basin

ec: T. Mac Donald
G. Dagg-Foster
P. Taylor

From: Michael Rooke
To: Straberger, Kyle (ENE)
Cc: Tanya Minarik
Subject: Action Required for Stormwater Inspection Report
Date: December 27, 2013 11:43:51 AM
Attachments: Image.1388162614350.gif
Response to Action Required in Inspection Report 2012.pdf

Hello Kyle:

Please find attached the procedure going forward to address the "temperature" parameter from not being analysed during the monthly pond sampling at the Orgaworld Ottawa facility. I believe it to be fairly straight-forward. If you have any questions or concerns, please let me know.

Kind regards,

Mike Rooke
Compliance Officer



mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

September 6, 2018 Reference No. 11148316

Ms. Tara MacDonald, Acting District Manager tara.m.macdonald@ontario.ca
Ottawa District Office
Ministry of the Environment, Conservation and Parks
103-2430 Don Reid Drive
Ottawa, Ontario
K1H 1E1

Dear Ms. MacDonald:

Re: Environmental Compliance Approval Review of Facility Modifications
Orgaworld Canada Ltd. Ottawa Composting Facility

1. Introduction

Orgaworld/Renewi is currently engaged in a project (Project) to enhance the functionality and operational performance of the Ottawa Composting Facility (Facility). Facility enhancements will improve working conditions inside the building and life expectancy of the Facility and equipment. These modifications will allow Orgaworld to provide long-term organics processing services to the City of Ottawa (City), supporting municipal and provincial organic waste diversion objectives.

GHD has reviewed Environmental Compliance Approvals (ECAs) issued by the Ministry of the Environment Conservation and Parks (MECP) for the Facility. This letter outlines the proposed Facility modifications and upgrades, and applicable ECA requirements related to the proposed changes.

In order to support the City's organic diversion efforts and maintain operational standing, this project needs to be initiated as soon as possible, and that approvals and permitting through the MECP are on the critical path for project development.

2. Background

Organic material collected by the City of Ottawa is processed by Orgaworld/Renewi. Organics diversion is an important part of the City of Ottawa's long-term waste strategy. Diverting organic waste away from the landfill saves the City on landfilling costs, reduces the potential for odour and leachate issues at the landfill, reduces greenhouse gas emissions, and supports Ontario policies to increase organic waste diversion.

Bill 151, Waste Free Ontario Act, 2016: Bill 151's main objectives revolve around the implementation of a more specific version of Extended Producer Responsibility (EPR) where the producers bear full responsibility for waste materials. It can reasonably be said that Bill 151's main focus is on traditional materials such as blue box, tires, electronics and household hazardous waste. It is noted that organics do not appear per se in any component of Bill 151 itself. This act is accompanied by the Strategy for a Waste

Free Ontario: Building the Circular Economy (Strategy), 2017, in which the management of organic waste is considered.

The Strategy shows a clear intent to solicit greater volumes of source separated organics (SSO). In this respect, an increased ability to support organics diversion by the City is well-aligned with the fundamental principles. Included as part of the Strategy is the Food and Organic Waste Framework.

Ontario's Food and Organic Waste Policy Statement: in April 2018, the Province released the Food and Organic Waste Framework and Policy Statement. The Policy strives to reduce food and organic waste, recover resources from food and organic waste (e.g., biogas), support resource recovery infrastructure, and promote beneficial use of recovered resources. The Policy was issued pursuant to Section 11 of the Resource Recovery and Circular Economy Act and supports the provincial vision of a circular economy, moving towards zero waste and zero greenhouse gas emissions from the waste sector.

Note that the outcome of the recent Provincial election has effectively cancelled Cap-and-Trade regulation in Ontario but has thus far not affected Bill 151 or any components thereof.

3. Operational and Administrative Updates

The following operational and administrative updates are proposed for the Facility:

- Expansion of the Facility to increase storage area (no changes to storage capacity)
- Temporary bypass of ammonia scrubber to support replacement of the existing ammonia scrubber with new ammonia scrubbers
- Outfitting compost tunnels 7 and 8
- Outfitting biofilter 3

A review of the changes noted above as they relate to the current ECAs applicable to the Facility are described further below.

4. ECA Review

At present, the Facility operates under the following ECAs:

- Waste ECA Number 2766-7HEPSZ (September 16, 2009). This ECA prescribes the waste handling and storage elements of the facility, receiving hours, financial assurance, service area, and description of allowable incoming feedstocks and outgoing product quality.
    - Amendment Notice No. 1 (October 21, 2010). To approve a temporary operation of a mobile grinder to allow Orgaworld Canada Inc. to process and remove off-site the 10-100 Organic Waste fraction, which if stored indoors poses a fire hazard and therefore a risk to the health and safety of the environment or any person.

- Amendment Notice No. 2 (May 2, 2012). To approve extended waste receipt hours.
- Amendment Notice No. 3 (February 6, 2015). The Approval is amended to include the ERT decision for Case Nos.: 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011.
- Amendment Notice No. 4 (April 18, 2017). To approve financial assurance re-evaluation and require submission of the additional financial assurance amount.

- Air ECA Number 1631-A2ELCQ (December 10, 2015). This ECA prescribes the allowable air and noise emissions from the Facility, and is structured as a comprehensive approval with limited operational flexibility.
- Sewage Works ECA Number 2844-9YNGZC (February 1, 2017). This ECA prescribes the surface water and leachate management components of the Facility operations, as well as limits on discharge from the on-site stormwater pond. This ECA further contains a description of the groundwater monitoring program for the Facility.

4.1 ECA Review

The following review includes the above noted proposed changes and ECAs applicable to the Facility.

Expansion of the Facility to Increase Storage Area (no changes to storage capacity)

Storage area expansion is required to re-distribute existing storage capacity, achieving a more effective layout for operations and reducing the vertical depth required for stockpiling unprocessed organic waste. No increases to the storage amounts (tonnages) are proposed. Limits on organic waste storage durations have also been considered with the additional storage space to be built. The storage amounts and duration will remain within the ECA for Waste limits described in Condition 2. (4), (5), and (6), with the provision of this additional storage space.

The storage expansion building is proposed to take place in an area outside of the Processing Building shown in the as-built drawings for the Site. These drawings will be updated to include the storage expansion area and will be kept on site as required under the Waste ECA (no amendment required; simple updating of the as-built drawing information to include the storage area is sufficient under the Waste ECA). The proposed location for a new storage area north of the existing Processing building is shown on the attached Figure 1. Air collected from within the proposed storage expansion will be directed to the odour control system.

As part of Amendment number 4 to the Waste ECA, the Financial Assurance calculations were updated. The 2017 Financial Assurance calculation reported by Orgaworld is based on the following tonnages, which are within the storage capacity limits:

Materials	2017 Financial Assurance	Waste ECA Limit
Unprocessed Organic Waste	2,500 tonnes	3,000 tonnes
Leaf & Yard Waste	Included in unprocessed waste above	1,500 tonnes
Material in Composting Tunnels	3,000 tonnes	5,040 tonnes
Immature Compost	2,100 tonnes	10,000 tonnes
Residual Waste	1,000 tonnes	1,000 tonnes

The Financial Assurance calculations currently estimate that the maximum amount of material stored at the Facility is 6,500 tonnes, excluding uncured compost. No change to this calculation is required as a result of storage changes. Regardless, a re-evaluation of the amount of Financial Assurance required for the Facility is required commencing on April 30, 2020 and at intervals of three years thereafter (Waste ECA Amendment Notice No. 4). Additionally, commencing on April 30, 2018, an updated re-evaluation of the Financial Assurance is required annually and is to be kept on site.

Ammonia Scrubbers

Replacing the existing ammonia scrubber system with three new ammonia scrubbers is proposed. The new ammonia scrubbers will increase the total capacity for ammonia scrubbing, in order to accommodate potential increases in ammonia generated by a modified feedstock from the City. In particular, bagged SSO may generate ammonia during the storage and transit cycle.

Orgaworld/Renewi are proposing to install a bypass of the ammonia scrubber for use during construction staging of the new ammonia scrubbers. The bypass damper will be made inoperable following construction.

Under Schedule "A" of the Waste ECA, a letter dated January 29, 2009 is included which describes the following:

MOE[1] Comment

Response #23 - Please note that we will require the ammonia scrubber to be ran continuously. Even though you anticipate the ammonia levels to be lower than those in the London plant, we consider that there is enough uncertainty in those levels to warrant a continuous operation. If you wish to change the

[1] Ministry of the Environment, now Ministry of the Environment, Conservation and Parks

mode of the ammonia scrubber operation, you can apply for an amendment once enough monitoring data is collected during the plant operation to support such a proposal.

CRA[2] Response

It is understood that the ammonia scrubber must be run continuously until a time in which operational data can support a change in the mode of operation. At that time, a Certificate of Approval amendment will be submitted to the MOE regarding these changes.

According to this condition, the ammonia scrubber system must be operated continuously until such time as operational data can support a change in the mode of operation. A temporary variance of this condition of the Waste ECA is requested.

The most recent Emission Summary and Dispersion Modelling (ESDM) Report prepared for the Facility, dated May 31, 2018, compares ammonia emissions with and without the ammonia scrubber (Table 4 of the ESDM). The dispersion modelling results were completed under worst-case conditions and are based on stack testing data from the London composting facility. The results demonstrate that the ammonia concentration at the Facility point of impingement (POI) standard is less than 1% when the ammonia scrubber is running and 2% without an ammonia scrubber. These results demonstrate that bypass of the ammonia scrubber is supported by the air modelling for the Facility. Once bagged SSO is introduced into the Facility the ESDM Report will be updated and the ammonia concentration POI standard re- evaluated.

Outfitting Compost Tunnels

Outfitting compost tunnels 7 and 8 for use in the composting operations is proposed. The tunnels are currently being used for material storage. Outfitting the tunnels will include items such as new doors, spigot floor, seals for piping, and sensors.

According to the ECA for Waste Section 2.(3)

(c) *Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;*

Outfitting two tunnels for operation is expected to increase composting tunnel volume to 4,000 tonnes, which is within the 5,040 tonne composting tunnel limit. The Financial Assurance calculations currently account for six tunnels or 3,000 tonnes of waste material in the composting tunnels. The Financial Assurance calculations will be updated, as required, in April 2019.

Outfitting Biofilter

The proposed outfitting of Compost Tunnel 7 and 8 as described above will increase the maximum loading of process air (air used in the composting process) to the odour control system at a given time, as

[2] Conestoga-Rovers and Associates, now GHD

well as potentially changing the airflow rate at the stack. To support increased loading, the outfitting of a biofilter (Biofilter 3) is proposed.

Total air volumes discharged by the Facility are not limited by the Air ECA; however, the total concentrations discharged are limited through the Acceptable POI Concentrations. As such, changing the airflow is supportable under the limited operational flexibility as long as overall emissions comply with the emissions envelope.

Under Condition 3.(3.1) of the ECA for Air:

Prior to making a Modification to the Facility that satisfies Condition 2.1 (a) [within the scope of the operations of the Facility], and (b) [do not result in an increase in the Facility Production Limit of 150,000 tonnes per year of Organic Waste], the Company shall prepare a proposed update to the ESDM Report to reflect the proposed Modification.

To support the outfitting of the compost tunnels and biofilter, an updated ESDM should be prepared to reflect the proposed modifications as required by the Air ECA, due to the resulting increases in process air flow.

Design and Operations Report

There are a number of items throughout the Design and Operations Report prepared for the Waste ECA application (an included as Schedule "A" in the Waste ECA) that require updating since it was originally compiled in 2008. The Design and Operations Report will be updated to reflect changes to operations including material stream modifications.

5. Summary

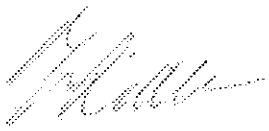
The proposed operational and administrative updates to the Facility are required to enhance the functionality and operational performance of the Facility in support of the City's organic waste collection program. Organics diversion is an important part of the City of Ottawa's long-term waste strategy. Diverting organic waste away from the landfill saves the City on landfilling costs, reduces the potential for odour and leachate issues at the landfill, reduces greenhouse gas emissions, and supports Ontario policies to increase organic waste diversion.

A review of the implications of the proposed updates to the Facility against the existing ECAs for the Facility was completed. Updates to the Financial Assurance, ESDM, and Design and Operations Report (originally drafted in 2008) will be completed. A temporary variance of the Waste ECA to allow for a temporary ammonia scrubber bypass during construction is requested and supported by air dispersion modelling for the Facility. No other technical amendments to the Facility's three ECAs (Waste, Air/Noise, and Sewage Works) are contemplated based on these capital upgrades.

Should you have any questions or concerns, please do not hesitate to contact us.

Sincerely,

GHD

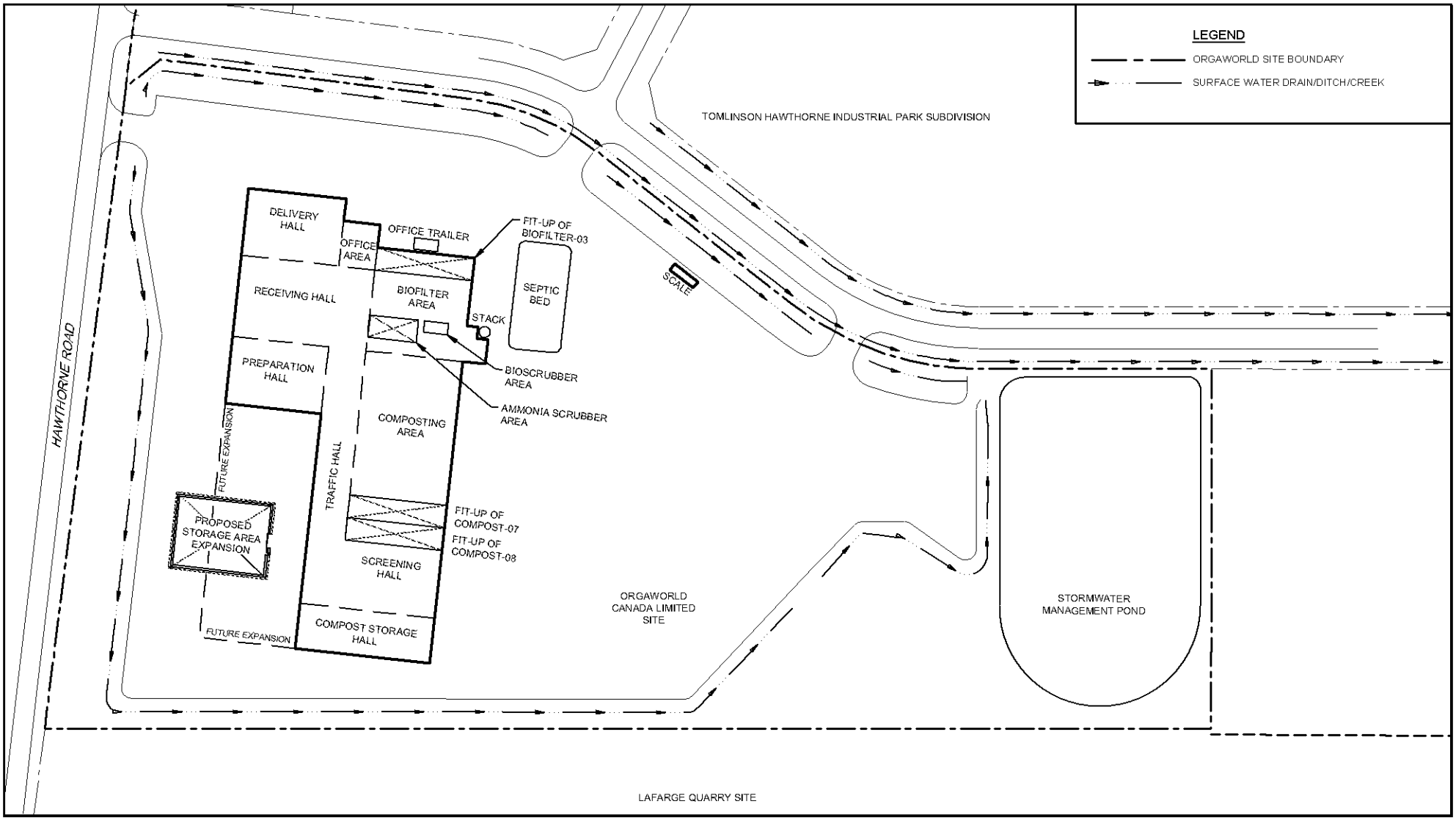


Tej Gidda, Ph.D., P.Eng.

DJS/mg/1

Encl.

cc: Kimberley Jones, Orgaworld Canada Ltd.
David Veinot, Orgaworld Canada Ltd.



0 15 30 45m

ORGAWORLD CANADA LTD.
5123 HAWTHORNE ROAD, OTTAWA, ONTARIO

ORGAWORLD OTTAWA EXPANSION
SITE PLAN PRE-CONSULTATION

11148316-03
August 17, 2018

figure 1

CAD File: P:\drawings\11148000s\11148316\11148316-PRES\11148316-03(PRES001)\11148316-03(PRES001)GN\11148316-03(PRES001)GN-WA001.dwg

004171

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: June-08-18 10:33 AM
To: 'David Veinot'
Cc: Michael Leopold; Andre Boucher
Subject: RE: Discharge - Industrial Sewage Works

Hello David,

Thank you for the submission of the response to my email of May 8, 2018. The submission will be reviewed and a response provided to Orgaworld once complete.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca


Please consider the environment before printing this email.

From: David Veinot [mailto:dveinot@orgaworld.ca]
Sent: May-29-18 10:41 AM
To: Straberger, Kyle (MOECC)
Cc: Michael Leopold; Andre Boucher
Subject: Re: Discharge - Industrial Sewage Works

Good Morning Kyle,

Attached is a reply to your email message of May 8th requesting Orgaworld to review the sampling data provided by Tomlinson, and to determine our compliance status with the conditions within the ECA associated with the operation of the stormwater management pond at our Ottawa facility.

If you have any further questions or comments, please do not hesitate to contact me.

Best regards,

David Veinot
Compliance Officer

dveinot@orgaworld.ca
C: (226) 268 6869 | P: (519) 663 4446 ext. 103 | F: (519) 6630830
Orgaworld Canada Ltd, P.O. Box 21070, London, ON N6K 0C7
* Head office - 2940 Dingman Drive, London ON N6N 1G4
* London ON Plant - 4675 Wellington Road South London, ON N6E 3W7
* Ottawa ON Plant - 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
* Surrey BC Plant - 9752 192 St, Surrey, BC V4N 4C7
www.orgaworld.ca

From: Straberger, Kyle (MOECC) <Kyle.Straberger@ontario.ca>
Sent: May 8, 2018 3:58 PM
To: David Veinot
Subject: Discharge - Industrial Sewage Works

Hello David,

As discussed this afternoon, Orgaworld was advised that Golder Associates, on behalf of Tomlinson, collected effluent samples from the discharge point of the stormwater management pond during the April 2018 discharge period. According to the sample analysis of the effluent samples collected, the effluent exceeded Table 2 Trigger Limits for E.coli and unionized ammonia. Based on Orgaworld's samples collected, as per Condition 5(5) of Environmental Compliance Approval No. 2844-9YNGZC (ECA), the water quality was in compliance with Table 2 Trigger Limits prior to the discharge; therefore, supporting the discharge of the stormwater management pond in April 2018.

The question being asked to the ministry is whether the samples collected by Golder Associates, on behalf of Tomlinson, is an exceedance of the ECA and a reportable spill.

Based on the review of the information above, Orgaworld is to review the sample results and QA/QC provided by Tomlinson to determine compliance with the conditions within the ECA associated with the operation of the stormwater management pond. If the review determines non-compliance, then Orgaworld is to notify the ministry and comply with the additional conditions of the ECA which speak to exceedances. If the review determines there was no violation of the ECA, then Orgaworld is to provide a response to the ministry outlining the outcome and rationale for this conclusion.

If you have any questions please contact me to discuss.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca


Please consider the environment before printing this email.

Ontario

Ministry of the Environment
Ministère de l'Environnement

eMail

Shawn Kinney Sent: March 31, 2014 02:54 PM	Send To:	Kyle Straberger
	Other Email Addresses:	
	Subject:	2012 AMR Orgaworld

Technical Support

Review Type - **Monitoring/Reporting - Industrial Sewage**

Reference Number
1466-96PPBC

Orgaworld Canada Ltd.
5123 Hawthorne Rd
Ottawa, Ontario
K1G 3Y3

Orgaworld Canada Ltd. Ottawa Composting Facility
5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan
Ottawa, NA
NA

Too old to review. Bob Holland will review 2013 AMR

Attachments:	

WATER TECHNOLOGIES INC.

EVALUATION OF CWTI'S PATENTED AMMEL AND ESD SYSTEMS FOR THE TREATMENT OF AMMONIA AND PHOSPHORUS IN GROUND WATER

LABORATORY STUDY SUMMARY REPORT

CONFIDENTIAL OVERVIEW FOR CONSIDERATION ONLY
NOT FOR DISTRIBUTION WITHOUT CONSENT OF CURRENT WATER TECHNOLOGIES INC.

Provided to:

DAVID VEINOT
Compliance Officer

On behalf of:
Renewi Canada, Ltd.
Ottawa ON Plant
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

May, 2018

Current Water Technologies, Inc. (CWTI)
4-70 Southgate Drive
Guelph, ON N1G 4P5 CANADA

CONFIDENTIAL

EXECUTIVE SUMMARY

Current Water Technologies, Inc. was engaged by Renewi to perform a laboratory-based study to determine the effectiveness of the AmmEL-LC system to remove ammonia and the ESD System to remove phosphorus from ground water provided from Renewi's Ottawa site.

The laboratory AmmEL-LC system consisted of one 10 cm diameter ion-exchange column with a bed volume of 6.36 L. The ion exchange column was designed to operate as a packed bed during ammonia loading and fluidized bed during column recharge. The IX system was coupled with an electrochemical reactor for column recharge between IX runs. The laboratory system was operated at a flow rate of approximately 1 L/min. The laboratory ESD system consisted of an ESD cell containing 0.76 m^2 of active electrode surface area. The laboratory unit was operated at a flow rate of 250 ml/minute.

The laboratory testing program demonstrated that CWTI's AmmEL-LC technology is capable of reducing inlet ammonia levels in groundwater water at Renewi's Ottawa site to effluent ammonia limits below 1 mg NH_3-N/L. CWTI's ESD System is capable of reducing inlet phosphorus levels in groundwater to below the required effluent limit of 0.03 mg/L.

The conclusions of the study are:

- Laboratory testing was very successful in demonstrating that the AmmEL-LC system is a viable option to treat ammonia levels characteristic of Renewi's ground waters and to meet the desired treated water requirements.

- At maximum removal efficiency, the AmmEL reduced inlet ammonia concentrations in the various totes provided by Renewi as follows:
    - Tote MW105-13 from 17 mg/L to less than 0.1 mg/L NH_3-N representing >99% removal
    - Tote EW107-15 from 122 mg/L to less than 0.2 mg/L NH_3-N representing >99% removal
    - Tote MW5-09 from 48 mg/L to less than 0.3 mg/L NH_3-N representing >99% removal

- Laboratory testing also demonstrated that in two of the waters, the ESD System is a viable option to treat phosphorus levels characteristic of Renewi's ground waters and to meet the desired treated water requirements. Due to the high phosphorus concentrations and complex nature of the water in Tote EW107-15, additional stages of ESD treatment will be required to achieve the target concentration of 0.03 mg/L.

- After two stages of ESD treatment, the phosphorus concentration in the AmmEL treated effluent was reduced as follows:
    - Tote MW105-13 from 0.115 mg/L to 0.0219 mg/L, representing 80.9% removal
    - Tote EW107-15 from 2.27 mg/L to 0.735 mg/L, representing 67.6% removal
    - Tote MW5-09 from 0.146 mg/L to 0.011 mg/L, representing 92.5% removal

CONFIDENTIAL

Recommendation:

- Should well EW107-15 be the source of the water for ammonia removal, CWTI would like to discuss alternatives to the ESD for removal of phosphate should phosphate concentration become the limiting factor to prevent off-site water discharge.

CONFIDENTIAL

Table of Contents

1 INTRODUCTION 5
1.1 AmmEL System – Basic Principles 5
1.2 ESD System – Basic Principles 6
2 MATERIALS AND METHODS 9
3 RESULTS 10
3.1 Ambient Water Testing - AmmEL 10
3.2 Ambient Water Testing - ESD 14
3.3 Treated Water Chemistry 16
4 NEXT STEPS – RECOMMENDATIONS 16
5 SUMMARY 17

List of Figures

Figure 1. Schematic of AmmEL-LC Process. 5
Figure 2. Mobile AmmEL Demonstration Unit 6
Figure 3. Principle of CDI (during active desalination) 7
Figure 4. Principle of CDI (During Regeneration) 7
Figure 5. 36-Cell ESD Unit in 20-Foot Shipping Container 8
Figure 6. Laboratory-Scale AmmEL-LC Unit 9
Figure 7. Laboratory-Scale ESD400 Unit 9
Figure 8. Ambient Temperature Ammonia Removal Data Tote MW105-13 11
Figure 9. Ambient Temperature Ammonia Removal Data Tote EW07-15 12
Figure 10. Ambient Temperature Ammonia Removal Data Tote MW5-09 13

List of Tables

Table 1. Ambient Temperature Run Tote MW105-13 Ammonia Removal Data 10
Table 2. Ambient Temperature Run Tote EW107-15 Ammonia Removal Data 12
Table 3. Ambient Temperature Run Tote MW5-09 Ammonia Removal Data 13
Table 4. ESD Phosphorus Removal Data – Tote MW105-13 14
Table 5. ESD Phosphorus Removal Data – Tote EW107-15 15
Table 6. ESD Phosphorus Removal Data – Tote MW5-09 16

List of Appendices

Appendix 1. Raw Water Chemistry 18
Appendix 2. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW105-13 19
Appendix 3. Third Party Analyses of AmmEL and ESD Treated Water – Tote EW107-15 20
Appendix 4. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW5-09 21

CONFIDENTIAL

1 INTRODUCTION

As an introduction to the AmmEL and ESD technology and to determine its efficacy in removing ammonia and phosphorus from ground water collected at Renewi's Ottawa site, CWTI conducted a preliminary laboratory-scale feasibility study.

The purpose of the project was to implement a laboratory-scale feasibility study with CWTI's AmmEL and ESD systems to treat ground waste water of the type found at Renewi's Ottawa site. The goal of the project was to reduce the ammonia-nitrogen concentration to less than 1 mg/L and phosphorus concentration to less than 0.02 mg/L. The feasibility test was performed at CWTI's facility in Guelph, Ontario using water supplied by Renewi.

The specific project goals were:

- Perform laboratory-scale feasibility testing on Renewi ground water
- Collect operational data for the duration of the test
- Provide a summary report following completion of the testing period

1.1 AmmEL System – Basic Principles

The AmmEL-LC treatment technology is a 2-stage process; the first stage (Phase 1) consists of removal of ammonia from the waste stream using an ion-exchange (IX) zeolite medium followed by the second stage (Phases 2&3), electrochemical oxidation of ammonium to nitrogen (N_2) gas in the IX regenerant solution. The Regeneration and Conversion phases occur simultaneously. The column regeneration circuit is a closed loop, i.e., the regenerant solution is reused once the ammonia is oxidized (Figure 1).

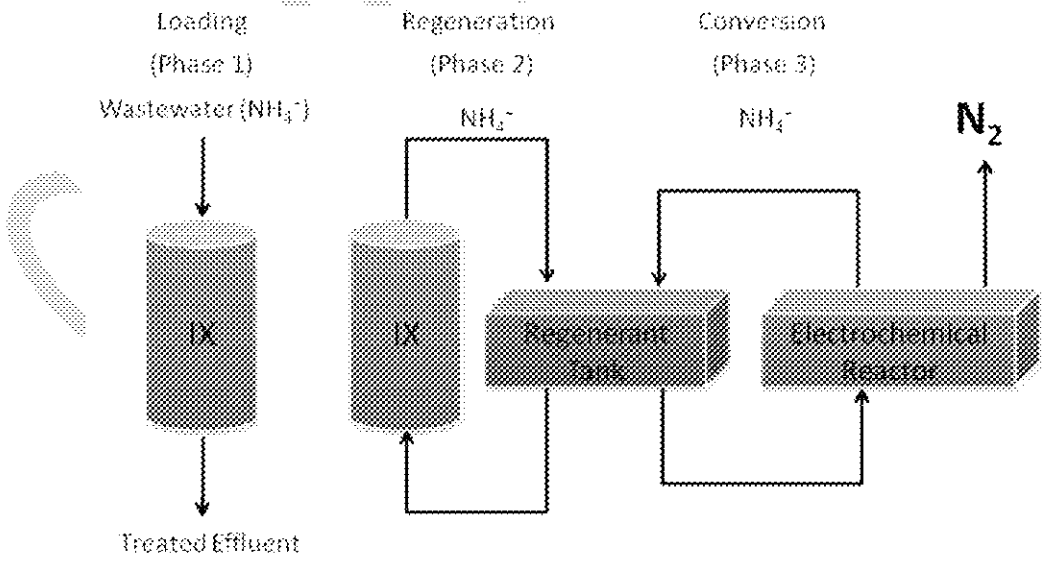


Figure 1. Schematic of AmmEL-LC Process.

Some of the advantages of the technology over conventional systems are:

- Converts ammonia to environmentally friendly nitrogen gas
- Operates independent of temperature and maintains efficiency when treating water at 0°C
- No production of nitrate
- No production of greenhouse gas nitrous oxide
- Relatively small footprint
- Rapid start-up and shut-down
- Lower capital cost than bio-based systems of similar capabilities
- Fully automated and remotely monitored



Figure 2. Mobile AmmEL Demonstration Unit

1.2 ESD System – Basic Principles

The ESD System is a state-of-the-art electrochemical technology designed to produce drinking water, gray water and/or select process waters from brackish and waste waters. The system has also proven extremely successful in producing high purity (< 1 μS/cm) water. The produced water is free of toxic levels of metals and other inorganic contaminants and is done more efficiently and economically than conventional methods. ESD has the potential to dramatically improve the treatment of municipal drinking water, industrial process water, makeup water, and municipal wastewater around the globe. For drinking water applications, the ESD system is predicted to have a lower capital cost than competitive membrane systems and lower operating costs (<$0.08/$m^3$ includes power and chemicals, excludes manpower).

CWTI's ESD system is based on the principles of Capacitive Deionization. The Capacitive deionization (CDI) process is a low-pressure on-membrane process that removes dissolved ions from a water stream in the presence of an electrical field. In general, inlet water is pumped through cells that contain the charged electrodes. The electrodes attract and retain ions on the electrode surfaces (Figure 3). As the ions build up on the surface of the electrodes the cells lose efficiency so that treated water produced at

the start of the cycle has lowest conductivity, and conductivity gradually increases until a pre-set maximum is reached. The treated water exits the system as a high volume with low total dissolved solids (TDS) content.

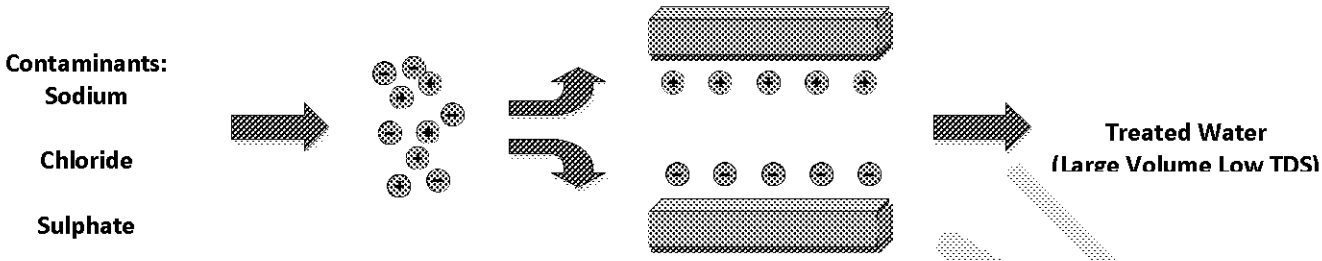


Figure 3. **Principle of CDI (during active desalination)**

The electrodes have a finite capacity for holding ions. When the maximum conductivity setting is reached the system switches to regeneration. To regenerate the electrodes, the applied potential is reversed and the ions are then repelled back into the gap between the electrodes. A small volume of rinse water then carries the ions from the cells producing a waste stream that has a much smaller volume with higher TDS concentration (Figure 4). Since the CDI process does not require high-pressure pumps, the energy consumption is expected to be low and is related mainly to the DC power consumption on the cells. Once flushing is complete the system resets and the treatment cycle begins again.

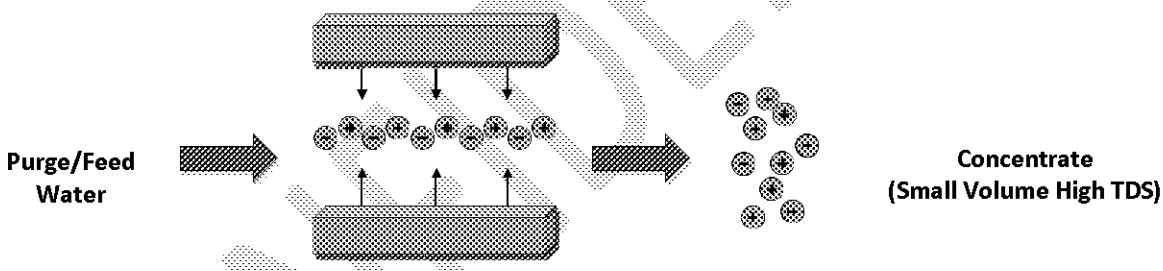


Figure 4. **Principle of CDI (During Regeneration)**

CWTI knows of no other direct, commercial competitor to the novel, electrochemical ESD System in the water treatment industry. The ESD System offers several advantages compared to conventional ion exchange, reverse osmosis and distillation systems. This patent-pending technology expends less electrical energy, produces minimal wastewater, and provides potable water more efficiently than conventional methods. ESD has proved to be capable of producing water free of toxic levels of metals and other inorganic contaminants more efficiently and economically than conventional methods and achieves water recovery rates as high as 98% combined with greater than 99% TDS removal.

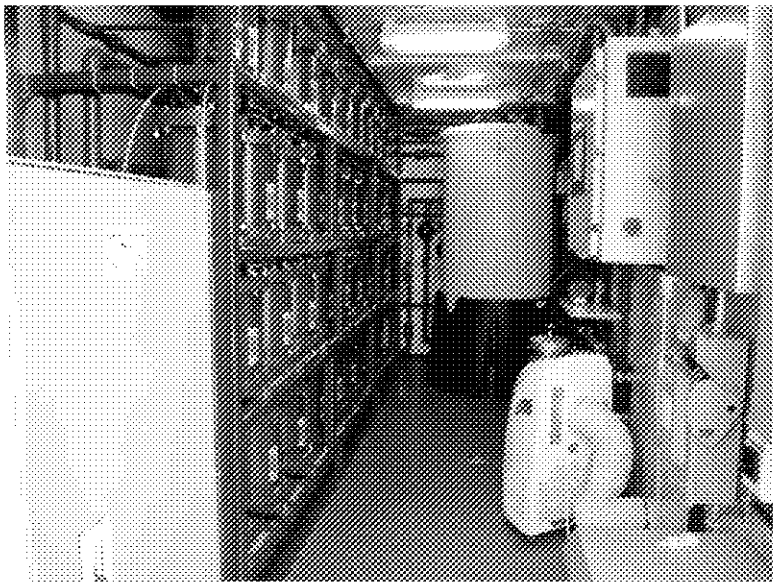


Figure 5. 36-Cell ESD Unit in 20-Foot Shipping Container

CONFIDENTIAL

2 MATERIALS AND METHODS

The AmmEL study was performed using a single 4 inch ID column containing 6.36 L of zeolite (Figure 6). The zeolite used was CWTI's proprietary modified zeolite - the same type used in the IX columns of the demonstration unit. Feed water for the laboratory study was supplied from Renewi's Ottawa site in three $1m^3$ totes. The water chemistry for the three totes is included in Appendix 1.

The zeolite column was loaded with ammonia to an outlet concentration of ~2 mg NH_3-N/L. Outlet ammonia concentrations were monitored during the loading cycle using an ammonium ion-selective electrode. Regeneration of the column was performed with 5% NaCl solution made using high purity water.

Capacitive deionization experiments were performed on CWTI's Model ESD400 Laboratory Scale Capacitive Deionization Unit (Figure 7). The unit is designed to operate at a flow rate range of 0-500 mL/min with a maximum operating pressure of 20 psi. Typical operating flow rates are in the range 250-400 mL/min. The unit is fitted with a CDI cell containing 0.76 m^2 of electrode surface area with an operating potential of 1.3 VDC and maximum peak current of 60 ADC. The unit is controlled through a combination of programmable logic controller (PLC) and a touch screen human-machine interface (HMI).

Electrical conductivity measurements were performed using an Oakton hand-held conductivity meter. Ammonia measurements were performed with a bench top Thermo Scientific millivolt meter and a Cole-Parmer ammonia ion selective electrode (ISE). The ISE was calibrated according to manufacturer's procedure prior to each experimental run, and millivolt data was collected four minutes after the ISE was inserted into the sample when a stable mV reading could be recorded from the meter.

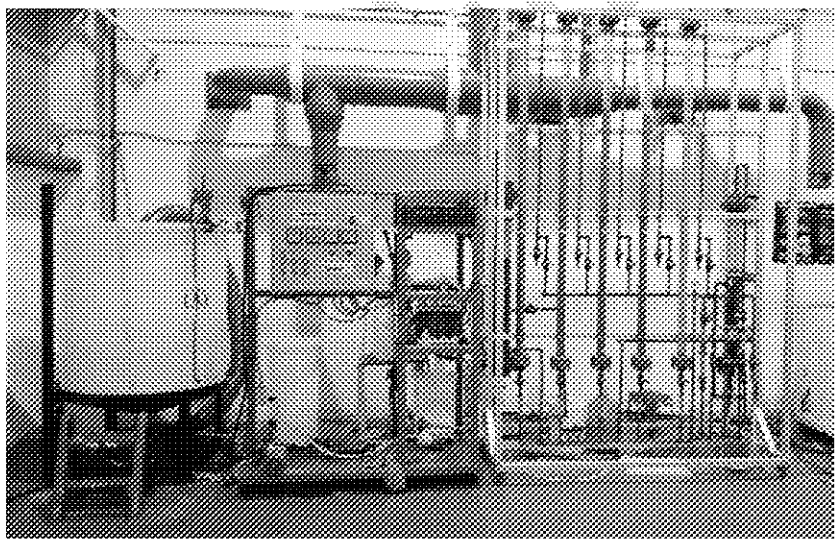


Figure 6. Laboratory-Scale AmmEL-LC Unit

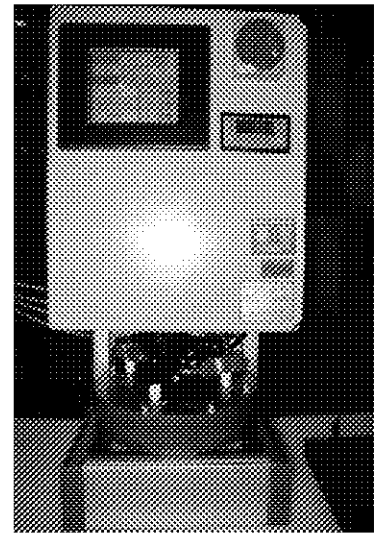


Figure 7. Laboratory-Scale ESD400 Unit

3 RESULTS

3.1 Ambient Water Testing - AmmEL

Tote MW105-13

Ammonia removal testing was done on Tote Number MW105-13. Ammonia removal data gathered from ambient temperature runs are included in Table 1 and Figure 8. Ammonia concentrations are plotted as a function of number of ion exchange bed volumes of water treated. One bed volume is

Table 1. **Ambient Temperature Run Tote MW105-13 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
	0	17.00	0.00	0.00
1	60	0.19	98.9	8.85
2	120	0.19	98.9	17.69
3	240	0.17	99.0	26.54
4	300	0.09	99.5	35.39
5	360	0.12	99.3	44.20
6	420	0.12	99.3	53.06
7	492	0.13	99.2	72.47
8	546	0.14	99.2	80.41
9	600	0.17	98.9	88.33
10	685	0.29	98.3	100.85
11	720	0.37	97.7	106.00
12	780	0.47	97.2	114.84
13	810	0.20	98.8	118.81
14	840	0.33	98.0	123.23
15	870	0.44	97.3	127.65
16	900	0.56	96.7	132.06
17	930	0.81	95.2	136.47
18	960	1.10	93.5	140.88
19	990	1.54	90.9	145.31
20	1020	2.23	86.8	149.73

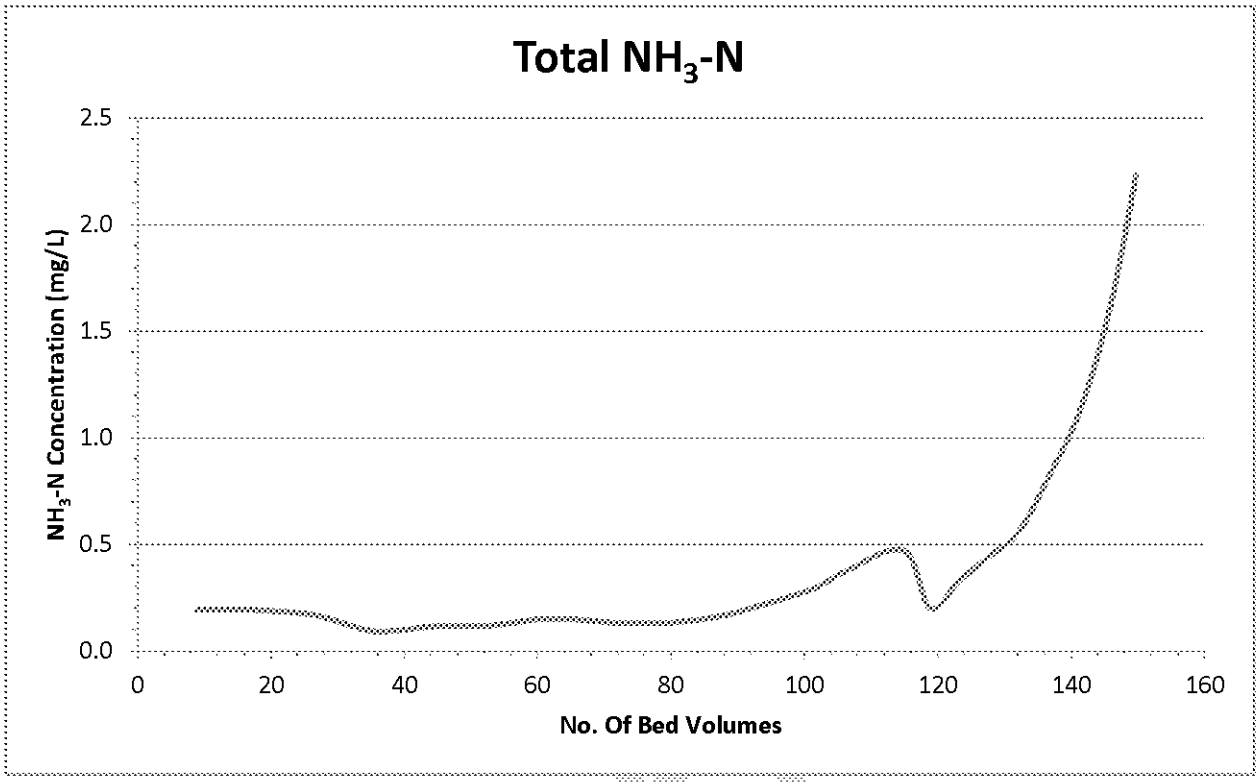


Figure 8. Ambient Temperature Ammonia Removal Data Tote MW105-13

equivalent to 6.36 L, the volume of zeolite contained in the IX column. The water provided to CWTI by Renewi was pumped through the ion exchange column without pH adjustment or pre-treatment. For Run 1 at ambient temperature, after treating 149 bed volumes of water (1015 L), the outlet ammonia-nitrogen concentration measured 2.2 mg/L.

Tote EW107-15

Ammonia removal data gathered from the ambient temperature run for Tote EW107-15 are included in Table 2 and Figure 9. The initial ammonium concentration in this tote was significantly higher (122 mg/L vs. 17 mg/L), and as a result, the zeolite became saturated with ammonia at a faster rate. As expected, this lead to a shorter loading cycle and fewer bed volumes of water treated. For Run 2 at ambient temperature, after treating 57 bed volumes of water (388 L), the outlet ammonia-nitrogen concentration measured 39 mg/L.

Table 2. **Ambient Temperature Run Tote EW107-15 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
1	0	122.40	0.00%	0.00
2	62.00	0.19	99.85%	9.10
3	120.00	0.20	99.84%	17.62
4	180.00	0.86	99.30%	26.43
5	250.00	9.57	92.18%	36.71
6	300.00	18.03	85.27%	44.06
7	360.00	33.30	72.79%	52.87
8	390.00	38.98	68.16%	57.27

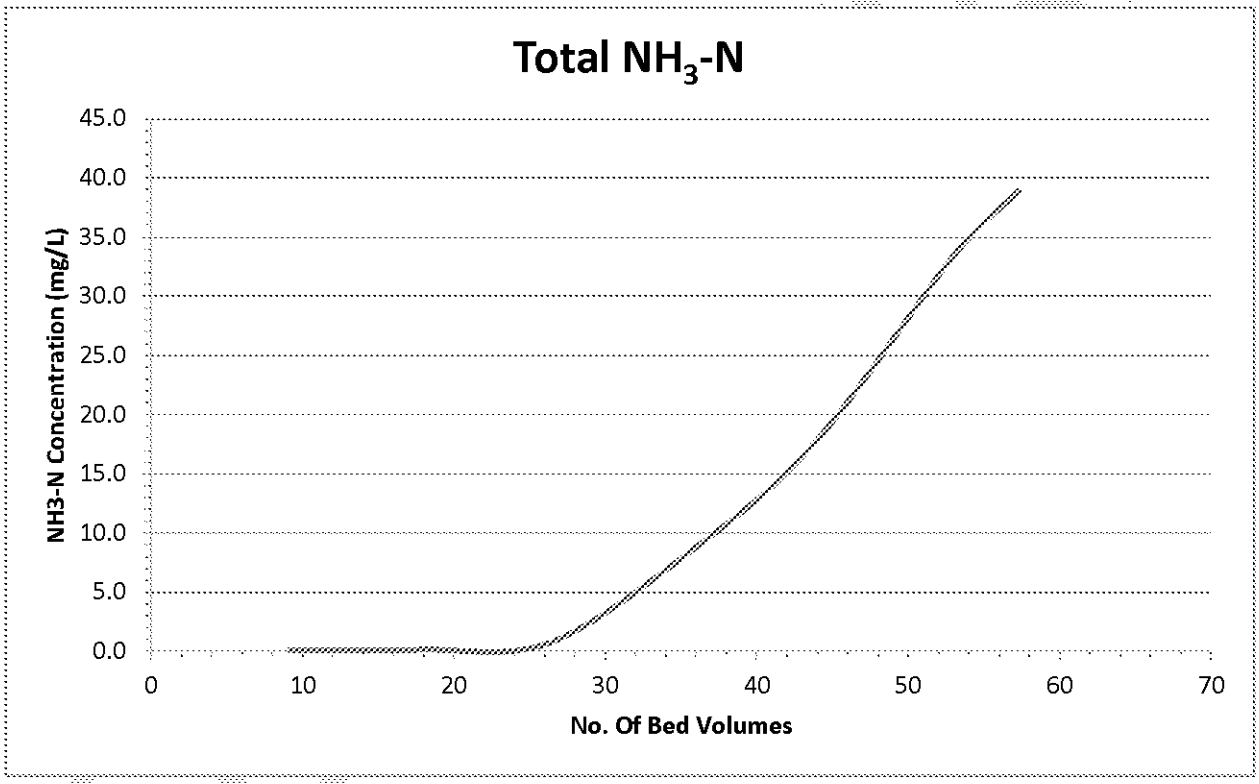


Figure 9. **Ambient Temperature Ammonia Removal Data Tote EW07-15**

Tote MW5-09

Ammonia removal data gathered from the ambient temperature run for Tote MW5-09 are included in Table 3 and Figure 10. The initial ammonium concentration in this tote was 48 mg/L, and as a result, as expected, the total number of bed volumes treated fell between totes MW105-13 and EW107-15. For Run 3 at ambient temperature, after treating 125 bed volumes of water (850 L), the outlet ammonia-nitrogen concentration measured 4.6 mg/L.

Table 3. **Ambient Temperature Run Tote MW5-09 Ammonia Removal Data**

Sample Number	Run Duration (Min, Cum)	Total NH_3-N, mg/L	%NH_3-N Removed	# of Bed Volumes
1	0	48.39	0.00%	0.00
2	60.00	0.43	99.10%	8.14
3	120.00	0.42	99.12%	15.75
4	200.00	0.36	99.25%	26.83
5	240.00	0.31	99.36%	32.38
6	300.00	0.37	99.24%	41.05
7	360.00	0.46	99.05%	49.72
8	420.00	0.33	99.31%	57.68
9	480.00	0.41	99.15%	65.99
10	530.00	0.45	99.07%	72.78
11	590.00	0.48	99.01%	81.09
12	650.00	0.70	98.55%	89.76
13	710.00	1.11	97.70%	98.25
14	770.00	1.88	96.12%	107.28
15	830.00	3.22	93.34%	116.30
16	890.00	4.61	90.48%	125.32

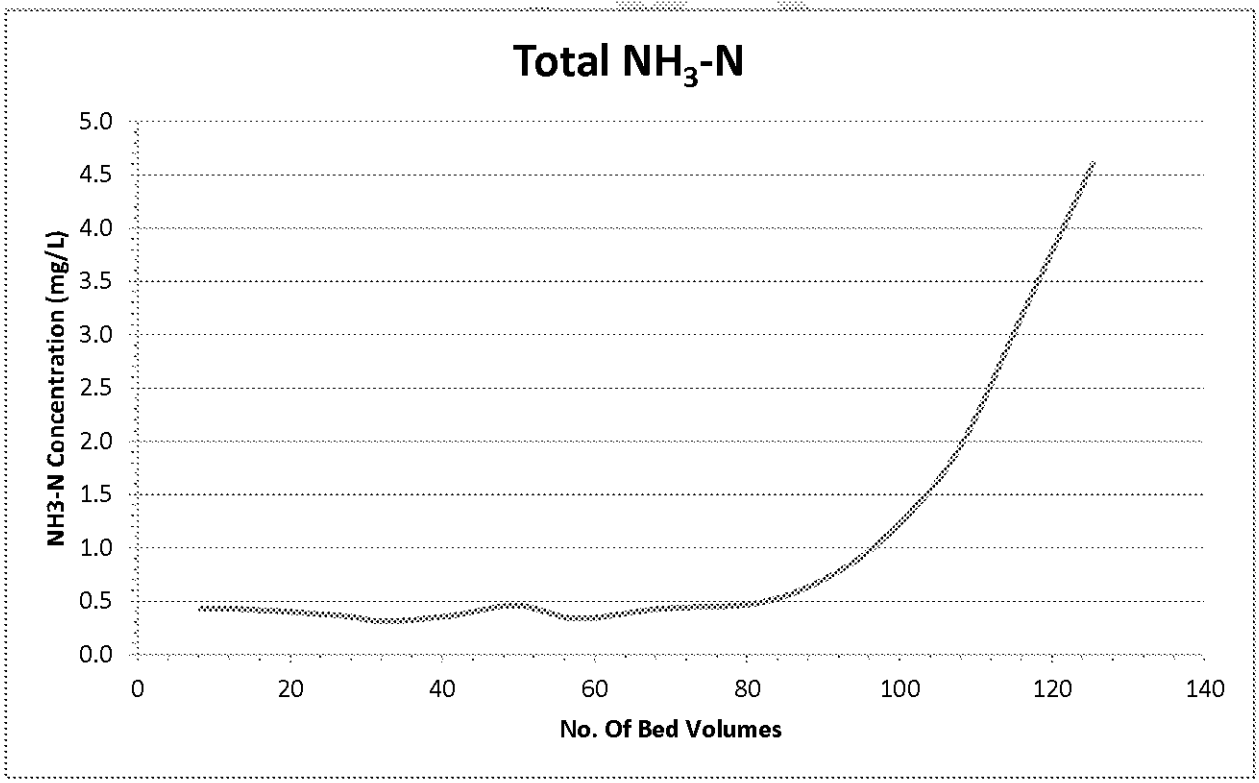


Figure 10. **Ambient Temperature Ammonia Removal Data Tote MW5-09**

3.2 Ambient Water Testing - ESD

Tote MW105-13

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 4. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 4. ESD Phosphorus Removal Data – Tote MW105-13

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	7.33	Feed water pH	7.14
Feed water Conductivity	2,053 µS/cm	Feed water Conductivity	542 µS/cm
Product water pH	7.14	Product water pH	6.93
Product water Conductivity	542 µS/cm	Product water Conductivity	315 µS/cm
Feed Phosphorus conc.	0.115 mg/L	Feed Phosphorus conc.	0.0347 mg/L
Product Phosphorus conc.	0.0347 mg/L	Product Phosphorus conc.	0.0219 mg/L
Phosphorus removal	69.8%	Phosphorus removal	36.9%
Ion removal	73.6%	Ion removal	41.9%

After two stages of ESD treatment, the phosphorus concentration in the product water is below the target concentration of 0.03 mg/L.

CONFIDENTIAL

Tote EW107-15

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 5. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 5. **ESD Phosphorus Removal Data – Tote EW107-15**

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	8.04	Feed water pH	7.96
Feed water Conductivity	2750 µS/cm	Feed water Conductivity	1200 µS/cm
Product water pH	7.96	Product water pH	7.51
Product water Conductivity	1200 µS/cm	Product water Conductivity	417 µS/cm
Feed Phosphorus conc.	1.8 mg/L	Feed Phosphorus conc.	1.18 mg/L
Product Phosphorus conc.	1.18 mg/L	Product Phosphorus conc.	0.735 mg/L
Phosphorus removal	34.4%	Phosphorus removal	37.7%
Ion removal	57.5%	Ion removal	63.0%

Due to the high initial phosphorus concentration (2.27 mg/L), after two stages of ESD treatment the phosphorus levels are still above the target phosphorus concentration of 0.03 mg/L. Additional stages of ESD treatment are required to achieve the target phosphorus concentration

CONFIDENTIAL

Tote MW5-09

Phosphorus removal testing was done on the AmmEL treated effluent. The data gathered from the ESD runs are included in Table 6. The ESD runs were performed with no pre-treatment or filtration of the AmmEL treated effluent.

Table 6. **ESD Phosphorus Removal Data – Tote MW5-09**

Stage 1 ESD		Stage 2 ESD	
Flow Rate	250 mL/min	Flow Rate	250 mL/min
Feed water pH	8.08	Feed water pH	7.46
Feed water Conductivity	1980 µS/cm	Feed water Conductivity	564 µS/cm
Product water pH	7.46	Product water pH	6.36
Product water Conductivity	564 µS/cm	Product water Conductivity	92.8 µS/cm
Feed Phosphorus conc.	0.049 mg/L	Feed Phosphorus conc.	0.0156 mg/L
Product Phosphorus conc.	0.0156 mg/L	Product Phosphorus conc.	0.011 mg/L
Phosphorus removal	68.2%	Phosphorus removal	29.5%
Ion removal	73.7%	Ion removal	79.9%

After two stages of ESD treatment, the phosphorus concentration in the product water is below the target concentration of 0.03 mg/L.

3.3 Treated Water Chemistry

Samples of the treated water following AmmEL treatment and one and two stages of ESD treatment were collected by a representative of Renewi and submitted to a third party lab for analysis. The results of those analyses are presented in Appendix 2.

4 NEXT STEPS – RECOMMENDATIONS

The recommended next step is to use the data collected from the study to develop a plan of action to use CWTI's AmmEL and ESD Systems in an on-site groundwater remediation program.

5 SUMMARY

The laboratory testing program demonstrated that CWTI's AmmEL-LC technology is capable of reducing inlet ammonia levels in groundwater water at Renewi's Ottawa site to effluent ammonia limits below 1 mg NH_3-N/L. CWTI's ESD System is capable of reducing inlet phosphorus levels in groundwater to below the required effluent limit of 0.03 mg/L.

The conclusions of the study are:

- Laboratory testing was very successful in demonstrating that the AmmEL-LC system is a viable option to treat ammonia levels characteristic of Renewi's ground waters and to meet the desired treated water requirements.

- At maximum removal efficiency, the AmmEL reduced inlet ammonia concentrations in the various totes provided by Renewi as follows:
    - Tote MW105-13 from 17 mg/L to less than 0.1 mg/L NH_3-N representing >99% removal
    - Tote EW107-15 from 122 mg/L to less than 0.2 mg/L NH_3-N representing >99% removal
    - Tote MW5-09 from 48 mg/L to less than 0.3 mg/L NH_3-N representing >99% removal

- Laboratory testing also demonstrated that in two of the waters, the ESD System is a viable option to treat phosphorus levels characteristic of Renewi's ground waters and to meet the desired treated water requirements. Due to the high phosphorus concentrations and complex nature of the water in Tote EW107-15, additional stages of ESD treatment will be required to achieve the target concentration of 0.03 mg/L.

- After two stages of ESD treatment, the phosphorus concentration in the AmmEL treated effluent was reduced as follows:
    - Tote MW105-13 from 0.115 mg/L to 0.0219 mg/L, representing 80.9% removal
    - Tote EW107-15 from 2.27 mg/L to 0.735 mg/L, representing 67.6% removal
    - Tote MW5-09 from 0.146 mg/L to 0.011 mg/L, representing 92.5% removal

CONFIDENTIAL

Appendix 1. Raw Water Chemistry

Well #		EW107-15	MW105-13	MW5-09
Date Sampled		28-Mar-2019	28-Mar-2019	28-Mar-2019
Physical Tests (Water)				
Conductivity	umhos/cm	2930	2170	2020
pH	pH units	7.23	7.34	7.29
Total Dissolved Solids	mg/L	1780	1460	1350
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	970	583	538
Ammonia, Total (as N)	mg/L	68.7	14.1	16.4
Chloride (Cl)	mg/L	195	148	115
Fluoride (F)	mg/L	<0.20	0.18	0.23
Nitrate (as N)	mg/L	<0.20	<0.10	<0.10
Nitrite (as N)	mg/L	<0.10	<0.050	<0.050
Total Kjeldahl Nitrogen	mg/L	66.1	15.3	18.7
Phosphorus, Total	mg/L	2.27	0.115	0.146
Sulfate (SO_4)	mg/L	175	491	578
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.50	<0.50	<0.50
Arsenic (As)-Dissolved	mg/L	<0.010	<0.010	<0.010
Barium (Ba)-Dissolved	mg/L	0.166	0.076	0.131
Boron (B)-Dissolved	mg/L	<1.0	<1.0	<1.0
Cadmium (Cd)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Calcium (Ca)-Dissolved	mg/L	300	247	241
Chromium (Cr)-Dissolved	mg/L	<0.050	<0.050	<0.050
Cobalt (Co)-Dissolved	mg/L	<0.010	<0.010	<0.010
Copper (Cu)-Dissolved	mg/L	<0.020	<0.020	<0.020
Iron (Fe)-Dissolved	mg/L	<1.0	<1.0	5.9
Lead (Pb)-Dissolved	mg/L	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved	mg/L	91.7	81.2	80.3
Manganese (Mn)-Dissolved	mg/L	0.561	0.512	2.09
Molybdenum (Mo)-Dissolved	mg/L	<0.0050	<0.0050	0.0064
Nickel (Ni)-Dissolved	mg/L	<0.050	<0.050	<0.050
Potassium (K)-Dissolved	mg/L	75.3	30.9	22.8
Selenium (Se)-Dissolved	mg/L	<0.20	<0.0050	<0.0050
Sodium (Na)-Dissolved	mg/L	109	80.3	63.6
Zinc (Zn)-Dissolved	mg/L	<0.10	<0.10	<0.10

Appendix 2. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW105-13

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	2100	542	315
pH	pH units	7.77	7.14	6.93
Total Dissolved Solids	mg/L	1420	340	193
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	563	109	68
Ammonia, Total (as N)	mg/L	0.046	0.016	<0.010
Chloride (Cl)	mg/L	146	18.2	14.5
Fluoride (F)	mg/L	0.20	0.047	0.031
Nitrate (as N)	mg/L	<0.10	<0.020	<0.020
Nitrite (as N)	mg/L	<0.050	<0.010	<0.010
Total Kjeldahl Nitrogen	mg/L	0.70	0.47	0.42
Phosphorus, Total	mg/L	0.0899	0.0347	0.0219
Sulfate (SO_4)	mg/L	472	134	63.5
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.0050	<0.0050	0.0059
Arsenic (As)-Dissolved	mg/L	0.00155	0.00132	0.00111
Barium (Ba)-Dissolved	mg/L	0.00386	0.00097	0.00071
Boron (B)-Dissolved	mg/L	0.058	0.052	0.047
Cadmium (Cd)-Dissolved	mg/L	0.000011	0.000011	0.000010
Calcium (Ca)-Dissolved	mg/L	229	33.7	20.5
Chromium (Cr)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00064	0.00027	0.00020
Copper (Cu)-Dissolved	mg/L	0.00022	0.00104	0.00119
Iron (Fe)-Dissolved	mg/L	0.050	0.035	0.029
Lead (Pb)-Dissolved	mg/L	<0.000050	0.000053	0.000065
Magnesium (Mg)-Dissolved	mg/L	78.1	12.7	7.61
Manganese (Mn)-Dissolved	mg/L	0.517	0.0845	0.0537
Molybdenum (Mo)-Dissolved	mg/L	0.0192	0.00374	0.00172
Nickel (Ni)-Dissolved	mg/L	0.00288	0.00260	0.00219
Potassium (K)-Dissolved	mg/L	6.23	1.30	0.693
Selenium (Se)-Dissolved	mg/L	0.000070	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	153	57.6	29.7
Zinc (Zn)-Dissolved	mg/L	0.0027	0.0059	0.0054

Appendix 3. Third Party Analyses of AmmEL and ESD Treated Water – Tote EW107-15

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	2750	1200	417
pH	pH units	8.04	7.96	7.51
Total Dissolved Solids	mg/L	1950	828	306
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	1130	417	113
Ammonia, Total (as N)	mg/L	0.066	0.03	<0.010
Chloride (Cl)	mg/L	216	32	4.93
Fluoride (F)	mg/L	<0.10	<0.10	<0.020
Nitrate (as N)	mg/L	<0.10	<0.10	<0.020
Nitrite (as N)	mg/L	<0.050	<0.050	<0.010
Total Kjeldahl Nitrogen	mg/L	4.4	2.88	2.5
Phosphorus, Total	mg/L	1.8	1.18	0.735
Sulfate (SO_4)	mg/L	272	177	86.4
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.050	0.0267	0.0257
Arsenic (As)-Dissolved	mg/L	0.00300	0.00246	0.00191
Barium (Ba)-Dissolved	mg/L	0.01230	0.00395	0.0017
Boron (B)-Dissolved	mg/L	<0.10	0.078	0.073
Cadmium (Cd)-Dissolved	mg/L	<0.000050	<0.000010	<0.000010
Calcium (Ca)-Dissolved	mg/L	275.0	79.0	17.3
Chromium (Cr)-Dissolved	mg/L	<0.0050	0.00306	0.00236
Cobalt (Co)-Dissolved	mg/L	<0.0010	0.00048	0.00035
Copper (Cu)-Dissolved	mg/L	<0.0020	0.00126	0.00148
Iron (Fe)-Dissolved	mg/L	<0.10	0.100	0.079
Lead (Pb)-Dissolved	mg/L	<0.00050	0.000478	0.00046
Magnesium (Mg)-Dissolved	mg/L	90.6	28.60	4.82
Manganese (Mn)-Dissolved	mg/L	0.8200	0.2910	0.0768
Molybdenum (Mo)-Dissolved	mg/L	0.02190	0.00890	0.00461
Nickel (Ni)-Dissolved	mg/L	<0.0050	0.00290	0.00257
Potassium (K)-Dissolved	mg/L	17.20	7.960	2.19
Selenium (Se)-Dissolved	mg/L	0.00944	0.000166	0.00013
Sodium (Na)-Dissolved	mg/L	291.0	172.0	66.9
Zinc (Zn)-Dissolved	mg/L	<0.010	0.0049	0.0059

Appendix 4. Third Party Analyses of AmmEL and ESD Treated Water – Tote MW5-09

Parameter	Unit	AmmEL Treated Water	Stage 1 ESD Treated Water	Stage 2 ESD Treated Water
Physical Tests (Water)				
Conductivity	umhos/cm	1980	564	92.8
pH	pH units	8.08	7.46	6.36
Total Dissolved Solids	mg/L	1420	373	75
Anions and Nutrients (Water)				
Alkalinity, Total (as $CaCO_3$)	mg/L	525	85	<10
Ammonia, Total (as N)	mg/L	0.213	0.059	0.012
Chloride (Cl)	mg/L	111	9.25	2.14
Fluoride (F)	mg/L	0.15	0.034	<0.020
Nitrate (as N)	mg/L	<0.10	<0.020	<0.020
Nitrite (as N)	mg/L	0.156	0.012	<0.010
Total Kjeldahl Nitrogen	mg/L	0.66	0.3	<0.15
Phosphorus, Total	mg/L	0.0049	0.0156	0.011
Sulfate (SO_4)	mg/L	510	179	28.2
Dissolved Metals (Water)				
Aluminum (Al)-Dissolved	mg/L	<0.0050	0.0075	0.0093
Arsenic (As)-Dissolved	mg/L	0.00034	0.00023	0.00016
Barium (Ba)-Dissolved	mg/L	0.00744	0.00154	0.00038
Boron (B)-Dissolved	mg/L	0.062	0.054	0.048
Cadmium (Cd)-Dissolved	mg/L	0.000021	<0.000010	<0.000010
Calcium (Ca)-Dissolved	mg/L	242	33	4
Chromium (Cr)-Dissolved	mg/L	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved	mg/L	0.00024	0.00014	<0.00010
Copper (Cu)-Dissolved	mg/L	0.0019	0.00451	0.00442
Iron (Fe)-Dissolved	mg/L	<0.010	0.013	0.017
Lead (Pb)-Dissolved	mg/L	0.000188	0.000182	0.000444
Magnesium (Mg)-Dissolved	mg/L	80.2	13.2	1.7
Manganese (Mn)-Dissolved	mg/L	1.96	0.313	0.040
Molybdenum (Mo)-Dissolved	mg/L	0.00746	0.00166	0.0004
Nickel (Ni)-Dissolved	mg/L	0.00202	0.00188	0.00120
Potassium (K)-Dissolved	mg/L	8.1	2.30	0.25
Selenium (Se)-Dissolved	mg/L	0.000051	<0.000050	<0.000050
Sodium (Na)-Dissolved	mg/L	133	65.3	9
Zinc (Zn)-Dissolved	mg/L	0.0096	0.0080	0.0046

From: Hook, Jordan (MECP)
To: Endenburg, Sarah (MECP)
Subject: FW: Convertus" Discharge of Leachate at 5123 Hawthorn Road, Ottawa
Date: July 3, 2025 1:57:13 PM
Attachments: image001.png
image002.png
image003.png
image004.png

Confidential. For FOI purposes only.

From: David Veinot <dveinot@convertusgroup.com>
Sent: Monday, April 29, 2024 3:44 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Jordan,

To ensure we have all the time and management attention we need, let's plan on meeting at Convertus Ottawa on **Wednesday afternoon at 1:30pm**. I'll be available all afternoon, or as much time as you like.

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Monday, April 29, 2024 10:05 AM
To: David Veinot <dveinot@convertusgroup.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Hi David,

No problem. I have a meeting scheduled in the morning, if we could do 10:00- 10:15 am, that would be great.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 29, 2024 9:07 AM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Jordan,

I found out that the Convertus Ottawa facility is hosting their annual tour with representatives from the City of Ottawa this Thursday afternoon starting at 1pm. The City likes to bring new hires and waste management reps by every year as an orientation on their green bin program.

To ensure that we can get participation of the site management representatives as needed, can we move your visit to Thursday morning instead. Say 9:00am?

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Thursday, April 25, 2024 2:56 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Great, thanks for letting me know. I may attend the Site for a few hours on one of these days. Were you planning on being at the Ottawa Site for any of these days?

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 25, 2024 2:50 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the

sender.

Jordan,

The Spring sampling schedule at Convertus Ottawa has been moved up to next week, from May 1-3, 2024.

David Veinot
Environmental Compliance Manager

---

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Thursday, April 25, 2024 2:27 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Hello David,

No problem. Thank you for the explanations and confirming the monitoring tier you will be in for 2024. The pictures you attached of the underground holding tanks was a great visual.

If you could please let me know when the spring sampling does occur, that would be appreciated.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 22, 2024 4:08 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Jordan,

Sorry for the delay. I was in Manassas, Virginia last week to visit our newly acquired composting site.

1. All three manholes, or catch basins, connected to the USTs were constructed the same way. The manholes are reinforced segmented concrete sections connected with rubber gaskets.

   While six USTs were approved, only five were installed. As an aside, all of the USTs are two-piece 10,000-gallon reinforced concrete tanks with a mastic-sealed joint (not a gasket) joining the two halves.

   Only two of the five installed UST tanks are used to hold leachate. The two tanks are connected to each other via two 6" PVC pipes, effectively making one large tank. Only one of the tanks is connected to the manhole, or catchbasin, in the neighbouring Technical Hall. Please see the attached Figure to help understand the layout. Photos are also included. The first photo shows the tanks during their installation, the second shows the manholes in the Tech Hall, the third shows the PVC connections between the two process tanks. Photos four and five show the manhole's gasket.

2. GHD has confirmed that the Spring 2024 sampling event is scheduled to occur the week of May 6th. I have asked GHD to see if the sampling can be moved up to remain consistent with previous years (April, August & November).

3. The Trigger Program was set up for the purpose of identifying when additional confirmation of groundwater impacts is appropriate, and when implementation of a remedial response is appropriate. Routine monitoring is Tier I monitoring. Additional confirmation monitoring is triggered when two or more parameters exceed their respective trigger levels in a single sample from Tier I monitoring. When this is triggered, the follow up duplicate monitoring is referred to as Tier II monitoring. The purpose of Tier II monitoring is to confirm the presence of groundwater impacts.

   When Tier II monitoring (duplicate follow-up sampling) is undertaken and the impacts are confirmed, an evaluation of the impact is undertaken. This evaluation was undertaken formally as part of the Trigger Program in the past and as a result EW107-15 was commissioned in 2016 as a groundwater extraction well. Operating EW107-15 as a groundwater extraction well is a remedial response. Accordingly, the monitoring that is undertaken at the site is in Tier III (post remedial response monitoring).

   The Trigger Program evaluation included in the 2023 AMR identifies that there are multiple trigger exceedances at several shallow groundwater monitoring wells. The report describes that since remediation has already been implemented, there is no need for Tier II response monitoring at these locations during 2024. Accordingly, regular routine monitoring will continue through 2024. It should be noted that the monitoring program undertaken under Tier I or Tier III is the same.

Please let me know if you have any further questions.

David Veinot
Environmental Compliance Manager

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Tuesday, April 16, 2024 1:49 PM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

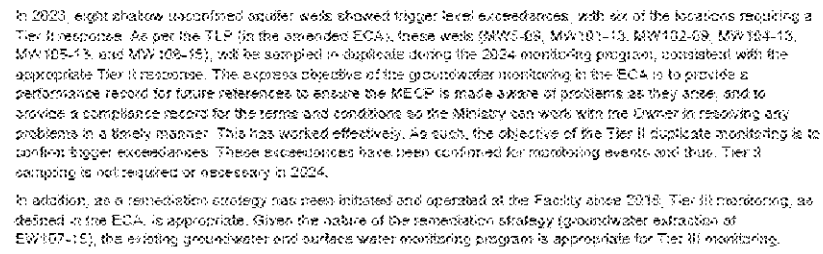
Hello David,

Thank you for providing me with further information on the event. I understand that at this time it is unknown to Convertus if any leachate actually entered any parts of the natural environment (i.e., groundwater). I am glad to hear that the gasket has been repaired and there is no current sign of groundwater entering the underground storage tanks.

I have a few additional questions:

1. There are six underground storage tanks listed in your sewage ECA, are these access manholes all constructed the same way with a rubber gasketed seal? Are only two of these tanks being used for the storage of leachate?
2. Do you have dates set to conduct the future supplemental groundwater monitoring and your remedial activities? Are you considering your "pump and treat" at EW107-15 a remedial activity and thus remaining in Tier I of the TLP? I also see reference in the AMR that Tier III of the TLP is appropriate?

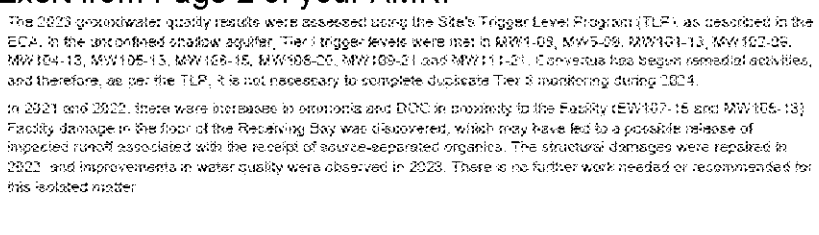
Exert from Page 21 of your AMR:



In 2023, eight shallow unconfined aquifer wells showed trigger level exceedances, with six of the locations requiring a Tier II response. As per the TLP (in the amended ECA), these wells (MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, and MW108-15), will be sampled in duplicate during the 2024 monitoring program, consistent with the appropriate Tier II response. The express objective of the groundwater monitoring in the ECA is to provide a performance record for future references to ensure the MECP is made aware of problems as they arise, and to provide a compliance record for the terms and conditions so the Ministry can work with the Owner in resolving any problems in a timely manner. This has worked effectively. As such, the objective of the Tier II duplicate monitoring is to confirm trigger exceedances. These exceedances have been confirmed for monitoring events and thus, Tier II sampling is not required or necessary in 2024.

In addition, as a remediation strategy has been initiated and operated at the Facility since 2018, Tier III monitoring, as defined in the ECA, is appropriate. Given the nature of the remediation strategy (groundwater extraction at EW107-15), the existing groundwater and surface water monitoring program is appropriate for Tier III monitoring.

Exert from Page 2 of your AMR:



The 2023 groundwater quality results were assessed using the Site's Trigger Level Program (TLP), as described in the ECA. In the unconfined shallow aquifer, Tier I trigger levels were met in MW1-09, MW5-09, MW101-13, MW102-09, MW104-13, MW105-13, MW106-15, MW108-20, MW109-21 and MW111-21. Convertus has begun remedial activities, and therefore, as per the TLP, it is not necessary to complete duplicate Tier II monitoring during 2024.

In 2021 and 2022, there were increases in chlorides and DOC in proximity to the Facility (EW107-15 and MW105-13). Facility damage in the floor of the Receiving Bay was discovered, which may have led to a possible release of impacted runoff associated with the receipt of source-separated organics. The structural damages were repaired in 2022, and improvements in water quality were observed in 2023. There is no further work needed or recommended for this isolated matter.

For your awareness, the MECP Technical Support Section is reviewing your 2023 Annual Monitoring Report.

Thanks,

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: April 15, 2024 4:23 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Ben Kempel <Ben.Kempel@ghd.com>
Subject: RE: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Jordan,

The issue identified from the 2023 Annual Monitoring Report was not a spill. It was not a 'discharge of leachate to the natural environment', but a discharge of the natural environment into the leachate.

We were experiencing higher than expected volumes of leachate at the site during the late winter months that couldn't be accounted for by the moisture in the incoming SSO alone. We conducted an investigation of potential causes for this excess leachate, and while doing so we pumped out a manhole under the Tech Hall connected directly to the underground leachate storage tanks. Once empty, we saw an inflow of groundwater coming into the manhole through a gasketed seam (the manhole is a two-piece concrete unit connected by a rubber gasket around the circumference). What we saw was the opposite of a spill. The groundwater was flowing into the manhole, not the other way around. Our leachate volume was being increased by the incoming volume of this groundwater. We arranged for a tank maintenance company to professionally seal the leak using injected epoxy.

Now this event raised a secondary issue for us. If groundwater could flow in under certain conditions, is it possible for leachate to flow out under different conditions? Neighbouring water level measurements were reviewed to see if the water table was typically above, or below, the level of the leak (63" below grade). Because these wells were not very close to the manhole, and the water levels varied spatially, some extrapolations needed to be made. It was found that that during the past few years the groundwater level was consistently above the height of the leak, and the system experience inflow. However, there were occasions in the past when the water table may have dropped below the level of the leak and there could have been an outflow of leachate into the groundwater, IF a pathway was present. We don't know if this actually happened, as we don't know when the gasket failure actually occurred. We monitor the groundwater quality from the neighbouring extraction well on a monthly basis, and see concentrations rise and fall, but that is what you'd expect to see from an extraction well pumping intermittently. We also have level sensors in the tanks connected to the SCADA system, but the leachate levels rise and fall so frequently due to the tunnel irrigation process that a small volume loss may not have been noticed. However, we certainly did notice the rapid increase in the leachate volume within our USTs this winter that initiated the excess leachate investigation, so it is possible the leak is a recent development.

In the end, we have no hard evidence of a leachate leak to groundwater, but in the spirit of

transparency, we wanted to offer up the possibility of one intermittently occurring in the past. Despite the fact that this excess leachate investigation, and resulting corrective action, actually happened in 2024, we didn't want to wait until next year's annual report to describe it to the MECP. As stated in the report, future groundwater monitoring results will provide insight into any effect of this gasket deficiency. Along with the broken knee wall concrete in the Receiving Department described to the MECP in 2022, this may (or may not) be a source of organic-related compounds into the groundwater. We only offer them as potential sources. In both cases, the deficiency was identified and corrective action quickly taken.

Please let me know if you need anything else.

David Veinot
Environmental Compliance Manager

---

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: Monday, April 15, 2024 3:12 PM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Convertus' Discharge of Leachate at 5123 Hawthorn Road, Ottawa

Good afternoon David,

It has been brought to the Ministry's attention that a discharge of leachate to the natural environment was discovered on February 8, 2024 at Convertus Canada Ltd.'s Ottawa facility located at 5123 Hawthorn Road. It's stated in Convertus Canada Ltd's 2023 Groundwater and Surface Water Monitoring Report that the leak in the underground process water (leachate) storage tank system was identified on February 8, 2024. It is also stated in the report that it is believed to be a result of a rubber gasketed-seam on a manhole and it was repaired on February 26, 2024.

Exert from the GHD produced 2023 Groundwater and Surface Water Monitoring Report for Convertus Canada Ltd.'s site in Ottawa:

GHD understands that another potential release into the shallow groundwater was discovered on February 8, 2024. A pre-cast concrete manhole, connected to the underground process water (leachate) storage tank system, was observed to have a leak along a rubber gasketed-seam. This was detected during a maintenance activity when the manhole was pumped dry. Groundwater was observed to be unexpectedly entering the manhole due to hydrostatic pressure, at a depth of 63 inches below grade. This groundwater inflow was causing excessive volumes of leachate to be generated and requiring off site disposal. The subject manhole is located on the east side of the Facility, where shallow groundwater quality impacts have been identified. Based on the elevation at the manhole, in relation to the seasonally fluctuating groundwater levels, it is possible that this gasket failure could have been an intermittent contributor for process water to enter the shallow groundwater from the Facility's leachate storage system when the groundwater level dropped below the level of the manhole. The time period over which this could have occurred is not known, nor is there any hard evidence of the process water actually leaving the manhole and going into the groundwater. Convertus had a specialized third-party contractor repair the gasket on February 26, 2024. Future groundwater monitoring results will provide insight into the effect of this repair on shallow groundwater quality near, and downgradient, of the Facility.

If you could please provide more details on this spill event via email, that would be appreciated.

Thanks,

Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environnementale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.
Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.
Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

From: Hook, Jordan (MECP)
To: Endenburg, Sarah (MECP)
Subject: FW: Convertus Ottawa Facility Odour Complaint
Date: July 3, 2025 2:00:32 PM
Attachments: image001.png

Confidential. For FOI purposes only.

From: Hook, Jordan (MECP)
Sent: Monday, May 26, 2025 11:37 AM
To: David Veinot <dveinot@convertusgroup.com>
Cc: Katie Sheridan <ksheridan@convertusgroup.com>; Chris Jones <cjones@convertusgroup.com>; Erik Brown <ebrown@convertusgroup.com>
Subject: RE: Convertus Ottawa Facility Odour Complaint

Good morning David,

Thank you for answering my questions and providing a maintenance update for the facility.

The complainant did not provide a lot of detail with their initial complaint. The complainant is located in the Hawthorne Industrial Park area along Rideau Road (West of Convertus). If I receive any further information related to this complaint, I will let you know.

I am acknowledging the review and actions that were taken by Convertus on May 23, 2025.

Jordan

From: David Veinot <dveinot@convertusgroup.com>
Sent: Friday, May 23, 2025 5:00 PM
To: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Cc: Katie Sheridan <ksheridan@convertusgroup.com>; Chris Jones <cjones@convertusgroup.com>; Erik Brown <ebrown@convertusgroup.com>
Subject: RE: Convertus Ottawa Facility Odour Complaint

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good afternoon Jordan,

Thank you for letting us know about the odour complaint earlier today.

Unfortunately, your email was sparse on details regarding the nature of the complaint. Your email didn't provide the complaint's address, or a description, frequency, intensity or duration of the odour (F.I.D.O.L). No specific dates or times were provided, except for today's. Its hard

to review meteorological data for prevailing wind direction if such information is missing.

Some things we do know to answer your follow-up questions. There have been no process upset conditions during the past month. However, there have been some maintenance activities conducted. In late March/early April, we did complete a new door installation on an (emptied) composting tunnel, which actually allowed better sealing of the process tunnels and lessened the load on the air system.

Since mid-April, the site has consistently been working through the weekends, but this consisted of mainly maintenance activities (primarily Screening Line upgrades), so no organic material was actually being received or moved within the plant on those days. All active composting tunnels would be closed, negative pressure throughout the plant maintained, and the odour abatement system would be working. The exterior doors would be closed as no SSO trucks would be received. No one working on-site on the weekends reported unusual odors on those days.

Our site personnel conducted an odour tour of the neighbourhood earlier today following receipt of your complaint notification. No odour associated with the facility was detected in any area visited. Odours that were observed included smoke from controlled brush fire on Blais Rd and a mild tire/asphalt smell along Rideau Rd.

Since we have no details about the historical weekend odours, I am not recording them as formal complaints. Today's investigation did not uncover any activity occurring at Convertus that should result in an unusual odour event. Therefore, I am logging today's complaint as unsubstantiated.

Condition 8.2(b) of our Air ECA requires us to notify the MECP of every odour complaint received by our facility. If we had received odour complaints in the past few months, you would have been told. We have not received any complaints from our direct phone line, email address, 24-hour community complaint line, or social media accounts. Today's complaint was the first received at Convertus Ottawa since February 2023.

Today's complaint has been electronically logged in accordance with Condition 8.2 (a) of our Air ECA and an investigation report has been completed.

Please let me know if you require anything else.

David Veinot
Environmental Compliance Manager
Convertus Group

c. (226) 268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4

From: Hook, Jordan (MECP) <Jordan.Hook@ontario.ca>
Sent: May 23, 2025 10:55 AM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Convertus Ottawa Facility Odour Complaint

Good morning David,

I received an odour complaint on May 23, 2025 that was allegedly coming from the Convertus' facility in Ottawa.

The complainant stated that the odours are usually worse on weekends (no specific dates were provided). Could you please confirm if there have been any process upsets or changes in operations at the Ottawa facility? Have you received any complaints in the last few months?

Thanks,

Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environmentale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.
Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.

Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

From:	Hook, Jordan (MECP)
To:	Endenburg, Sarah (MECP)
Subject:	FW: Ministry Technical Support Section Review of Convertus Ottawa"s 2024 Groundwater and Surface Water Monitoring Report
Date:	July 3, 2025 2:00:35 PM
Attachments:	Convertus 2024 Annual Report and Workplan - MECP Groundwater Comments.pdf image001.png

Confidential. For FOI purposes only.

From: Hook, Jordan (MECP)
Sent: Wednesday, June 4, 2025 3:18 PM
To: David Veinot <dveinot@convertusgroup.com>
Subject: Ministry Technical Support Section Review of Convertus Ottawa's 2024 Groundwater and Surface Water Monitoring Report

Good afternoon David,

The Ministry's Technical Support Section has completed their review of Convertus' 2024 Groundwater and Surface Water Monitoring Report for the Convertus Ottawa Facility at 5123 Hawthorne Road in Ottawa (the "Site").

I have attached the Ministry's technical review memorandum for your review and action. Based on this technical review, the Ministry is recommending that Convertus notifies the impacted adjacent property owners of this shallow groundwater contamination from the Site.

Once you have had a chance to review it, please let me know if you have any questions.

Thanks,
Jordan

Jordan Hook
Environmental Compliance Officer | Agent de la conformité environmentale
Badge #2097 | N^{O} de l'insigne 2097
Ministry of the Environment, Conservation and Parks | Government of Ontario
Ministère de l'Environnement, de la Protection de la nature et des Parcs | Gouvernement de l'Ontario
(613) 862-9604 | jordan.hook@ontario.ca

Ottawa District Office | Eastern Region
2430 Don Reid Drive, Unit 103
Ottawa ON K1H 1E1

Ontario

Are you reporting a spill? Please contact the Ministry of the Environment, Conservation and Parks, Spills Action Centre at (416)325-3000 or 1(800) 268-6060.

Vous voulez signaler un déversement? Veuillez contacter le Centre d'intervention en cas de déversement du ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 325-3000 ou au 1 800 268-6060.

Are you reporting a pollution incident or environmental concern? Please use the ministry's online pollution reporting tool or for more urgent matters contact the Pollution Hotline at 1(866) 663-8477.
Vous voulez signaler un incident de pollution ou une préoccupation environnementale? Veuillez utiliser l'outil de signalement d'un cas de pollution en ligne du ministère ou, pour les questions urgentes, appeler la Ligne-info antipollution au 1 866 663-8477.

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	3466-BZNNSY	**Module Type:**	Other
Status:	To be assigned	**File Storage Number:**	
Program:	Air	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
David	Veinot
Name of Company:	
Convertus	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(226)268-6869		**Fax**	

Date Reported to MOE:	2021/04/01	**Time Reported to MOE:**	13:43
Date of Incident:	2021/04/01	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Convertus Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Convertus: front end loader caught fire, no spill

Initial Incident Description (as reported):

Created: Akiko Date (Spills Action Centre) - 2021/04/01 01:43:56 PM

Caller reports that a front end loader caught on fire, while it was outside on the paved parking lot to perform maintenance. The engine overheated. The FD arrived and put the fire out with water only. The firewater run off went to a catch basin that goes to their contained storm water management pond
No evidence of fuel spilled, and believed to be consumed in the fire.
Some smoke was visible at the time.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	

Known or Suspected Health / Environmental Consequence at the Time of Incident

Health / Environmental Consequence:	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
To be determined	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8102-BZNNYF
Originating Document:		**Created by:**	Akiko Date
Date Created:	2021/04/01	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Akiko Date
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name: **Badge No:**	

Work Unit: District/Area Office: Date: Signature:	

District/Area Supervisor:

Name: Work Unit: District/Area Office: Date: Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8383-A7MRXR	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 211
Program:	Air	**Activity:**	Inspections - Air Facilities

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2015/12/21	**Time Reported to MOE:**	15:25
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Air Facility Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/03/01 03:25:08 PM
On December 21, 2015 an Air Facility Inspection was completed at Orgaworld's Ottawa Site, located at 5123 Hawthorne Road in Ottawa, to determine compliance during the 2014 operating year under Environmental Compliance Approval Number 7021-7HQNDE and the 2015 operating year under Environmental Compliance Approval Number 1613-A2ELCQ which revoked and replaced Environmental Compliance Approval Number 7021-7HQNDE on December 10, 2015. As a result of the inspection the following non-compliance issues were identified: Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE - Failure to submit the 2014 Written Summary by May 31, 2015 Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE & Section 20.6 of the Environmental Protection Act by undertaking modifications outside of the Limited Operational Flexibility time period

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2020/04/08 02:20 PM
Since the Air Facility Inspection, additional Ministry inspections have occurred which confirmed the Facility has submitted the Annual Written Summary each year as required. No further Ministry action is required at this time. File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	

No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	3226-A63LFF	1. The Facility must ensure all ...	2016/04/13	2016/04/13
VAI	3226-A63LFF	2. By May 31, 2016, the Facilit ...	2016/05/31	Abatement ended

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	2716-A7MSEQ
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/03/01	**Date Completed:**	2021/06/16
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

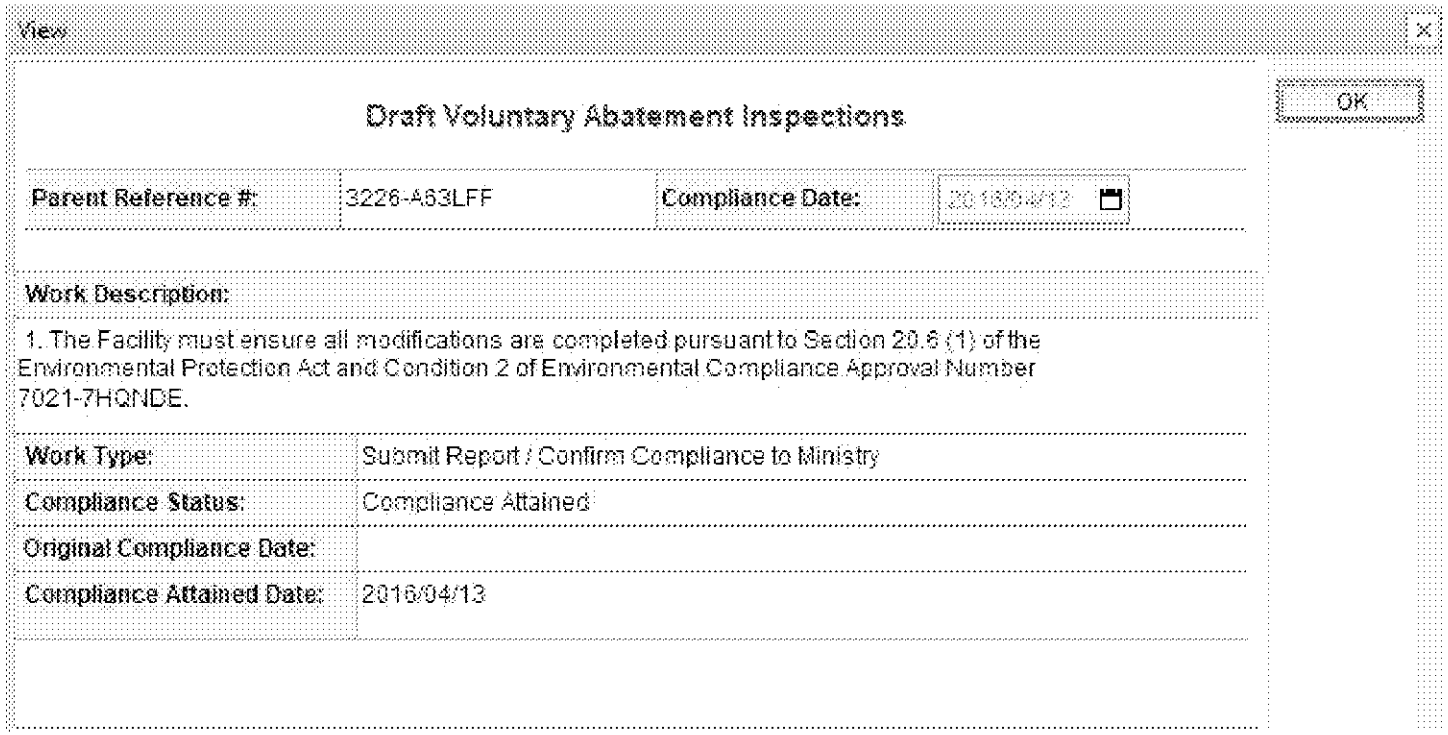
Provincial Officer:

Name:	**Kyle Straberger**

Badge No:	
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2020/04/08
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2021/06/16
Signature:	


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
3226-A63LFF
Compliance Date:
Work Description:
1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.
Work Type:
Submit Report / Confirm Compliance to Ministry
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/04/13

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	4722-AAYMYP	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Brian	Begg
Name of Company:	
Orgaworld Ottawa Inc.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	K1G 1Y3
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)822-2056		**Fax**	

Date Reported to MOE:	2016/06/16	**Time Reported to MOE:**	12:55
Date of Incident:	2016/06/16	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

004220

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
Large Door Open

Initial Incident Description (as reported):
Created: Tor Rustad (Ottawa District Office) - 2016/06/16 01:01:50 PM
Thursday, June 16, 2016, 12:55, telephone call from Caller: a large door at the facility is jammed open and cannot be closed. Caller is reporting this matter under a Standard Operating Procedure with the Ottawa District office.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/09/12 04:35 PM
June 16, 2016 - EO Straberger Voicemail Message - Tor Rustad - Reports that Brian Begg, Orgaworld, contacted the Ottawa District Office to report a door of the Orgaworld Ottawa Facility is not able to close and therefore requested to speak with EO Straberger. June 17, 2016 - EO Straberger (11:05) Phone call to Brian Begg, (613)822-2056. Voice mail box full and no message could be left. Email sent to Brian Beggs, cc'd Nick Pora & Michael Rooke (all Orgaworld staff), requesting an update and actions taken to address and rectify the failed door. 11:57am - MSG - Nick Pora, Orgaworld Ottawa, stated out of the office today and inquired if follow-up could be completed Monday. If not, contact him at (613) 797-4671. 1:33pm - Received email from Brian Begg, Orgaworld Ottawa, stating that yesterday at 10:30am door #2 was stuck in the open position as a result of a broken cable on the right side. The Door Company was contacted who arrived on-site at approx. 1pm with repairs completed at 3:30pm. No issues with curbside waiting was reported. 2:00pm - Sent email to Brian Begg, Orgaworld Ottawa, thanking for the update to the event and inquiring if any complaints were reported to Orgaworld Ottawa. Confirmed receipt of Nick Pora's voicemail message indicating any remaining follow-up can be completed on Monday. No complaints were received by the Ministry of the Environment and Climate Change as a result of the malfunction of the door during 10:30am to 3:30pm. No additional follow-up was required based on repairs being completed same day with not

complaints received by the MOECC.

No further MOECC action is required at this time.

Recommend File Closed

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	6268-AAYN3F
Originating Document:		**Created by:**	Tor Rustad
Date Created:	2016/06/16	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Tor Rustad
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/09/12**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	3484-93LSDJ	**File Storage Number:**	SI OT GL HA 210
Module:	Incident Reporting	**Module Type:**	Condition of Operation
Cross Reference:	(doc link)	**Task Link:**	8616-93LSNM
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		3484-93LSDJ	
Date Created:	2013/01/03	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Air	**Activity:**	Compliance Monitoring

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/01/03 15:46		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Source Testing Report Submission *cannot be longer than 60 characters*
Incident Description:	As required under Condition 10 of issued ECA No. 7021-7HQNDE, Orgaworld retained the services of Conestoga-Rovers & Associates to undertake a compliance source testing program at their Facility (5123 Hawthorne Road, Ottawa, On). The compliance source testing program was completed in November of 2012. On January 3, 2013, the Ottawa District Office and Standards Development Branch (SDB) received a copy of the Source Testing Report - Determination of Odour for Compliance with Certificate of Approval (Air) No. 7021-7HQNDE. The submission of the report satisfies the requirements of Condition 10.(7) which requires the company to submit the report to the Director and District Manager within two (2) months after source testing was completed. The District Office is awaiting review comments from SDB. Document & File

Links & Comments:	
Attachments Names.	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/01/03		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Not Anticipated		
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/06/03

Signature:

District/Area Supervisor:

Name:

Work Unit:
District/Area Office:
Date:

Signature:

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0153-93HL97	**File Storage Number:**	SI OT OT HA 230
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	3052-93HLBU
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		0153-93HL97	
Date Created:	2012/12/31	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2012/12/31 10:32		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Minor non-compliance with sampling requirements *cannot be longer than 60 characters*
Incident Description:	Following an Industrial Sewage Works Inspection of Orgaworld Canada located at 5123 Hawthorne Road in the City of Ottawa, the following actions are being required by the IO: 1.) Ensure samples are collected on a monthly basis as required by Condition 5 - Surface Water Monitoring and Recording 2.) Ensure monthly samples are analysed for the parameters outlined in Table 1 - Effluent Monitoring SWM Pond EO was informed of reasons why samples were not collected as per the requirements of the ECA. No further MOE action is required at this time; document and file. (Closed)

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2012/12/18		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Possible		
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		
What effluent types are being assessed?	Process (Effluent), Stormwater		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	0153-93HL97	1.) Ensure samples are collecte ...	2013/01/31	2013/01/01
VAI	7182-8YZHG8	2.) Ensure monthly samples are ...	2013/01/01	2013/01/01
VAI	7182-8YZHG8	1.) Ensure samples are collecte ...	2013/01/01	2013/01/01

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/06/03

Signature:

District/Area Supervisor:

Name:

Work Unit:
District/Area Office:
Date:

Signature:

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	3125-AWWNYQ	**Module Type:**	Legislation Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 700
Program:	Waste - Hazardous & Liquid industrial	**Activity:**	Inspections - Reg. 347 Generators

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			

Date Reported to MOE:	2018/03/15	**Time Reported to MOE:**	13:53
Date of Incident:	2017/04/04	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Adminstrative Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2018/03/16 01:53:08 PM
Subject Waste Generator Inspection occurred on March 15, 2018 at Orgaworld Ottawa. Manifest records review determine Copy 6 of Manifest No. RS77263 was missing. Company is will be following up with the receiver site to determine status of copy.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2018/03/23 03:47 PM
March 23, 2018 - Email from David Veinot, Compliance Officer, Orgaworld Ottawa, provided copy 6 of Waste Manifest No. RS77263 dated April 4, 2017. The Carrier, OGI of Mitchell (1111971 Ontario Limited) still had the copy of the manifest in their files through a clerical error. Orgaworld is currently arranging for training for HWIN and O. Reg 347 training for both Ontario locations (Ottawa & London) to ensure this error does not occur in the future. A Subject Waste Generator Inspection was conducted at Orgaworld Ottawa to assess compliance with O. Reg 347 and HWIN generator requirements. Based on the findings the company did not have the required records to indicate proper disposal of subject waste. The company has followed up with the waste carrier and disposal site involved in the transfer of waste and received the missing manifest record. Training is being arranged for the company to ensure future events do not occur. No further action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2018/03/15	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	

Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	3125-AWWNYQ	Company to follow up with carri ...	2018/03/23	2018/03/23
VAI	3867-AWTRVN	Confirm Copy 6 of Manifest No. ...	2018/03/23	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

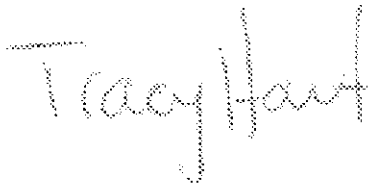
Cross Reference:	(doc link)	**Task Link:**	7116-AWWPCR
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2018/03/16	**Date Completed:**	2019/11/19
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2019/08/22
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2019/11/19
Signature:	

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	6801-BFDRE7	**Module Type:**	Spill
Status:	Closed	**File Storage Number:**	NOT FILED
Program:	Water - Ground & Surface	**Activity:**	Spills

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Ron	Clyne
Name of Company:	
Ron Clyne Heating	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)2961567			

Date Reported to MOE:	2019/08/25	**Time Reported to MOE:**	15:57
Date of Incident:	2019/08/23	**Time of Incident:**	15:30
Incident Date Confirmation:	Actual		

Client(s)

Client Details

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
TSSAfsb - 10L Diesel, Broken Nozzle

Initial Incident Description (as reported):
Created: Ian Oosting (Spills Action Centre) - 2019/08/25 03:57:03 PM
Caller reports a 10L diesel spill to asphalt due to a broken nozzle. Nozzle was attached to a 30 foot hose. Nozzle has been replaced. No drains impacted. Absorbent was placed down and swept up. copy sent to TSSAfsb

SAC Action Class:	TSSA - Fuel Safety Branch - Hydrocarbon Fuel Release/Spill
Non-Standard Procedure:	No

Incident Description:
Last update: Angela Cappello (Ottawa District Office) - 2019/08/29 11:51 AM
ODO Duty Officer: small spill contained on asphalt, no off-site or water impacts and cleaned up. NFA required at this time.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Land
Incident Event:	Leak/Break
Incident Reason:	Equipment Failure

Source Type:	Service Station
Sector Type:	Miscellaneous Industrial
MOE/Other Agencies Involved:	Provincial Agency - Technical Standards & Safety Authority
Was there a discharge / emission / spill of a contaminant to the environment?	
Yes	

Contaminants Table

Contaminant Name	Description	Code	UN#	Limit	Quantity	[units]	[freq]
DIESEL FUEL		13	1202		10	L	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

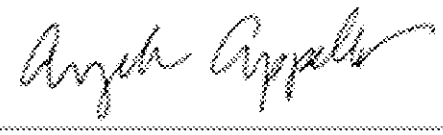
Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	5150-BFDSDX
Originating Document:		**Created by:**	Ian Oosting
Date Created:	2019/08/25	**Date Completed:**	2019/09/10
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Ian Oosting
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Angela Cappello
Badge No:	
Work Unit:	Ottawa District Office
District/Area Office:	Ottawa District Office
Date:	2019/08/29
Signature:	

Area Supervisor:

Name:	Emily Tieu
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2019/09/10
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8448-AEMP9Q	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 211
Program:	Air	**Activity:**	Inspections - Air Facilities

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2016/10/11	**Time Reported to MOE:**	14:07
Date of Incident:	2016/09/29	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Minor Administrative Non-Compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/10/11 02:07:28 PM
As a result of an Air Facility Inspection, the Inspecting Officer noted that copies of the Emission Summary Table and Acoustic Assessment Summary Table were not available during the inspection. A request was made and copies were provided post inspection. As per Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ, the Company shall make the Emission Summary Table and Acoustic Assessment Summary Table available by any person, with charge, by posting it on the Internet or by making it available during regular business hours at the Facility.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/11/14 09:06 AM
It was noted that these were not available at the Facility therefore the Inspecting Officer is requring hardcopies to be available during regular business hours at the Facility and updated as necessary. Electronic copies were provided as part of the inspection. No further MOECC action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2016/09/29	**Time of Arrival at Site:**	09:30
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	

Was there a discharge / emission / spill of a contaminant to the environment?
No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8448-AEMP9Q	Ensure hardcopies of the Emissi ...	2016/10/18	2016/10/18
VAI	1604-AE9RRM	Orgaworld Ottawa must ensure ha ...	2016/10/18	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8177-AEMPCV
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/10/11	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	1529
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2016/11/14
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	6777-A9NQXU	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

Name of Company:

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**

Date Reported to MOE:	2016/05/05	**Time Reported to MOE:**	11:50
Date of Incident:	2016/05/05	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
5123 Hawthorne Road Address: 5123 Hawthorne Rd, Ottawa, City District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664 Site #: 4871-9KKR3W

Incident Summary:
Odour Complaint - Orgaworld Ottawa

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/05/05 03:34:07 PM
Caller states that while at the intersection of Hawthorne Road and Rideau Road an odour was detected. Caller reports the odour resembled a rotting / sour milk odour. The odour was detected at 11:50am and noted the Orgaworld Facility had their doors open.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/05/05 04:09 PM
May 5, 2016 - EO Straberger contacted Nick Pora, Ontario Operations Manager - Orgaworld, and left a voicemail message of the odour complaint reported to the ministry. (1:05pm) EO Straberger received a voicemail message from Nick Pora indicating an investigation has been completed which included a site visit to the area. Weather conditions may not support the source being Orgaworld as the wind direction was SW and the location would be north of the facility. Not discounting the complaint. Orgaworld filled out a log of the investigation and request a call back to discuss. (1:45pm) EO Straberger received email from Nick Pora providing a copy of the investigation log form completed in response to the odour complaint reported to the ministry. Field response initiated (walking referenced roads) and no odours detected. Wind direction suggests complaint is invalid. (2:15pm) EO Straberger contacted Nick Pora to discuss the investigation into the odour complaint. Reviewed investigation log which suggests the complaint may not be associated with Orgaworld operations due to wind direction at the time of the complaint. All doors are functional and are closed with the exception to allow receipt of waste. Negative pressure system functional. Will ensure doors are only open to allow trucks to access tipping floor. No further action is required at this time. Will document and file complaint and follow-up information. --- The ministry received a complaint of a odour at the intersection of Hawthorne Road and Rideau Road. Caller described the odour as rotten sour milk and further noted the doors of the Orgaworld Facility was open. Complaint details were provided to Orgaworld who completed an investigation which determined all operational systems (doors, negative pressure system) were operating properly. Field investigations was completed with no odours detected. Weather conditions were reviewed for the time period of the complaint which determine the complaint did not support Orgaworld Ottawa as being the source due to wind direction and location. Copy of the investigation log was provided to the ministry. No further MOECC action is required at this time. Recommend file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	6661-A9NRN6
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/05/05	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/05/05**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0210-9YVQ22	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 600
Program:	Waste - Solid/Non-hazardous	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Michael	Rooke
Name of Company:	
Orgaworld Ottawa	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(519) 663-4446	104	(613) 630-6324 **Cell**	mrooke@orgaworld.ca

Date Reported to MOE:	2015/07/29	**Time Reported to MOE:**	09:10
Date of Incident:	2015/07/28	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road
Address: 5123 Hawthorne Rd, Ottawa, City
District Office: Ottawa
LIO GeoReference: Zone: 18, UTM Easting: 456360.53, UTM Northing: 5016788.0, Latitude: 45.30324, Longitude: -75.55664
Site #: 4871-9KKR3W

Incident Summary:

Fire in Composting Tunnel

Initial Incident Description (as reported):

Created: Kyle Straberger (Ottawa District Office) - 2015/07/29 02:46:25 PM

EO Straberger received an email from Michael Rooke, Orgaworld Ottawa, stating that last night, on July 28, 2015, a small fire started in Tunnel 8 of the Ottawa Orgaworld Composting Site. The fire caused no damage, nor injuries. The material was moved outside and the fire department sprayed the water from the on-site hydrant in order to put out the hot spots and as a precaustionary measure prevent any possible re-ignition. All water applied to the material stayed on-site and will eventually flow into the approved stormwater management pond. The water will either used in the facility as per usually operations or if compliant with trigger parameters outlined in the ECA, will be discharged. The City of Ottawa has been notified and Orgaworld anticipates no other adverse effect to the site, or to service.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2016/03/01 03:08 PM

July 29, 2015 - EO emailed Michael Rooke to obtain answers to the following questions:

1. Do we know the cause of the fire other than the generation of a hot spot?
2. Is this event similar to the previous fires regarding the composting of 12-20?
3. Has the material been relocated back inside the facility?

July 29, 2015 - EO received the following response from Michael Rooke in response to the above questions:
Hello Kyle:

Sorry for the delay in responding. No, the ignition source is still under investigation, but I agree with you and tend to believe it was a localized hot spot. This material is comprised of residual plastic and material greater than 15mm. It was not being composted, but was being stored in Tunnel 8, so I don't believe this event to be similar to previous fires. The material is still outside. It is our belief that it would pose unnecessary risk to health and safety to bring this material back into the facility. Our intention to dispose of the material, but first, we wish to make sure we are not transferring our problems to another facility/landfill. We are currently wetting down the material and spreading it out it ensure there are no further hotspots. We plan to ship to final disposal as fast as possible, but this may take several days. Please let me know if you have any concerns, or require further information regarding this matter. Thanks for your time Kyle.

Kind regards,

Mike Rooke
Compliance Officer

July 29, 2015 - EO Straberger emailed Michael Rooke to inquire the duration of the storage of this material in the composting tunnel as well as agree witht he approach Orgaworld is taking to prevent further fire hazards.

July 30, 2015 - EO received email from Michael Rooke stating that the material was stored in the composting tunnel for 23 days.

July 30, 2015 - EO emailed Michael Rooke and requested that the MOECC be updated when disposal of this material occurs.

July 30, 2015 - EO received an email from Michael Rooke confirming this will be completed.

EO received confirmation that the waste material was transported to BFI over a phased in approach to ensure waste was fully extinguished and to prevent anaerobic conditions that could trigger any concerns and/or complaints.

Summary: The fire located in the tunnel 8 consisting of residuals and overs was extinguished by the City of Ottawa Fire Department. Waste was transported to Progressive Waste Solutions (formerly known as BFI) for disposal. No complaints or on-going fire incidents were received nor occurred since the July 2015 event.

No further MOECC action required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	2287-9YVQGQ
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2015/07/29	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/03/01**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	

Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8087-9TVQL9	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			
Date Reported to MOE:	2014/07/16	**Time Reported to MOE:**	14:15
Date of Incident:	2014/07/16	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Non-Compliance with Condition 9(8) of ECA Number 7251-8GKRPD

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2015/02/19 02:15:32 PM
Industrial Sewage Works Inspection was completed at Orgaworld Ottawa to assess compliance with ECA Number 7251-8GKRPD. Non-compliance with Condition 9(8) which requires Orgaworld to establish a Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. Since 2013 Orgaworld has been in discussion with the Ottawa District Office regarding contamination of groundwater as a result of operations at the site (ammonia primarily). In 2014 Orgaworld submitted a Groundwater Assessment and Work Plan to outline current and historic groundwater quality as well as provide a path forward to remediate the groundwater impacts. MOECC's TSS reviewed the report and accepted Orgaworld's proposal with an additional requirement to implement surface water sampling in the surrounding ditches immediately to determine if surface water is being impacted by shallow groundwater.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2015/02/19 02:25 PM
Orgaworld has been provided the review comments by TSS and is currently in the process of installing a remediation monitoring well to extract the contaminants. The extracted water is to be used in the composting process as process water as ammonia (as well as other contaminants of lesser concentration) does not pose a risk to compost quality. Additional updates to be provided as Orgaworld proceeds with the Groundwater Assessment and Work Plan.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Surface Water
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent)
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	

No

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8087-9TVQL9	Implement Work Plan as outlined ...	2014/10/17	2014/10/17
VAI	0741-9T7RLS	Implement Work Plan as outlined ...	2014/10/17	2014/10/17

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	1042-9TVQST
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2015/02/19	**Date Completed:**	2015/03/13
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	Kyle Straberger
Badge No:	1529
Work Unit:	
District/Area Office:	Ottawa District Office
Date:	2015/03/11
Signature:	

Senior Environmental Officer:

Name:	Jena Leavoy
Work Unit:	
District/Area Office:	
Date:	2015/03/13
Signature:	

View

OK

Voluntary Compliance

Parent Reference #:	8087-9TVQL9	**Compliance Date:**	2014/10/17

Work Description:

Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

Work Type:	Conduct Study - Monitoring or Sampling Program
Compliance Status:	Compliance Attained
Original Compliance Date:	2014/10/17
Compliance Attained Date:	2014/10/17

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	0741-9T7RLS	**Compliance Date:**	2014/10/17

Work Description:

Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

Work Type:	Implement Remedial or Clean-up Actions
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2014/10/17

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	6701-9K4QZA	**File Storage Number:**	SI OT GL HA 610
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	1023-9K4R88
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		6701-9K4QZA	
Date Created:	2014/05/14	**Date Completed:**	2014/11/07
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Notifications

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:		**Name of Company:**
First Name	**Last Name**	Orgaworld Ottawa
Mike	Rooke	

Contact Mailing Address

Civic Address:			**Unit Identifier:**
5123 Hawthorne Road			
Delivery Designator:			**Delivery Identifier:**
Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/05/13 14:36		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Overhead Door Malfunction *cannot be longer than 60 characters*
Incident Description:	Email Notification from Orgaworld Ottawa indicating an issue with the overhead bay doors of the SSO receiving bay. The email below outlines the actions that will be taken to ensure limited odour issues, if any, during the manual operation of the doors until repairs can be made. Condition 6.2 outlines Orgaworld's responsibility to ensure odourous emissions are contained Condition 6.2 - The Company shall keep all doors in the enclosed building of the Facilityfully closed at all times, except when used for necessary personnel or vehicle entrance and exit. Hello Kyle: Orgaworld Ottawa is currently experiencing issues with one of our overhead doors. The problem is with the main spring needing replacement. Currently the door is down, however, if we need to use this door (due to the large number of city trucks wanting to enter the facility) then we will open the door, and leave it open until all the trucks are out. This action will be taken to minimize the risk while the door opens and closes. Repairs are slated to occur tomorrow morning when we do not have so many trucks entering the facility. Obviously we will attempt not to use this door, but wanted to give you advanced warning of this issue. If you have any questions or concerns, please let me know. Kind regards, Mike Rooke Compliance Officer Email fro Tanya Minarik stating the door repairs have been completed. Incident resolved. Hi Kyle, The repair to this door was just completed. Kind regards,

	Tanya Minarik Site Supervisor Orgaworld has confirmed that the malfunction of the overhead doors for the receiving bay of the Facility has been fixed and is now operational. The ODO did not received any odour complaints for the two days when the door was operated manually. No further MOE action is required at this time; file closed.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/05/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		**Owner of Material:**	
Estimated Clean Up Cost:		**Who Cleaned Up:**	
% Clean Up:	**%**	**MOE/Other Agencies Involved:**	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	6701-9K4QZA	Confirm work completed	2014/05/14	2014/05/14

Offence(s)

Suspected Violation(s)/Offence(s):
Act - Regulation - Section,

Description
{General Offence}

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office: Ottawa District Office
Date: 2014/05/14

Signature:

Senior Environmental Officer:

Name: Jena Leavoy

Work Unit:
District/Area Office: Ottawa District Office
Date: 2014/11/07

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	8804-BYHRY4	**Module Type:**	Pollution Incident Report (PIR)
Status:	Closed	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

Name of Company:

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**

Date Reported to MOE:	2021/02/23	**Time Reported to MOE:**	15:25
Date of Incident:	2021/02/23	**Time of Incident:**	11:52
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Convertus Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

MOE TIPS: Convertus Group ammonia smell inside & outside a building

Initial Incident Description (as reported):

Created: Brenda Capicciotti (Spills Action Centre) - 2021/02/23 03:25:44 PM

MOE TIPS email received:

From: Bekkout, Lamine (MECP) <Lamine.Bekkout@ontario.ca>
Sent: February 23, 2021 2:41 PM
To: Tips, MoE (MECP) <MOE.Tips.moe@ontario.ca>
Cc: Jurcic, Rose (MECP) <rose.jurcic@ontario.ca>
Subject: FW: Reply: No, Page: https://www.ontario.ca/page/ministry-environment-conservation-parks (Case: 246-2021-317)

Hello MOE Tips,

Please see forwarded anonymous report from a client.

Summary: anonymous client reporting ammonia smell inside and outside a building of Convertus Group at 5123 Hawthorne Road, Ottawa Ontario.

Thank you,
Lamine Bekkout (pronounced La-meen Bee-koot)
Public Education and Stakeholder Relations
Communications Branch
Ministry of Environment, Conservation and Parks
Tel: 437-778-8657

Message:
Convertus Group at 5123 Hawthorne Road, Ottawa Ontario. Ammonia smell inside and outside building. Less acid trucks come to side now, acid used to remove ammonia in the air but expensive. Bh always high.
Reply Request: No
Name: anonymous
E-mail:
Phone number:
Address:
User agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:78.0) Gecko/20100101 Firefox/78.0

**********MOE TIPS email attached below

SAC Action Class:	Pollution Incident Reports (PIRs) and "Other" calls
Non-Standard Procedure:	No

Incident Description:
Last update: Alexander J Baker (Ottawa District Office) - 2021/03/01 10:02 AM
EO BAKER followed up on the report with Convertus Ottawa to determine the accuracy of the report. Convertus Group's Environmental Compliance Manager confirmed that he toured the facility on February 25th and did not observe any of the reported odours. Additionally, the Operations Manager of the site confirmed that there has not been a reduction in the volume of acid used in the ammonia scrubbers. All three (3) scrubbers are fully operational and set to hold a pH of 4.0. Acid is automatically added to the system as needed to maintain this set pH level. Further details cannot be ascertained from the anonymous caller. The ministry will continue to monitor and address odour complaints at the site, but will not take action on this report at this time.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	FW Reply No Page httpswww.ontario.capageministry-environment-conservation-parks (Case 246-2021-317).msg
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part

of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8570-BYHSUE
Originating Document:		**Created by:**	Brenda Capicciotti
Date Created:	2021/02/23	**Date Completed:**	2021/03/25
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Brenda Capicciotti
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Alexander J Baker**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/01**
Signature:	

Supervisor:

Name:	**Adam Worth**
Work Unit:	**Ottawa District Office**
District/Area Office:	**Ottawa District Office**

Date:	2021/03/25
Signature:	

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	1052-BYPMJR	**Module Type:**	Pollution Incident Report (PIR)
Status:	Closed	**File Storage Number:**	SI OT
Program:	Waste - Solid/Non-hazardous	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
David	Veinot
Name of Company:	
Convertus	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Date Reported to MOE:	2021/02/12	**Time Reported to MOE:**	16:01
Date of Incident:	2021/02/11	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Convertus Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3

Telephone: (519)663-4446, Extension: 103, FAX: (519)663-0830, email: dveinot@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Convertus Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Rejected Load at Convertus Ottawa

Initial Incident Description (as reported):

Created: Alexander J Baker (Ottawa District Office) - 2021/03/01 11:39:28 AM

In accordance with condition 5.3 of ECA #2766-7HEPSZ, Convertus notified MECP of a rejected load.

The details of the load, and the actions taken, are as follows:

Date & Time: Thursday February 11, 2021 1:37pm
Customer: City of Ottawa
Carrier: Miller Waste
Weighbridge Ticket # 2177987
Description of Waste: Expected to be 4,090 kg of municipal organic SSO but turned out to be 3,040 kg of organic SSO mixed with 1,050 kg of contamination (primarily cardboard).
Weight of Rejected Load: 1,050 kg

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Adam Worth (Ottawa District Office) - 2021/03/25 02:13 PM

Since there is no way to load rejected material back into a curbside truck for disposal, Miller Waste sent out a crew and another truck a few hours later to separate the SSO from the contamination by manually sorting through the pile. They left with 1,050 kg of residual waste. The remaining 3,040 kg of SSO was accepted for composting. Convertus was told that they were disposing of the residual waste at the City of Ottawa's Trail Road Landfill 4475 Trail Road, Ottawa.

Copies of the incoming weighbridge ticket and several photos showing the pile before it was manually sorted to remove contamination, and after, are attached.

This is the first load of waste that was rejected at Convertus Ottawa in 2021.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	0 - No Impact

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	2021-02-11 Incoming SSO Scale Ticket.jpg; 2021-02-11 Pic (After).jpg; 2021-02-11 Pic (Before).jpg; Rejected Load at Convertus Ottawa on February 11_ 2021.msg
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	0660-BYPNAM
Originating Document:		**Created by:**	Alexander J Baker
Date Created:	2021/03/01	**Date Completed:**	2021/03/25
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Alexander J Baker
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Alexander J Baker**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/24**
Signature:	

Supervisor:

Name:	**Adam Worth**
Work Unit:	**Ottawa District Office**
District/Area Office:	**Ottawa District Office**
Date:	**2021/03/25**
Signature:	

From:	David Veinot
To:	Hart, Tracy (MECP)
Cc:	Baker, Alexander (MECP); Ray Stevens; Tim Middleton; Brown, Anthony; Ashley Hauver
Subject:	Rejected Load at Convertus Ottawa on February 11, 2021
Date:	February 12, 2021 4:01:27 PM
Attachments:	image005.png image006.png 2021-02-11 Incoming SSO Scale Ticket.jpg 2021-02-11 Pic (Before).jpg 2021-02-11 Pic (After).jpg

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Good Afternoon Tracy,

In accordance with Condition 5.3 (Rejected Waste Handling) of our ECA (Waste) #2766-7HEPSZ, I wish to notify you of a partial load of waste that rejected by our Ottawa composting facility yesterday afternoon.

The details of the load, and the actions taken, are as follows:

Date & Time: Thursday February 11, 2021 1:37pm
Customer: City of Ottawa
Carrier: Miller Waste
Weighbridge Ticket # 2177987
Description of Waste: Expected to be 4,090 kg of municipal organic SSO but turned out to be 3,040 kg of organic SSO mixed with 1,050 kg of contamination (primarily cardboard).
Weight of Rejected Load: 1,050 kg

Miller Waste offloaded SSO material at Convertus Ottawa from a curbside truck. Convertus Receiving personnel noticed the contamination right away and reported it to site management. Material was isolated from the incoming waste pile and the City of Ottawa and Miller Waste were notified.

Since there is no way to load rejected material back into a curbside truck for disposal, Miller Waste sent out a crew and another truck a few hours later to separate the SSO from the contamination by manually sorting through the pile. They left with 1,050 kg of residual waste. The remaining 3,040 kg of SSO was accepted for composting. We were told they were disposing of the residual waste at the City of Ottawa's Trail Road Landfill 4475 Trail Road, Richmond, ON.

Copies of the incoming weighbridge ticket and several photos showing the pile before it was manually sorted to remove contamination, and after, are included for your review.

This is the first load of waste that was rejected at Renewi Ottawa in 2021.

Please let me know if you have any questions.

David Veinot

Environmental Compliance Manager

---

t. 1(519)663-4446 x203 **c.** 1(226)268-6869
e. dveinot@convertusgroup.com
w. convertusgroup.com
8 – 307 Commissioners Road West, London, ON, N6J 1Y4





004272



004273

Convertus

Ottawa, ON SSO Facility
8123 Hawthorne Road,
Ottawa ON K1G 3X3
Tel 613.822.2858 Ext. 142
Fax 613.822.2858

Vehicle Operator ID:

Vehicle License Plate:

Vehicle Origin:

Contract #:

Material Density Code:

Material Source Point:

Business Name:

Tare wt:

004274

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0053-9DZLKX	**File Storage Number:**	SI OT GL HA 610
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5880-9DZLUJ
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		0053-9DZLKX	
Date Created:	2013/12/02	**Date Completed:**	2016/05/31
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/12/02 10:49		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		

ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Non-compliance with ECA *cannot be longer than 60 characters*
Incident Description:	Waste Disposal (processing) Site inspection completed on November 21, 2013 to determine compliance with ECA and applicable environmental legislation. The following non-compliance items were noted after completing the inspection: 1. Incoming Organic Waste - incoming organic waste is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter polychlorinated biphenols (PCBs). 2. Finished Compost - finished compost is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter PCBs. Voluntary Abatement - The Facility immediately upon receiving the inspection report, shall ensure all incoming organic waste and finished compost is analyzed for all the parameters outlined in Schedule B of the ECA. The Facility, by no later than December 12, 2013, provide sample results for the following months of March, June and October of 2013 to determine if sample results indicate a further lack of sampling for PCBs parameter. See attached letter from Waste Policy Branch (Sones) to the Canadian Compost Council outlining the rollout of the new Ontario Quality Compost Standards and how it impacts facilities (ECA conditions, sampling requirements, etc). No further action is required at this time until direction is provided clarifying the MOECC position with respects to PCBs and the letter from Waste Policy Branch. File Closed

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/11/21		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:	Possible		
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		**Owner of Material:**	
Estimated Clean Up Cost:		**Who Cleaned Up:**	
% Clean Up:	**%**	**MOE/Other Agencies Involved:**	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	0053-9DZLKX	Effective immediately upon rece ...	2013/12/02	2013/12/02
VA	0053-9DZLKX	2. Finished Compost - finished ...	2014/01/16	2014/01/16
VAI	7476-9DMQ3R	1. Incoming Organic Waste - inc ...	2014/01/16	2013/12/12
VAI	7476-9DMQ3R	2. By no later than December 12 ...	2013/12/12	2013/12/12

Offence(s)

Suspected Violation(s)/Offence(s):

Act - Regulation - Section,
Description
{General Offence}

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

Work Unit:
District/Area Office:

Ottawa District Office
Date: 2016/03/01

Signature:

Supervisor:

Name: Tara MacDonald

Work Unit:
District/Area Office: Ottawa District Office
Date: 2016/05/31

Signature: 

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	5433-A7HJUS	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
City of Ottawa			
Date Reported to MOE:	2016/02/26	**Time Reported to MOE:**	09:22
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Non-compliance-Industrial Sewage Works Environmental Compliance Approval

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/02/26 09:21:58 AM
On December 21, 2015 the Ministry of the Environment and Climate Change completed an Industrial Sewage Works Inspection at the Orgaworld Ottawa Composting Facility located at 5123 Hawthorne Road in the City of Ottawa. The inspection concluded that Orgaworld was non-compliant with Condition 5.1 & Condition 10.3 in 2014.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/04/14 09:32 AM
No non-compliance was identified in the 2015 operating year that was available for review at the time of the inspection (Condition 10.3 - Annual Report - submission date of March 2016). Orgaworld must ensure the following action items are addressed to be compliant with their ECA. 1. Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 5 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year. 2. Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10 of the ECA, to the Ottawa District Office by no later than March 31, 2016. It should be noted that during the review of the district file and information requested as part of the inspection that Orgaworld had complied with Condition 5.1 for the 2015 operating year by analysing all samples collected as per Table 1 of the ECA. No environmental complaints or impacts were reported to the ministry as a result of lack of sample analysis for the 2014 operating year. The lack of analysis will impact Orgaworld's potential for relief for a reduction in the list of parameters and monitoring frequencies specified in Condition 5.3 as it pertains to Condition 5.1. Orgaworld will be required to demonstrate compliance with this condition consecutively over a period of time before the ministry would modify the monitoring program. --- March 10, 2016 - EO received email from Mike Rooke, Orgaworld (RM), providing copy of the 2014 Annual Report as required by action item #2 of the Industrial Sewage Works Inspection Report. All actions required outlined in the Industrial Sewage Works Inspection Report have been addressed. A copy of the 2014 Annual Report was submitted as required. No further MOECC action is required at this time; file closed.

Incident Description Continuation:

Incident Update:

	No

Was there an MOE field response?	
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	1 - Administrative

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent), Stormwater
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	5433-A7HJUS	Orgaworld must continue to ensu ...	2016/03/31	2016/03/31
VA	5433-A7HJUS	Orgaworld shall complete and su ...	2016/03/31	2016/03/10
VAI	3356-A63LEJ	1. Orgaworld must continue to e ...	2016/03/31	2016/03/31
VAI	3356-A63LEJ	2. Orgaworld shall complete and ...	2016/03/31	2016/03/10
VAI	3356-A63LEJ	3. Orgaworld shall provide an e ...	2016/03/31	VA not Required

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8851-A7HK9F
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/02/26	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/04/14**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

View

OK

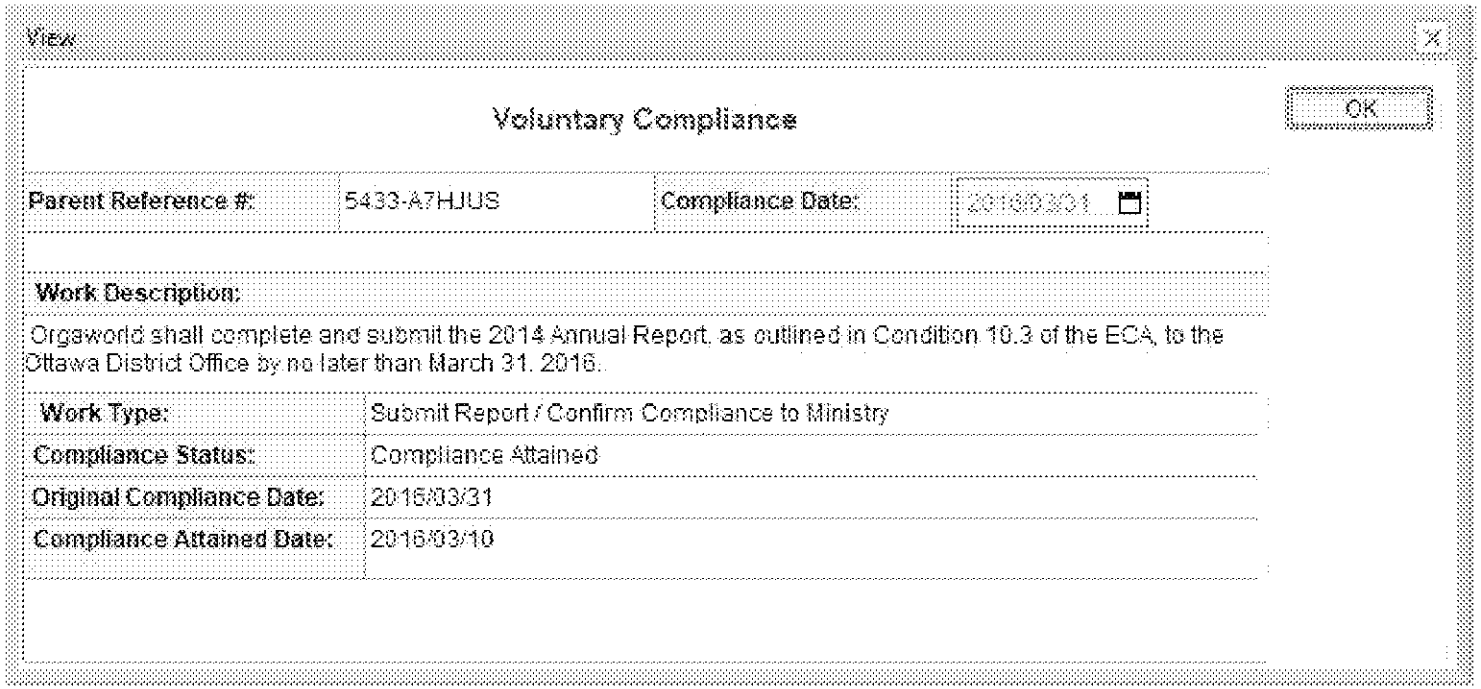
Voluntary Compliance

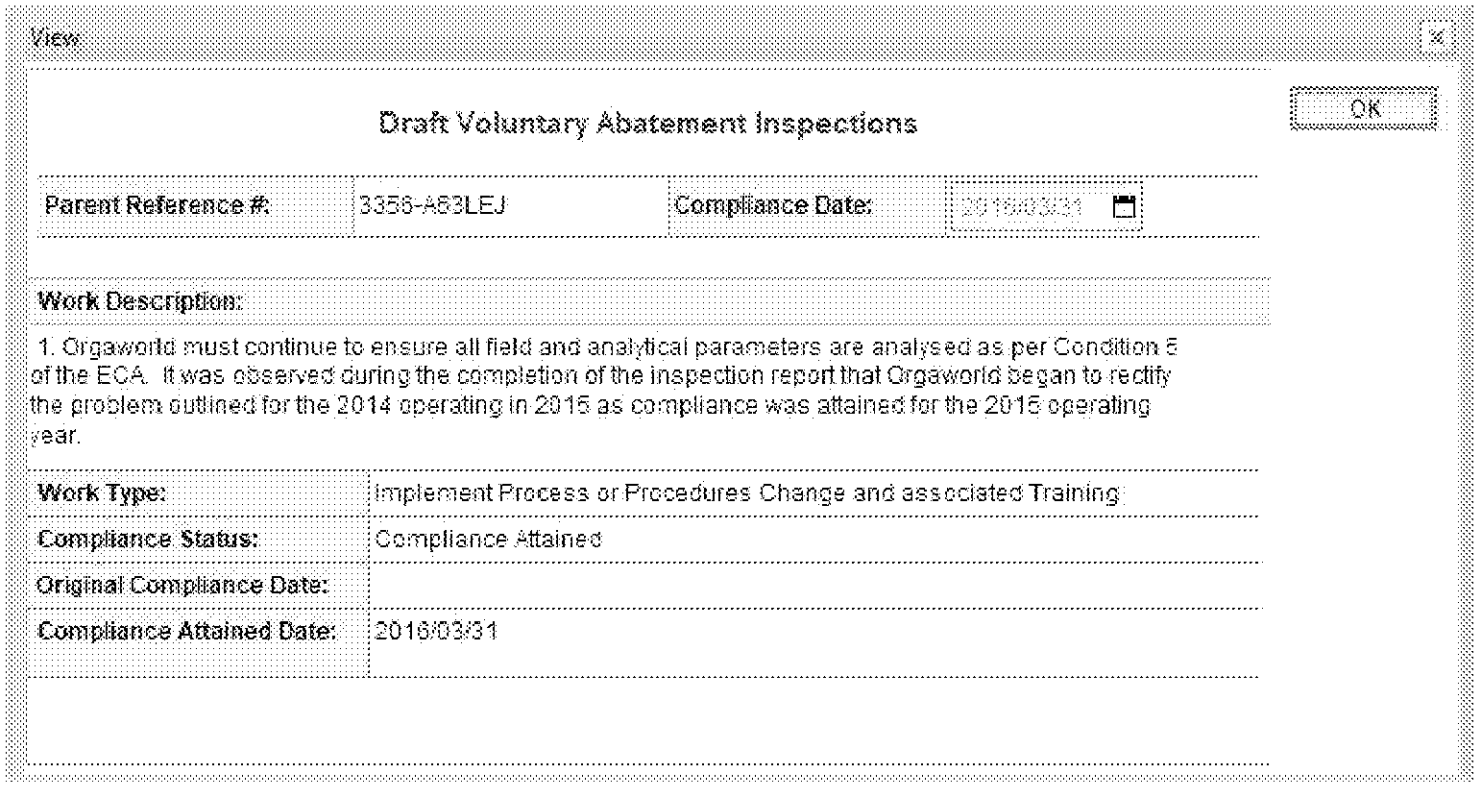
Parent Reference #:	5433-A7HJUS	**Compliance Date:**	2016/03/31

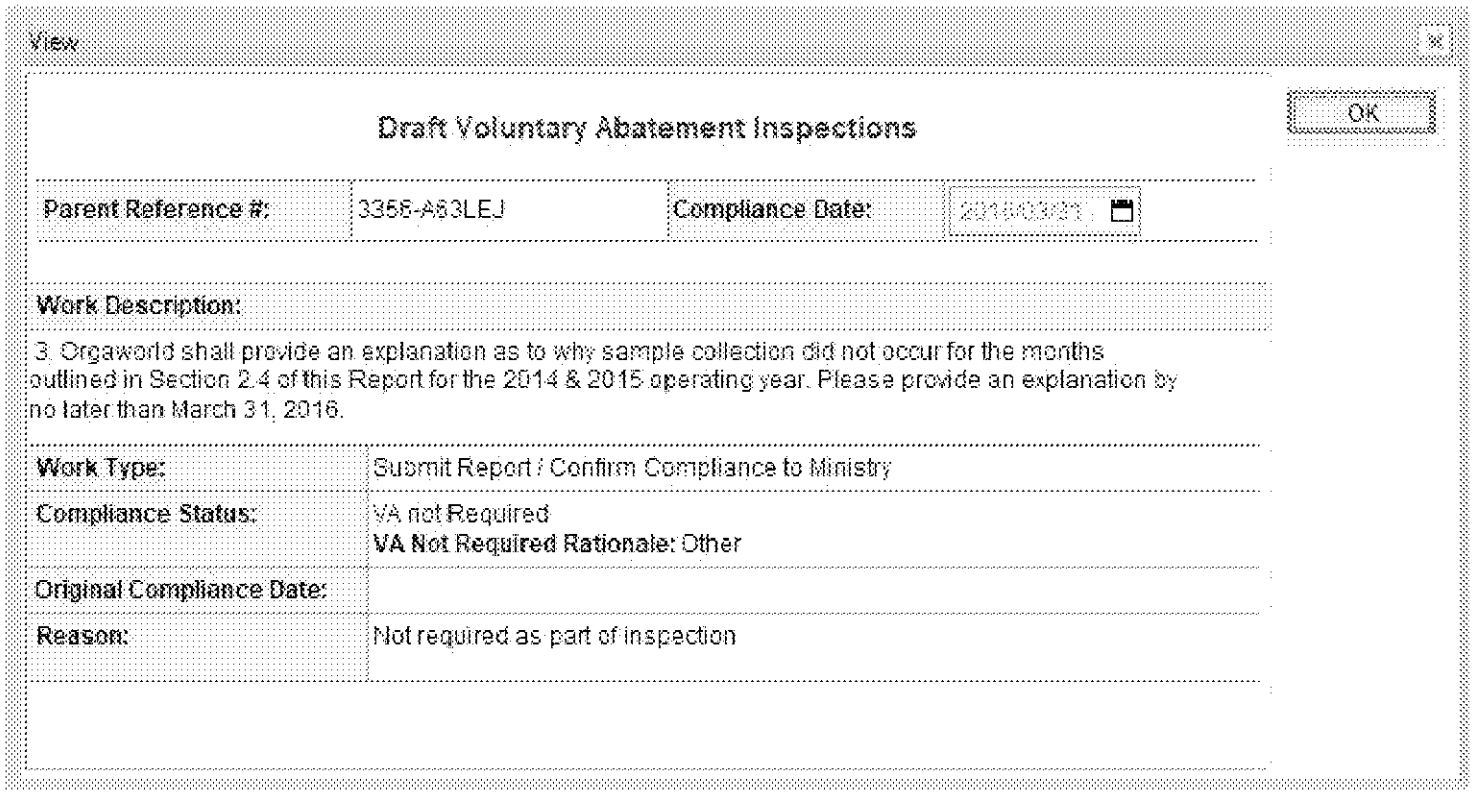
Work Description:

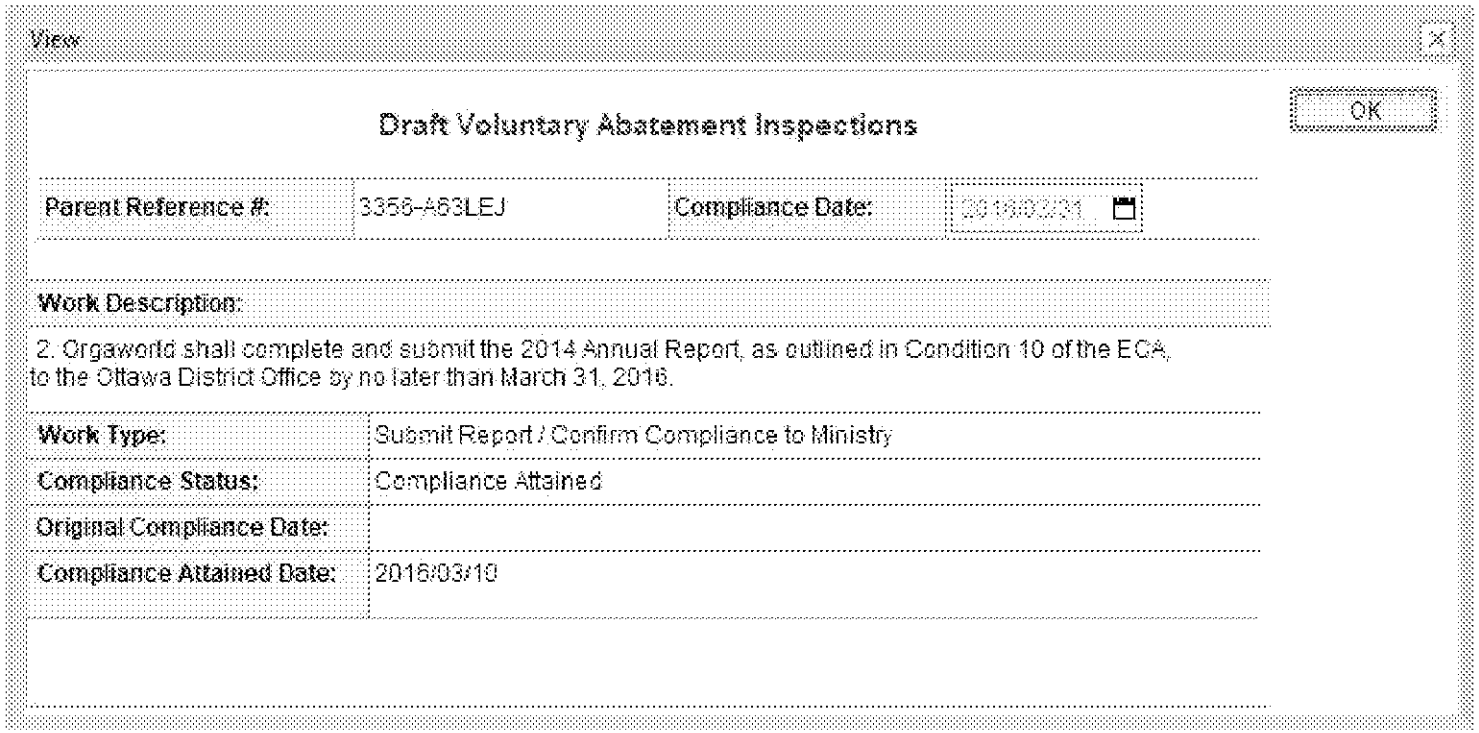
Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 5 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year.

Work Type:	Implement Process or Procedures Change and associated Training
Compliance Status:	Compliance Attained
Original Compliance Date:	2016/03/31
Compliance Attained Date:	2016/03/31


View
Voluntary Compliance
OK
Parent Reference #:
5433-A7HJUS
Compliance Date:
2016/03/31
Work Description:
Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10.3 of the ECA, to the Ottawa District Office by no later than March 31, 2016.
Work Type:
Submit Report / Confirm Compliance to Ministry
Compliance Status:
Compliance Attained
Original Compliance Date:
2016/03/31
Compliance Attained Date:
2016/03/10


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
3356-A83LEJ
Compliance Date:
Work Description:
1. Orgaworld must continue to ensure all field and analytical parameters are analysed as per Condition 8 of the ECA. It was observed during the completion of the inspection report that Orgaworld began to rectify the problem outlined for the 2014 operating in 2015 as compliance was attained for the 2015 operating year.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/03/31


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
3356-A63LEJ
Compliance Date:
Work Description:
3. Orgaworld shall provide an explanation as to why sample collection did not occur for the months outlined in Section 2.4 of this Report for the 2014 & 2015 operating year. Please provide an explanation by no later than March 31, 2016.
Work Type:
Submit Report / Confirm Compliance to Ministry
Compliance Status:
VA not Required
VA Not Required Rationale: Other
Original Compliance Date:
Reason:
Not required as part of inspection


View
Draft Voluntary Abatement Inspections
OK
Parent Reference #:
3358-A63LEJ
Compliance Date:
Work Description:
2. Orgaworld shall complete and submit the 2014 Annual Report, as outlined in Condition 10 of the ECA, to the Ottawa District Office by no later than March 31, 2016.
Work Type:
Submit Report / Confirm Compliance to Ministry
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/03/10

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0321-A85RET	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 610
Program:	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			

Date Reported to MOE:	2016/03/17	**Time Reported to MOE:**	15:58
Date of Incident:	2015/12/21	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Waste Transfer / Processing Inspection - Non-compliance

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2016/03/17 03:58:04 PM
On December 21, 2015 a Waste Transfer Processing Inspection was conducted which resulted in the following actions to be taken by Orgaworld: 1. By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report. 2. By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file. Awaiting completion of VAMA actions items.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2016/04/13 03:11 PM
April 12, 2016 - EO received email from Mike Rooke, Orgaworld (MR), providing copies of the updated Operations & Maintenance Manual and Daily Site Inspection Record Sheet. April 13, 2016 - (14:20) EO contacted Mike Rooke, Orgaworld, to discuss the actions taken by Orgaworld when an "On and off-site litter" issues is deemed "not OK" as per the findings in the 2015 inspection report. MR stated that when the daily inspection noted issues with on and off-site litter the issues was either pertaining to litter (dust/sand) on the paved areas of the site resulting in a street sweeper to be retained or was small amounts of litter (plastics) in which Orgaworld Staff would clean up as part of their daily tasks. - The new daily inspection record requires that all actions are to be entered when an item is assigned a "Not OK" in the check box. EO stated the review of the O&M Manuanl will be completed with comments provided by email when completed. --- As a result of the Inspection Report completed, Orgaworld Ottawa has submitted both updated documents as requested in Section 5.0 of the report. No further action is required at this time. File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	Yes

Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2015/12/21	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		1 - Administrative	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	6280-A63LG9	By no later than April 29, 2016 ...	2016/04/29	2016/04/12
VAI	6280-A63LG9	By no later than April 29, 2016 ...	2016/04/29	2016/04/12

Offence(s)

Suspected Violation(s)/Offence(s):

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	8544-A85RH5
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2016/03/17	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

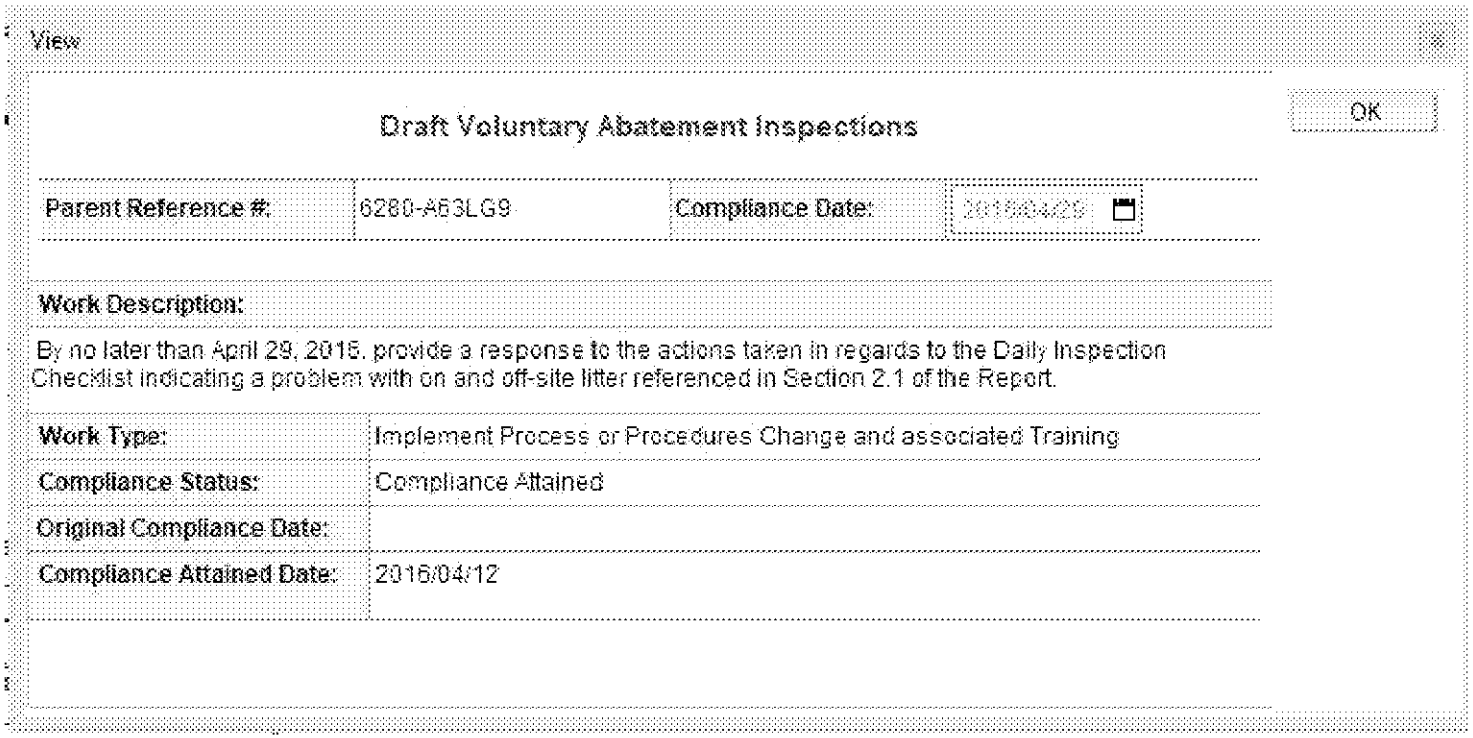
Signatures

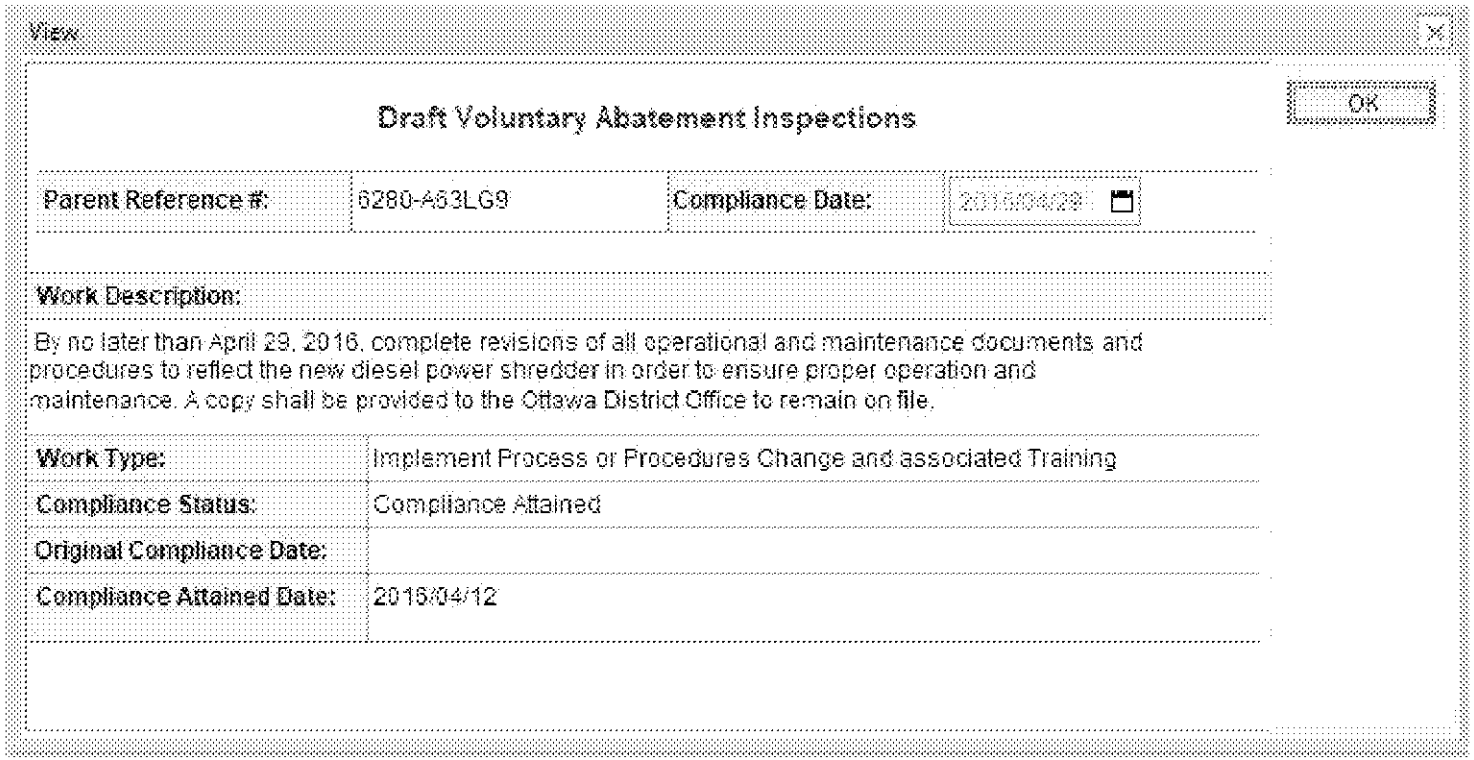
Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/04/13**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
6280-A63LG9
Compliance Date:
Work Description:
By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/04/12


View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
6280-A63LG9
Compliance Date:
2016/04/29
Work Description:
By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2016/04/12

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2746-9E3LUL	**File Storage Number:**	SI OT GL HA 230
Module:	Incident Reporting	**Module Type:**	ECA/CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	0734-9E3LX4
Originating Document:		**Created by:**	Kyle Straberger
Incident Report Reference Number:		2746-9E3LUL	
Date Created:	2013/12/04	**Date Completed:**	
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Recommended		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Kyle	Straberger

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2013/12/04 11:03		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Kyle Straberger		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca
Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Non-compliance - ECA - Monitoring Program *cannot be longer than 60 characters*
Incident Description:	A ministry inspection was completed at Orgaworld Ottawa to determine compliance with issued Industrial Sewage Works Environmental Compliance Approval. The results of the inspection determined that the Site had failed to obtain and record temperature of the SWMP during the monthly sample collection as required by Condition 5 of the ECA. As a result, the Facility must ensure the following action item is completed within the provided time frame to ensure compliance: 1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year. --- December 27, 2013 - EO Straberger received an email from Michael Rooke of Orgaworld with an attached document updating Caduceon Laboratories to inlcude 'temperature' as a parameter for the analysis of industrial sewage work samples. The submission of this information satisfies the actions requested of Orgaworld Ottawa. Documents received attached. Email to Mike Rooke acknowledging acceptance of the updated sample submission form and requesting implementation. Email received back indicating the sample submission document to Caduceon Labs has been implemented. No further MOE action is required at this time; file closed

Links & Comments:	
Attachments Names:	Email to EO Straberger from Michael Rooke, Orgaworld - Action Required for Stormwater Inspection Report.msg; Response to Action Required in Inspection Report 2012.pdf

Date & Time of Incident	**Incident Date Confirmation?** Actual 2013/11/21		
Source Type:		**Sector Type:**	

Nearest Watercourse:		Watershed Category Code:	
Environmental Impact:	Not Anticipated		
Nature of Impact:			
Incident Event:		Incident Reason:	
Damaged Party:	No		
What effluent types are being assessed?	Process (Effluent)		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	2746-9E3LUL	1. Develop and implement a proc ...	2014/01/03	2013/12/27
VAI	5470-9DNJAG	1. Develop and implement a proc ...	2014/01/03	2013/12/27

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Kyle Straberger
Badge No: 1529

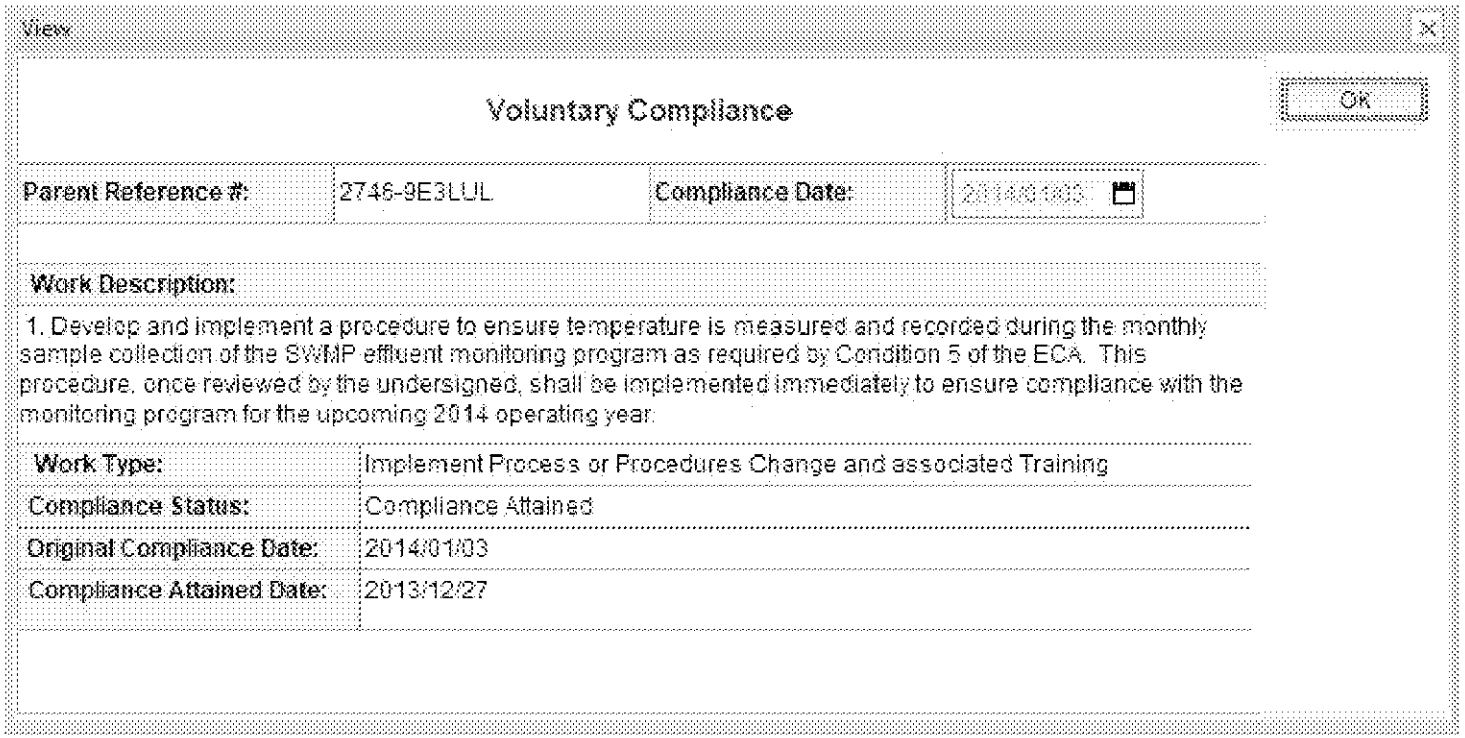
Work Unit:
District/Area Office: Ottawa District Office
Date: 2013/12/27

Signature:

District/Area Supervisor:
Name:

Work Unit:
District/Area Office:
Date:

Signature:


View
Voluntary Compliance
OK
Parent Reference #:
2746-9E3LUL
Compliance Date:
Work Description:
1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
2014/01/03
Compliance Attained Date:
2013/12/27

View

OK

Draft Voluntary Abatement Inspections

Parent Reference #:	5470-9DNJAG	**Compliance Date:**	2014/01/03

Work Description:

1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

Work Type:	Submit Remedial or Action Plan
Compliance Status:	Compliance Attained
Original Compliance Date:	
Compliance Attained Date:	2013/12/27

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	1327-8CCQJX	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	Legislation Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	3718-8CCQLJ
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		1327-8CCQJX	
Date Created:	2010/12/21	**Date Completed:**	2011/05/02
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Abatement - Voluntary

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/11/25 14:11		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: h.kaskens@orgaworld.nl
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	sewage inspection non compliance *cannot be longer than 60 characters*
Incident Description:	non compliance found during inspection; -unapproved alteration of sewage works - breach of the stormwater sewage lagoon Action items listed in inspection report: 1- Submit to the Ministry of the Environment a complete application for an amendment to the Sewage Works Certificate of Approval # 7032-88XPRAto reflect the alterations made to the system. Due by March 18th, 2010. 2- Submit to the undersigned, a report detailing the maximum pumping capacity of the sump pump at the site. Due by January 21st, 2010 TH. - report emailed on January 21st, 2011 detailing pump capacity. Company indicated that they have plugged the inlet of the pit therefore eliminating the need to pump groundwater. TH - Application to amend CofA was received by EAAB on March 21st, 2011

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2010/11/25		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

What effluent types are being assessed?	

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	1327-8CCQJX	Submit pump information	2011/01/21	2011/01/21
VA	1327-8CCQJX	submit application to amend CofA ...	2011/03/18	2011/03/21

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:

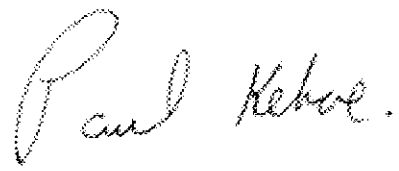


Area Supervisor:

Name: Paul Kehoe

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/05/02

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	5327-8CCR48	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	4666-8CCR5B
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		5327-8CCR48	
Date Created:	2010/12/21	**Date Completed:**	2011/04/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Abatement - Voluntary

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/10/21 14:38		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3
Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3
Telephone: (613)822-2056, FAX: (613)822-2058, email: h.kaskens@orgaworld.nl
Client #: 0746-8A7NQ5, Client Type: Corporation

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Air inspection non compliance *cannot be longer than 60 characters*
Incident Description:	Air inspection revealed some non compliance issues. 1- Create and implement a maintenance schedule as discussed in Section 2.8 of this report. 2- Create, implement and maintain as spare parts list and inventory. 3- Submit a report of compliance with actions items 1 and 2 listed above to the undersigned officer. Due: February 4th, 2010. T.H. Email received on Feb 4th, 2011 confirming compliance.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2010/10/21		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	5327-8CCR48	Submit a report of compliance	2011/02/04	2011/02/04

Offence(s)

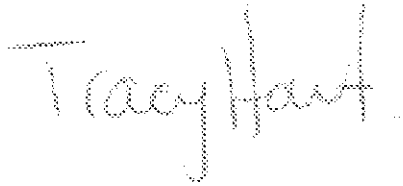
Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:

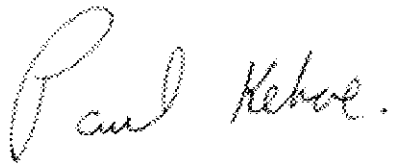


Area Supervisor:

Name: Paul Kehoe

Work Unit:
District/Area Office: Ottawa District Office
Date: 2011/04/29

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	4566-BDVJ82	**Module Type:**	Pollution Incident Report (PIR)
Status:	To be assigned	**File Storage Number:**	SI OT GL HA 100
Program:	Waste - Solid/Non-hazardous	**Activity:**	Pollution Incident Reports

Date Reported to MOE:	2019/07/02	**Time Reported to MOE:**	13:10
Date of Incident:	2019/06/29	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Renewi Canada Ltd. Mailing Address: 2940 Dingman Dr, London, Ontario, Canada, N6N 1G4 Physical Address: 2940 Dingman Dr, London, City, County of Middlesex, Ontario, Canada, N6N 1G4 Telephone: (999)999-9999 Client #: 5810-B5NJ5L, Client Type: Corporation

Site(s)

Site Details
Renewi Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456665.96, UTM Northing: 5016595.9, Latitude: 45.301529, Longitude: -75.55272 Site #: 6165-B9LSA2

Incident Summary:
Odour Complaint - Renewi Ottawa

Initial Incident Description (as reported):
Created: Kyle Straberger (Ottawa District Office) - 2019/07/08 09:48:46 AM
MECP Public Information Centre received an email on July 2, 2019 pertaining to an odour complaint from Renewi Ottawa operations:

There's been an continuous odor emitting form Orgaworld at 5123 Hawthorne Rd, Gloucester, ON since June 29 , 2019. We live approximately 1.5 kms southeast and have been smelling this for over 3 days now , normally we get a whiff once in a while , but not for 3 days.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	
Were there samples collected / analyzed at any time?	
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
To be determined	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	

	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	0313-BDVJEC
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2019/07/08	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	
Badge No:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0885-AXBR46	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Closed	**File Storage Number:**	SI OT GL HA 230
Program:	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ottawa			
Date Reported to MOE:	2018/03/15	**Time Reported to MOE:**	10:00
Date of Incident:	2018/03/15	**Time of Incident:**	
Incident Date Confirmation:	Estimated		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Industrial Sewage Works Non-compliance

Initial Incident Description (as reported):

Created: Kyle Straberger (Ottawa District Office) - 2018/03/29 03:40:59 PM

As a reuslt of an Industrial Sewage Works Inspection on March 15, 2018, the following non-compliance items were identified:

1. Failure to collect monthly sample for October 2017 as per ECA condition
2. Failure to collect monthly sample due to ice covered conditions

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2020/05/25 11:10 AM

Please see the VAMA Table for actions required.

April 24, 2018 - David Veinot sent a letter to the ministry providing responses to the action items outlined in the Industrial Sewage Works Inspection Report. See responses below:

Action Item #1: Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events.

Response: Orgaworld is committed to ensuring that water samples will be taken from the Storm Water Retention Pond on a monthly basis in accordance with Condition 4(1) of our Industrial Sewage ECA – Action Item Completed 4/24/2018.

Action Item #2: Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the facility plans to satisfy the requirements of the ECA.

Response: Orgaworld is exploring accessability options at our Storm Water Retention Pond which will allow for year-round water sampling while ensuring the safety of our staff. A description of the corrective action taken will be sent to the MOECC once the infrastructure has been installed and tested, but no later than December 31, 2018 – Action Item Outstanding.

December 10, 2018 - David Veinot sent a letter to the ministry providing a follow-up to the outstanding Action Item #2.

Action Item #2: Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the facility plans to satisfy the requirements of the ECA.

Response: Orgaworld explored a variety of accessability options at our Storm Water Retention Pond which would allow for year-round water sampling while ensuring the safety of our staff. Since your inspection, Renewi Canada has installed 6 aerators in the stormwater retention pond which will be operated year-round. The aerators are expected to prevent a build-up of ice in the areas immediately surrounding them. A pond water sample will be drawn on a monthly basis from this ice-free area, and submitted for analysis in accordance with our ECA. It is anticipated that the aerators will improve the ammonia concentrations found in the water through improved aeration - but the open water may also attract more well-fed geese. A photo of the operating aerators is provided on the next page. – Action Item Closed

July 10, 2018 - The company installed the first of six aerators in the stormwater management pond.
November 28, 2018 - The company installed the remaining five aerators.

The 2019 Annual Monitoring Report reported that the aerators worked continuously throughout the 2019 operating year with unplanned downtime as a result of units freezing. During the 2019, all months were sampled.

The company has addressed the non-compliance identified in the Industrial Sewage Works Inspection Report by installing aerators within the stormwater management pond. As a result, all monthly samples were able to be collected during the 2019 operating year.

No further MECP action required at this time; File Closed

Incident Description Continuation:

Incident Update:

Was there an MOE field response?		Yes	
Site Visit (other than inspection or ERP Response):		No	
Inspection:		Yes	
ERP Response:			
Date of Arrival at Site:	2018/03/15	**Time of Arrival at Site:**	10:00
Were there samples collected / analyzed at any time?		No	
Known or Suspected Health / Environmental Consequence at the Time of Incident			
Health / Environmental Consequence:		2 - Minor Environment	

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
For Sewage programs, what effluent types are being assessed?	Process (Effluent), Stormwater
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report?
(legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	8338-AXAPUW	Orgaworld Canada Inc. must ensu ...	2018/04/27	2018/04/24
VAI	8338-AXAPUW	Orgaworld Canada Inc. must revi ...	2018/12/31	2018/12/10

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

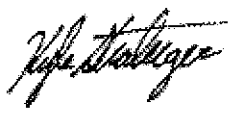
Waste / EGR Information entries:

Document Related Information

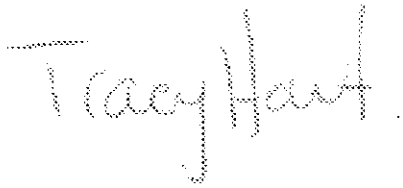
Cross Reference:	(doc link)	**Task Link:**	5152-AXBR6Q
Originating Document:		**Created by:**	Kyle Straberger
Date Created:	2018/03/29	**Date Completed:**	2021/06/16
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

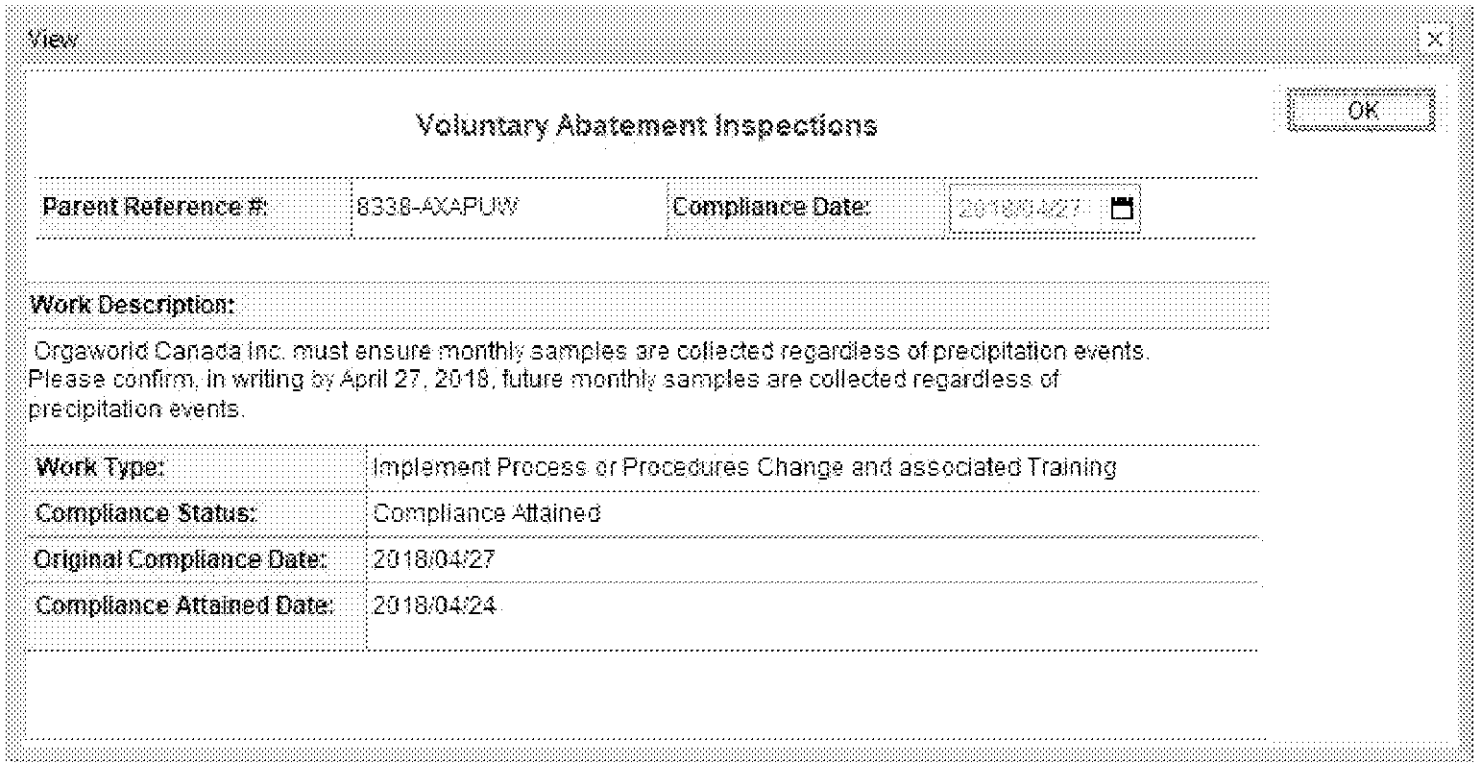
Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2020/05/25**
Signature:	

District Manager:

Name:	Tracy Hart
Work Unit:	
District/Area Office:	
Date:	2021/06/16
Signature:	


View
OK
Voluntary Abatement Inspections
Parent Reference #:
8338-AXAPUW
Compliance Date:
2018/12/31
Work Description:
Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the Facility plans to satisfy the requirements of the ECA.
Work Type:
Submit Remedial or Action Plan
Compliance Status:
Compliance Attained
Original Compliance Date:
2018/12/31
Compliance Attained Date:
2018/12/10


View
OK
Voluntary Abatement Inspections
Parent Reference #:
8338-AXAPUW
Compliance Date:
Work Description:
Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events.
Work Type:
Implement Process or Procedures Change and associated Training
Compliance Status:
Compliance Attained
Original Compliance Date:
2018/04/27
Compliance Attained Date:
2018/04/24

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	3026-9L2P9M	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	5052-9L2PAM
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		3026-9L2P9M	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:		**Name of Company:**
First Name	**Last Name**	
Mike	McKenzie	

Contact Mailing Address

Civic Address:			**Unit Identifier:**
3051 Westminster Dr.			
Delivery Designator:			**Delivery Identifier:**
Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
London		Ontario	
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(519)681-6370		**Fax**	

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/06/13 14:01		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint - VALID *cannot be longer than 60 characters*
Incident Description:	Caller stated that Orgaworld stinks this morning. JM - Complaint deemed valid due to wind direction

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/06/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

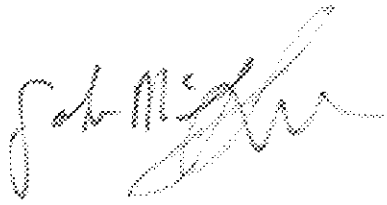
Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

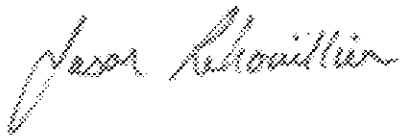


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0484-9L2NZW	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	7288-9L2P37
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		0484-9L2NZW	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:		**Name of Company:**	
First Name	**Last Name**		
Orgaworld	Answering service		

Contact Mailing Address

Civic Address:			**Unit Identifier:**
Delivery Designator:			**Delivery Identifier:**
Municipality:	**Postal Station:**	**Province/State:**	**Postal Code:**
London		Ontario	
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
		Fax	

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/06/12 16:55		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint- VALID *cannot be longer than 60 characters*
Incident Description:	Odour complaint from Roma Lynn Gillis at 4:50pm June 12, 2014. JM - Complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2014/06/12		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

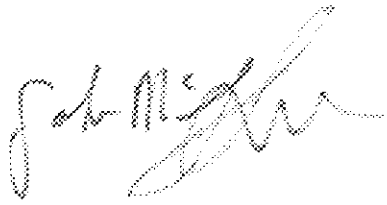
Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

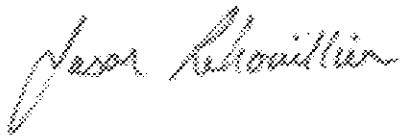


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	0163-9L2PLE	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	1377-9L2PMV
Originating Document:		**Created by:**	Jeff Mills
Incident Report Reference Number:		0163-9L2PLE	
Date Created:	2014/06/13	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:	**Name of Company:**
s.21	

s.21

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/06/13 14:24		
Office Receiving Incident Report:	London District Office		
Incident Info Received By:	Jeff Mills		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7 Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7 Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB

Incident Information

Incident Summary:	Odour complaint - VALID *cannot be longer than 60 characters*
Incident Description:	Caller states that Orgaworld stinks this morning. JM - complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/06/13		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Event:		**Incident Reason:**	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

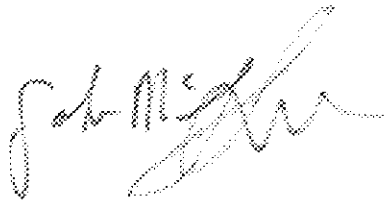
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/17

Signature:

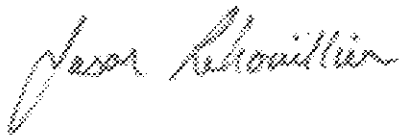


Wru Supervisor:

Name: Jason Lehouillier

Work Unit:
District/Area Office:
Date: 2016/01/29

Signature:



Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0114-AE9RA4	**Module Type:**	Pollution Incident Report (PIR)
Status:	Recommended	**File Storage Number:**	SI OT GL HA 100
Program:	Air	**Activity:**	Pollution Incident Reports

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Anthony	Brown
Name of Company:	
City of Ottawa - Program Co-ordinator for Recycling and Material Diverions.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
Ottawa		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)327-3568		**Fax**	

Date Reported to MOE:	2016/09/29	**Time Reported to MOE:**	15:50
Date of Incident:	2016/09/29	**Time of Incident:**	15:44
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca

Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

Simcon Steel
Address: 3436 Rideau Rd, Ottawa, City, K1G 3N4
District Office: Ottawa
LIO GeoReference: Zone: 18, UTM Easting: 455792.7, UTM Northing: 5016718.5, Latitude: 45.302578, Longitude: -75.56387
Site #: 0034-7AALHB
+ + + +
Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:

Orgaworld: Odour complaint from nearby worker.

Initial Incident Description (as reported):

Created: Jeremy Weiss (Spills Action Centre) - 2016/09/29 03:50:27 PM

-City of Ottawa reporting they received a call from a citizen regarding an odour complaint suspected from Orgaworld.
-Caller to City of Ottawa did not leave their name, but works at Simcon Steel Ltd (3436 Rideau Road, 613.822.9494), which is reported to be near Orgaworld (Google Maps shows approx. 655m "as the crow flies").
- City of Ottawa had notified Orgaworld of the odour complaint and will provide Orgaworld with 311 File Number and IDS IR #. Upon speaking with Orgaworld, City of Ottawa was informed that they (Orgaworld) was conducting inspections around the time of the complaint and that operations were okay at the facility.
-Message left to City of Ottawa stated they work near Orgaworld and odours were horrendous, hard to work with and wanted an investigation into the odours.

___ CONTACTS ___

Orgaworld:
Nick Pora, 613.797.4671

1611
SACjw
Wunderground.com, Ottawa International (45.32 deg N, 75.60 deg W) as of 16:11
Temp: 17.6 deg. C
Wind: only states from NORTH with no speed
Humidity: 57%
Pressure: 1032 hPa

SAC Action Class:	Pollution Incident Reports (PIRs) and “Other” calls
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2016/11/14 09:27 AM

EO Straberger

September 30, 2016

- Review weather data for September 29, 2016 collected from Ottawa International Airport:

Wind Direction = North
Average Wind Speed = 22.4km/hr
Weather = Clear in the morning and cloudy in the afternoon

Distance from Orgaworld stack to Simcon Steel Ltd = 825m
Complaint Location = east north east of the Orgaworld Stack

(9:24) Phone call to Nick Pora, Orgaworld, to discuss the complaint. Nick stated that he is currently working on the complaint investigation and is reviewing the meteorological in comparison to the SCADA system for Orgaworld. Nick also conducted a site visit to complaint site and spoke with an employee to discuss the odours. Nick stated an odour was detected but was difficult to describe and was not comparable to Orgaworld however could not rule it out. Other sources were observed, Tomlinson evaporation stacks (direct plan of view) and other industrial operations in the industrial park. Nick will provide the formal complaint response report to the MOECC once complete.

(10:58) Received email from Nick Pora, Orgaworld Ottawa, providing the complaint log completed as a result of the odour complaint. The summary of the complaint is as follows:

Name of Complaint - Simco Steel
Address - 3436 Rideau Road, Ottawa
Telephone Number - (613) 822-9494
Date: September 29, 2016
Time: 3:35pm (Received at 3:50pm)
Weather Conditions: ENE, 27 gust 37 km/hr, 17.6C, partly cloudy
Detail of Complaint - Business on Rideau Road phones City's 311 line to complain about "a bad smell"
Action Taken: Nick Pora went directly to location of complaint to investifate. Spoke to complainant about this smell being different (3:55pm). Directly downwind from 2 Tomlinson staks. Drive to different location but could not detect "Orgaworld" odours
Possible Cause(s) for Complaint: Odour orginating from other source. Doors open to let in/out curbside
End Result of Investigation: Some SCADA programming work was being done but plant was functioning correctly (normally). Ensure that receiving doors are only open when trucks passing through them.

October 5, 2016 - Emailed Nick Pora outlining the requirements of Condition 8 of the ECA requiring the submission of a report to the District Manager outlining the complaint and the follow-up completed.

October 5, 2016 - Received email from Nick Pora stating that the report will be submitted tomorrow if acceptable.

October 6, 2016 - Nick Pora sent email to Steve Burns, District Manager, providing the report into the complaint and investigation completed.

October 11, 2016 - Response letter sent to Orgaworld Ottawa acknowledging compliance with notification requirements and accepting the results of the investigation into the odour complaint.

It is of the opinion of the Environmental Officer that the results from the investigation completed by Orgaworld representative that the complaint of odours was not related to compost odours. The ministry and Orgaworld will continue to follow-up with odour complaints when received by the public.

No further MOECC action is required at this time; file closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Attachments:	
Attachments Names:	Orgaworld Ottawa Complaint Log - September 29, 2016 (Odour).pdf
Links & Comments:	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ● No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	3146-AE9RQK
Originating Document:		**Created by:**	Jeremy Weiss
Date Created:	2016/09/29	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Jeremy Weiss
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	**1529**
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2016/11/14**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	8466-9NQQNL	**File Storage Number:**	MI LN WE
Module:	Incident Reporting	**Module Type:**	Pollution Incident Report (PIR)
Cross Reference:	(doc link)	**Task Link:**	7460-9NQQQK
Originating Document:		**Created by:**	John Crouter
Incident Report Reference Number:		8466-9NQQNL	
Date Created:	2014/09/07	**Date Completed:**	2016/01/29
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Air	**Activity:**	Pollution Incident Reports

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

s.21

Reported By:			
Contact Mailing Address			
			Unit Identifier:
			Delivery Identifier:
s.21	**Postal Station:**	**Province/State:**	**Postal Code:**
		Ontario	
	Extension:	**Other Number:**	**Email Address:**

Reported By:	

MOE Information

Date & Time Reported to MOE:	2014/09/07 15:17		
Office Receiving Incident Report:	Spills Action Centre		
Incident Info Received By:	John Crouter		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			

SAC Action Class:	Air Spills - Gases and Vapours		
Non-Standard Procedure:	No		
ERP Call-out Initiated:	No		

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 4675 Wellington Rd S, London, Ontario, Canada, N6E 3W7
Physical Address: 4675 Wellington Rd S, London, City, County of Middlesex, Ontario, Canada, N6E 3W7
Telephone: (519)495-5497, FAX: (519)649-7757, email: ezevenhuizen@orgaworld.ca
Client #: 0906-6N4K5J, Client Type: Corporation, NAICS: 562219

Site(s)

Site Details

Orgaworld Canada Ltd. Ottawa Composting Facility
Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan,
Geographic Township: GLOUCESTER, Ottawa, City
District Office: Ottawa
GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, ,
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 2167-7FJPKB
+ + + +
1125 Wellington Road South
Address: 1125 Wellington Rd S, London, City, County of Middlesex
District Office: London - District
LIO GeoReference: Zone: 17, UTM Easting: 482022.5, UTM Northing: 4753115.5, Latitude: 42.930454, Longitude: -81.220314
Site #: 1966-5LNRP5

Incident Information

Incident Summary:	Orgaworld- odour complain - VALID *cannot be longer than 60 characters*
Incident Description:	Caller indicates that there is an odour coming from the Orgaworld. The caller indicates that the odour is quite strong. The odours have been going on all day. Caller rates the odour was about a 9 and is ongoing. (JM) Complaint deemed valid due to wind direction.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2014/09/07		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			

Nature of Impact:			
Incident Event:		Incident Reason:	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	MOE/Other Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	○ Yes	● No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Offence(s)

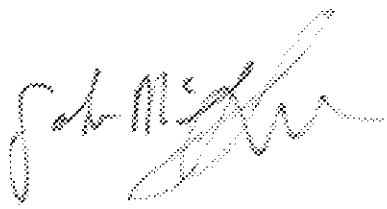
Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

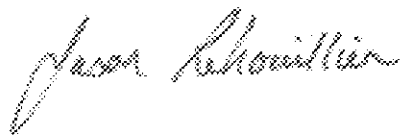
Name: John McGlynn
Badge No: 993

Work Unit: London District
District/Area Office: London District Office
Date: 2014/10/29

Signature:



Wru Supervisor:

Name:	Jason Lehouillier
Work Unit:	
District/Area Office:	
Date:	2016/01/29
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	8187-BPMNHB	**Module Type:**	ECA/CofA/Permit Non-Compliance
Status:	Recommended	**File Storage Number:**	SI OT GL HA 610
Program:	Waste - Solid/Non-hazardous	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**	**Branch/Region:**	**Section:**
Kyle	Straberger	Eastern Region	Not Available
Municipality/Unorganized Twp:			
Ministry of the Environment, Conservation and Parks			

Date Reported to MOE:	2020/04/30	**Time Reported to MOE:**	13:28
Date of Incident:	2020/04/30	**Time of Incident:**	
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd , Lot 27, Conc.6, Reference Plan 2003 Official Plan, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , Site #: 2167-7FJPKB

Incident Summary:

FA Re-Evaluation - Environmental Compliance Approval 2766-7HEPSZ

Initial Incident Description (as reported):

Created: Kyle Straberger () - 2020/05/15 01:28:15 PM

On April 30, 2020 the Ministry of the Environment, Conservation and Parks generated a Non-compliance Stub for a Financial Assurance (FA) re-evaluation for non-compliance with Condition 1(20) of Environmental Compliance Approval Number 2766-7HEPSZ.

SAC Action Class:	
Non-Standard Procedure:	No

Incident Description:

Last update: Kyle Straberger (Ottawa District Office) - 2020/05/15 03:53 PM

Condition 1.(20)
(a) Within twenty two (22) days from the date of this Approval, the Owner shall submit to the Director an additional Financial Assurance in the amount of CAD$190,226.00. This additional Financial Assurance shall be in a form acceptable to the Director.

(b) The Owner shall maintain the existing Financial Assurance in the amount of CAD$727,700.00.

(c) The new total Financial Assurance in the amount of CAD$917,926.00 shall provide sufficient funds for the transportation, Site clean-up and disposal of all quantities of waste on the Site at any one time.

(d) Commencing on April 30, 2020 and at intervals of three (3) years thereafter, the Owner shall submit to the Director, a re-evaluation of the amount of Financial Assurance to implement the actions required under Condition 1.(20)(c). The re-evaluation shall include an assessment based on any new information relating to the environmental conditions of the Site and shall include the costs of additional monitoring and/or implementation of contingency plans required by the Director upon review of the closure plan and annual reports.

(e) Commencing on April 30, 2018, the Owner shall prepare and maintain at the Site an updated re-evaluation of the amount of Financial Assurance required to implement actions required under Condition 1.(20)(c) for each of the intervening years in which a re-evaluation is not required to be submitted to the Director under Condition 1.(20)(d). The re-evaluation shall be made available to the Ministry staff, upon request.

(f) The amount of Financial Assurance is subject to review at any time by the Director and may be amended at his/her discretion. If any Financial Assurance is scheduled to expire or notice is received, indicating Financial Assurance will not be renewed, and satisfactory methods have not been made to replace the Financial assurance at least sixty (60) days before the Financial Assurance terminates, the Financial Assurance shall forthwith be replaced by cash.

May 7, 2020 - David Veinot, Convertus (formerly known as Orgaworld or Renewi), emailed EO Straberger and provided an update to the FA re-evalutation as required by Condition 1(20) of Environmental Compliance Approval Number 2766-7HEPSZ. On April 30, 2020 Convertus sumbitted, by mail, the 2020 Financial Assurance Re-Evaluation package to MECP's Client Services and Permissions Branch.

May 8, 2020 - Emailed David Veinot acknowledging receipt of the email and advised the information will be updated into the MECP's system.

The Ministry of the Environment, Conservation and Parks created a Non-Compliance Stub as a result of not receiving a FA Re-evaluation for Environmental Compliance Approval Number 2766-7HEPSZ on April 30, 2020. On May 7, 2020 Convertus advised the Ottawa District Office that on April 30, 2020 the financial re-evaluation package was submitted to the Ministry's Client Services and Permissions Branch via mail.

The Ministry's Client Services and Permissions Branch will review the information and provide a response to the company regarding the FA re-evaluation package.

No further action required by the local Ottawa District Office at this time.

File Closed.

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	1 - Administrative

Has a Water Body been impacted?	No
Receiving Environment:	
Incident Event:	
Incident Reason:	
MOE/Other Agencies Involved:	
Was there a discharge / emission / spill of a contaminant to the environment?	
No	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? (legislation, certificate of approval, order, or guideline)
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	● Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	8187-BPMNHB	Submit Financial Assurance Re-E ...	2020/04/30	2020/04/30

Offence(s)

Suspected Violation(s)/Offence(s):	

Waste / EGR Information

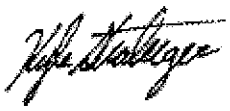
Waste / EGR Information entries:

Document Related Information

Cross Reference:	0127-9V4HMK (doc link)	**Task Link:**	8124-BPMRDP
Originating Document:	CofAs 0127-9V4HMK	**Created by:**	Kyle Straberger
Date Created:	2020/05/15	**Date Completed:**	
Office Receiving Incident Report:	Ottawa District Office	**Incident Info Received By:**	Kyle Straberger
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Kyle Straberger**
Badge No:	
Work Unit:	
District/Area Office:	**Ottawa District Office**
Date:	**2020/05/15**
Signature:	

District/Area Supervisor:

Name:	
Work Unit:	
District/Area Office:	
Date:	
Signature:	

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

INCIDENT REPORT

Reference Number:	0335-AVPTEJ	**Module Type:**	Spill
Status:	In progress	**File Storage Number:**	
Program:	Air	**Activity:**	Spills

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Brian	Begg
Name of Company:	
Orgaworld Ottawa Inc.	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
5123 Hawthorne Road			
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	K1G 1Y3
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
(613)822-2056	142	**Fax**	

Date Reported to MOE:	2018/02/05	**Time Reported to MOE:**	16:39
Date of Incident:	2018/02/05	**Time of Incident:**	09:00
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details
Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210

Incident Summary:
Orgaworld Canada: Facility Fire(Smothering) tunnels 7 and 8, contained

Initial Incident Description (as reported):
Created: Aaron Richards (Spills Action Centre) - 2018/02/05 04:39:58 PM
Brian Begg, Orgaworld Canada to SAC(ar). Brian states the facility experienced a fire(smothering) today involving tunnels #7 and #8. The cause of the fire is reported to be a result of the fermentation process, producing smoke. Brian states the Ottawa FD was contacted and arrived on site shortly after 09:00 where water was applied to the waste piles. Brian does not know how much water was applied but states that the on site reservois tank with a capacity of 125,000 US gallons was emptied. Brian states that the water was contained to the concrete bunker which is surrounded by a trench that leads to on site storage tanks. Brian states that there have been no off site impacts regarding run off water or smoke. Brian states one pumper truck is remaining on site to ensure all smouldering has been put out. Brian states that the waste involved willl be stored outside the bunker until it can be determined that all smouldering has ceased. 17:01 SAC(ar) to Ottawa FD, Jennifer. Jennifer states she will aquire information regrading volume of water applied and if there was any off site runoff related to the event and provide SAC with an update. 17:16 Ottawa FD, Jennifer to SAC(ar). Jennifer provided contact information for fire chief on site, Kevin Lambert (613-913-4605). 17:18 SAC(ar) to Kevin Lambert, Ottawa FD. Kevin states that the reservoir on site (14, 000 L capacity) was drained to apply to the waste material. Kevin states there is a catchment system on site and that the water that was applied was recaptured. Kevin states there were no observations of off site impact and no concerns for residential areas. One pumper truck has remained on site to spray the waste pile to prevent re-ignition. Kevin anticipates crews to remain on site until approximately 22:00 tonight. SAC(ar) requested an update when crews leave site for the night. *** SIte not within SWPA ***

SAC Action Class:	Air Spills - Fires
Non-Standard Procedure:	No

Incident Description:
Last update: Kyle Straberger (Ottawa District Office) - 2018/02/26 02:17 PM
EO Straberger

9am - Phone call from Brian Begg (BB), Orgaworld stating a fire (smouldering of SSO) has occurred at the Orgaworld Ottawa Facility. FIre Department has been notified and just arrived on-site. Further updates will follow

---

Email to BB - Outlined requirements in the ECA to report spills to teh SAC and follow-up report to the DM.

Hi Brian,

As part of Orgaworld's ECA, Condition 11 – Emergency Situations Response and Reporting requires all spills (fires are considered a spill to air) to be reported to SAC. As part of the condition, a report is to be submitted to the District Manager (Steve Burns) within 3 calendar days following the event.

This may already be outlined in Orgaworld's Emergency Response and Contingency Plan however this email may serve as a reminder. Please let me know if you have any questions.

Thank you,

Kyle Straberger

MSG - (11:00) BB, Orgaworld - Call back (613-790-0146

11:05am - Phone call to BB, Orgaworld. The material will be pulled outside and extinguished. The Fire Department has control of the site and Orgaworld is not allowed to enter until it has been released (health & safety reasons). Material could be outside for several days. City of Ottawa trucks hauling source separated organics are arriving and wanted to unload. Orgaworld would like to request the temporary storage of approx. 6 trucks (10 tonnes) and relocated it back inside when the fire department releases the site back to Orgaworld. Orgaworld believes it will be relocated back inside int he afternoon (1/2pm).

11:20am - Phone call BB outlining the ministry is in agreement with proposal. Email sent outlining additional requirements.

Hello Brian,

I concur with your proposal to allow for the temporary outdoor storage of approx. 10 tonnes (6 truckloads) of source separated organics at the Orgaworld Ottawa Facility today only, February 5, 2018, until the Ottawa Fire Department releases the site back to Orgaworld Ottawa.

In order to temporarily store the waste outside the following conditions will need to be complied with:

- Orgaworld Ottawa shall maintain records of the total amount of waste received and stored temporarily outside

- No additional waste or materials are to be stored outside; only incoming source separated organics from the City of Ottawa

- In the event complaints are received by Orgaworld Ottawa or the Ministry of the Environment and Climate Change, the source separated waste being stored at the site shall be either moved into the building immediately (if agreed to by the Ottawa Fire Department) or disposed of at a ministry approved waste disposal site by an approved waste management system

- Orgaworld Ottawa is approved to accept waste Monday to Friday from 6am to 7pm. In the event waste will not be relocated back into the processing building by 7pm, Orgaworld Ottawa will be required to remove the waste off-site to a ministry approved waste disposal site by an approved waste management system.

If you have any questions please contact me to discuss.

Regards,

Kyle Straberger

Email from BB - Agree thank you

Email from BB - Good afternoon Kyle it is now 6:00 PM all the Sso that was stored outside while the fire department had control is now all inside receiving thank you

February 6, 2018 - (9:30am) Phone call to BB. Approx. 600-800 tonnes (8 trucks) of the residual material is stored outside while the fire department has control of the site. The residual pile is still outside and will need to remain there until it is safe to go back in. Pile was steaming this morning and Orgaworld is monitoring it. Looking to have the pile moved inside by the weekend or early next week. No run-off from the pile has occurred since it was moved outside. Update will be provided to the MOECC on Friday as to the status of the residual pile

February 7, 2018 - Site visit to Orgaworld. Met with BB. Pile of residual is smouldering as of this morning. Orgaworld will be having a loader adjust the pile and put out the smouldering spot. No water will be applied to prevent run-off and surface water impacts. Advised Orgaworld when material is relocated back into the facility the soil where the pile was located be scrapped up and disposed of. BB agreed and will have it completed. Orgaworld has 24/7 shifts this week and next therefore the pile will be monitored.

- Walked around the pile and noted no off-site impacts or run-off from the pile. Odour minimal. No concerns identified.

February 14, 2018 - Phone call from BB stating the pile was smouldering today (front portion) and as a result, Orgaworld does not want to bring it inside over the weekend for fear of another potential fire (no shifts). MOECC agreed the pile can remain outside until the following week provided the pile is routinely inspected for runn-off and off-site impacts. The inspections are to be recorded. Orgaworld agreed and will provide an update next week.

Feb. 20 - Phone call to BB, Orgaworld - Left message requesting an update to the status of the pile given the amount of rain received and projected in the upcoming days. Contact information provided.

Phone call from BB - Pile is dry (soaking in rain) and hot in some areas. Weekend inspections were completed and documented. Plan to have pile relocated into the processing plant starting Thursday and ending Friday. No run-off from pile but will contact MOECC if condition changes. Orgaworld will remediate area where the pile was located once the pile is relocated inside. Orgaworld to contact MOECC Thursday when they start moving the pile inside.

February 26, 2018 - Phone call to BB. Material was all brought into the facility on Friday and clean-up of the soil was completed. Any residual soils/rocks will be disposed of at the landfill. No run-off from the material being stored outside occurred. The ground underneath the pile remained frozen. The material is approx. half processed and will be fully processed by the weekend.

Orgaworld

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Air, Land
Incident Event:	Fire/Explosion
Incident Reason:	Natural Phenomenon
Source Type:	Waste Disposal Site

Sector Type:	Miscellaneous Industrial
MOE/Other Agencies Involved:	Municipal - Ambulance/Fire/Police, Province - MOE-District Office
Was there a discharge / emission / spill of a contaminant to the environment?	
Yes	

Contaminants Table

Contaminant Name	Description	Code	UN#	Limit	Quantity	[units]	[freq]
FIRE SUPPRESSANT		27	n/a		14000	L	

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	○ Yes ○ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	7736-AVPTNH
Originating Document:		**Created by:**	Aaron Richards
Date Created:	2018/02/05	**Date Completed:**	
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Aaron Richards
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name: Badge No: Work Unit: District/Area Office: Date: Signature:	

District/Area Supervisor:

Name: Work Unit: District/Area Office: Date: Signature:	

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2228-8PCTN7	**File Storage Number:**	SI OC OT HAW 230
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	7022-8PCTQQ
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		2228-8PCTN7	
Date Created:	2011/12/08	**Date Completed:**	2013/04/16
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Inspections - Industrial Sewage

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2011/09/19 16:50		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:	2011/09/19		
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Geographic Township: GLOUCESTER, Ottawa, City, K1G 3Y3
District Office: Ottawa
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Industrial Sewage Inspection *cannot be longer than 60 characters*
Incident Description:	Industrial Sewage Inspection Report revealed non compliance issued to be addressed by the following action items 1. Submit a report on the effluent monitoring explaining why the parameters noted in Section 2.2 of this report were not sampled for. Report was due on May 31st, 2012 and was received on May 31st, 2012. See file for report.

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2011/09/19		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		**Incident Reason:**	
Damaged Party:	No		
What effluent types are being assessed?			

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	4851-8KYQGX	Submit a report on the effluent ...	2012/05/31	2012/05/31

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: None Assigned
Badge No:

Work Unit:
District/Area Office:
Date:

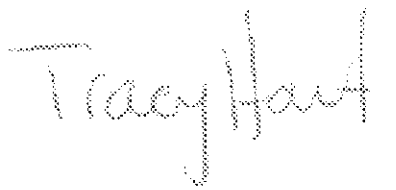
Signature:

District Manager:

Name: Tracy Hart

Work Unit:
District/Area Office: Cornwall Area Office
Date: 2012/07/04

Signature:



Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	2520-8PCSV3	**File Storage Number:**	SI OC GL HA 671
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5523-8PCSYF
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		2520-8PCSV3	
Date Created:	2011/12/08	**Date Completed:**	2013/04/17
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Waste - Solid/Non-hazardous	**Activity:**	Inspections - Transfer/Processing Non Hazardous

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:
Ottawa

Reported By:

MOE Information

Date & Time Reported to MOE:	2011/09/19 16:10		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	Planned Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:	2011/09/19		
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		

ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210

Site(s)

Site Details

5123 Hawthorne Road South
Address: Lot: Part of West Half of 27, Concession: 6, Geographic Township: GLOUCESTER, Ottawa, City, K1G 3Y3
District Office: Ottawa
LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Non-Hazardous Waste Transfer Processing Inspection *cannot be longer than 60 characters*
Incident Description:	Non-Hazardous Waste Transfer Processing Inspection revealed non compliance issues that are to be addressed with the following action items: 1. Review and provide an update on the methods used to monitor negative pressure inside the building. 2. Submit a detailed explanation as to how the finished compost is sampled. The explanation should include how the company handled the exceedences noted in Section 2.1 of this report. 3. Explain discrepency in tonnage amounts between the excell spreadsheet and the 2010 annual report. 4. Submit confirmation that monitoring and maintenance of the pollution control equipment is being conducted in accordance with the Odour Monitoring Program dated October 2009. Include odour system monitoring report spreadsheets for the month of June, 2011 for the ammonium scrubber, the biofilter and the bioscrubber. TH - Report of compliance received on May 31st, 2012. See file No further action

Links & Comments:	
Attachments Names:	

Date & Time of Incident	**Incident Date Confirmation?** Estimated 2011/09/19		

Source Type:		Sector Type:	
Nearest Watercourse:		Watershed Category Code:	
Environmental Impact:			
Nature of Impact:			
Incident Cause:		Incident Reason:	
Damaged Party:	No		

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VAI	3088-8KYSCU	Explain discrepency in tonnage ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Submit confirmation that monito ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Submit a detailed explanation a ...	2012/05/31	2012/05/31
VAI	3088-8KYSCU	Review and provide an update on ...	2012/05/31	2012/05/31

Offence(s)

Suspected Violation(s)/Offence(s):
Act - Regulation - Section, Description {General Offence}

Provincial Officer:

Name: None Assigned

Badge No:

Work Unit:

District/Area Office:

Date:

Signature:

District Manager:

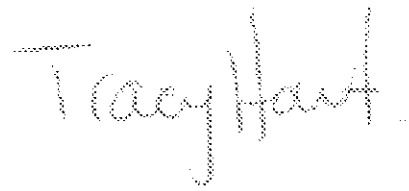
Name: Tracy Hart

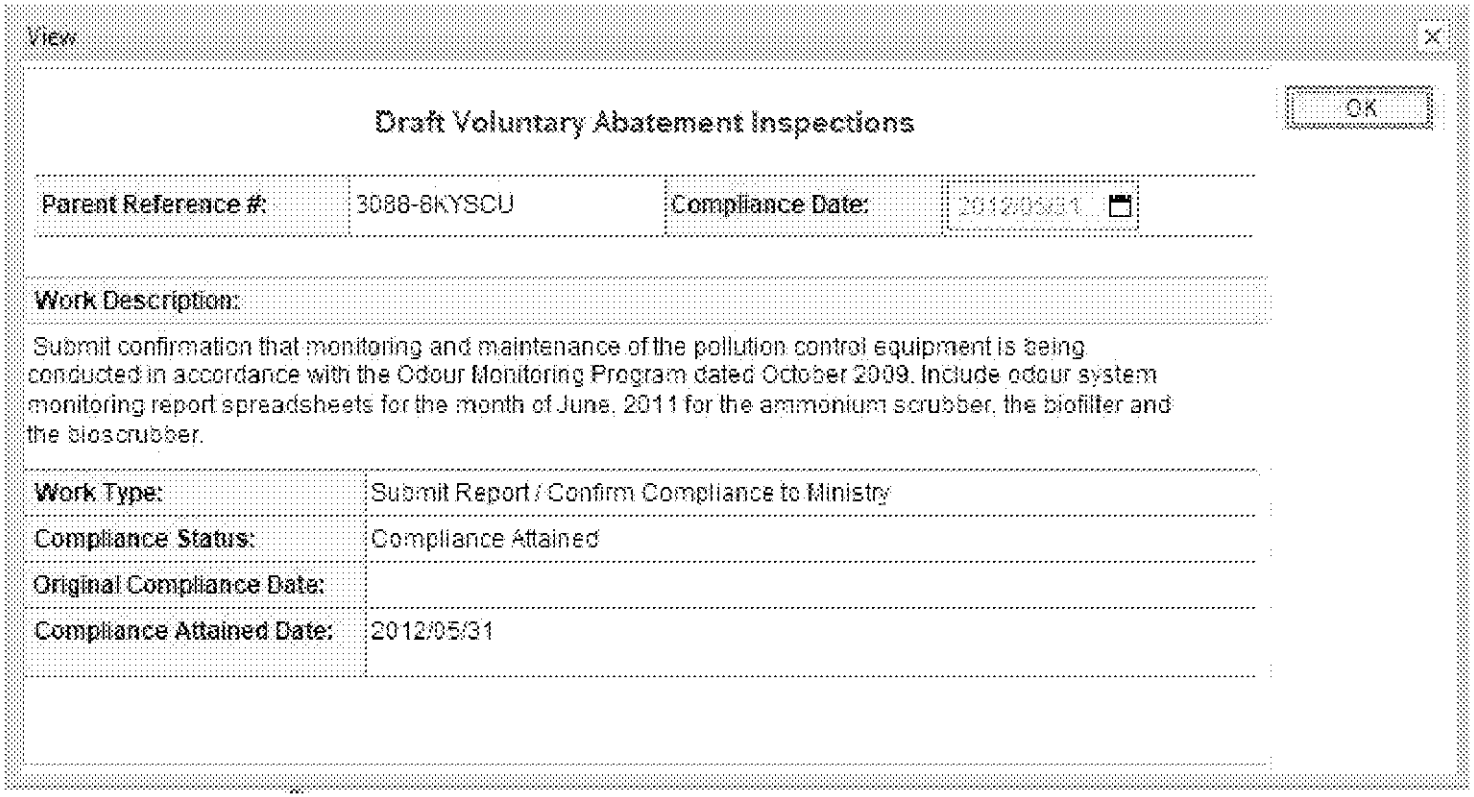
Work Unit:

District/Area Office: Cornwall Area Office

Date: 2012/07/03

Signature:




View
OK
Draft Voluntary Abatement Inspections
Parent Reference #:
3088-8KYSCU
Compliance Date:
Work Description:
Submit confirmation that monitoring and maintenance of the pollution control equipment is being conducted in accordance with the Odour Monitoring Program dated October 2009. Include odour system monitoring report spreadsheets for the month of June, 2011 for the ammonium scrubber, the biofilter and the bioscrubber.
Work Type:
Submit Report / Confirm Compliance to Ministry
Compliance Status:
Compliance Attained
Original Compliance Date:
Compliance Attained Date:
2012/05/31

Ontario

Ministry of the Environment
Ministère de l'Environnement

INCIDENT REPORT

Reference Number:	4032-83SSC7	**File Storage Number:**	SI OC GL HA 100
Module:	Incident Reporting	**Module Type:**	CofA/Permit Non-Compliance
Cross Reference:	(doc link)	**Task Link:**	5053-83ST67
Originating Document:		**Created by:**	Tracy Hart
Incident Report Reference Number:		4032-83SSC7	
Date Created:	2010/03/22	**Date Completed:**	2010/04/26
Bring Forward Date:		**Bring Forward Reason:**	
Status:	Closed		
Program	Sewage - Industrial	**Activity:**	Abatement - Mandatory

Is this an **air emission** (measured or modelled) or **wastewater** (sewage) **discharge exceedance** that will become part of the Environmental Compliance Report?

(legislation, certificate of approval, order, or guideline)

○ Yes ● No ○ To be determined *Click here for Guidance*

Caller or PO Information

Reported By:

First Name	Last Name
Tracy	Hart

Contact Mailing Address

Municipality:			
Ottawa			

Reported By:

MOE Information

Date & Time Reported to MOE:	2010/03/22 12:39		
Office Receiving Incident Report:	Ottawa District Office		
Incident Info Received By:	Tracy Hart		
MOE Response:	No Field Response	**Site Region:**	Eastern
Date & Time of MOE Arrival at Scene:			
Master Incident Report Number:			
SAC Action Class:			
Non-Standard Procedure:	No		
ERP Call-out Initiated:			

Client(s)

Client Details

Orgaworld Canada Ltd.
Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4
Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4
Telephone: (519)568-5610, FAX: (519)568-5612
Client #: 8883-7FKSLA, Client Type: Corporation

Site(s)

Site Details

Orgaworld SSO Facility, Ottawa
Address: 5123 Hawthorne Rd Part Lot 27, Concession 6, Ottawa, City
District Office: Ottawa
Site #: 6620-7KEQ3P

Incident Information

Incident Summary:	Industrial Sewage Works non compliance *cannot be longer than 60 characters*
Incident Description:	Orgaworld Canada Lt. operates an organic composting facility on Part Lot 27, Concession 6, Ottawa, ON. The facility operates under three certificate of approvals issued by the ministry. Waste Disposal Site CofA #2766-7HEPSZ Air CofA#7021-7HQNDE Industrial Sewage Works CofA #9465-7NVRWT These certificates of approval were issued on September 16th, 2009. The facility began receiving waste on the 27th of January 2010. In November 2009 I went through the companies certificate of approval to verify compliance with pre-operating conditions set out in the approvals. Condition 9(3) of the sewage works certificate of approval sates that within sixty (60) days of the issuance of this certificate of approval the owner shall: (a) complete an assessment of the ground-water quality for each stratrigraphic unit; (b) develop criteria in accordance with the Ministry Guideline B-7 - Incorporation of the Reasonable Use Concept into MOEE Groundwater Management Activities; and (c) submit to the District Manager for review and concurrence. Since the certificate of approval was issued on September 16th, 2009. the documents listed in this condition should have been submitted to the District Manager by November 15th, 2009. Condition 9(9) of the certificate of approval also states: The Owner shall enter into an agreement with Tomlinson Development Corporation, owner of the Hawthorne Industrial Park (or the current owner of that site), for the long-term operation and maintenance of the monitoring wells, and provide a copy of such agreement to the District manger prior to commencement of operation of the Works. Original proposed gorundwater monitoring was submitted to EAAB on June 25th, 2009. Wells TW-1, TW-2, TW-3, TW-4, TW-5, and TW-6 formed part of the proposed monitoring plan. November 17th, 2009, I sent the company an email reminding them of the condition, requesting a status on the ground-water assessment and requesting a copy of the agreement with Tomlinson Development. November 23rd - conversation with Greg Mariotti, site operations manager. Consultants were on site sampling today in order to prepare ground-water assessment. November 24th, 25th, 26th - - email exchange with Greg Mariotti. He submitted the Tomlinson Lease Agreement but after reviewing it I noted that it did not include any mention of the monitoring wells, subsequent phone conversations and email exchanges indicated that they would write up an agreement and get Tomlinson to sign it.

December 11th, received an email from Ron Cherkewski, CRA, explaining that two rounds of sampling have been done and that groundwater assessment will follow shortly.

Week of January 14th - I had a conversation with Greg, where he mentioned that they no longer have access to off site monitoring wells and that their consultants will be contacting me with regards to the issue.

January 22nd, 2010 - Teleconference with consultants and Orgaworld - detailing issues with wells off Orgaworld land. TW3 was "lost" ...it has been abandoned. TW1 gives bad results therefore they don't use it..... TW6 is in a different fracture zone
They will send a draft memo to summarise data to date and describe stratrigraphic unit. Looking to amend the problem, should send me something by Monday or Tuesday. Two offsite wells that they were relying on (TW2 and TW5 proposing to move them within the boundaries of Orgaworld. they are hoping to drill new wells in February or March.
I told them to submit to me their proposal but that it sounds like they will need to amend their certificate of approval.

February 5th 2010 - Received email technical memorandum presenting an up to date assessment of the ground-water and surface water quality at the location of the Orgaworld Source Separated Organics Processing Facility as well as proposed changes to the Monitoring Program to replace some deep bedrock wells which are no longer accessible to Orgaworld.

In March I had the chance to review the proposed monitoring plan, review the certificate of approval. I then contacted Tech support and sent them the proposed monitoring plan for their review, I also contacted Edgardo at EAAB to discuss the companies situation and potential application to amend their certificate of approval.

I then discussed the situation with Paul Kehoe, district supervisor and the decision was made to inform the company that they are required to apply to amend their certificate of approval and that we would send the file to IEB for their review.

I sent an email to Greg Mariotti on March 22nd indicating as much. He has replied that the application to amend is currently being put together, that he will send me a copy of the agreement he has with Tomlinson for the use of wells on the Orgaworlds site.

March 29th, 2010 received a copy of application to amend CofA.

April 8th, 2010, Meeting at Ottawa district office, with Greg Mariotti, Orgaworld; Tej Gidda, CRA; Paul Kehoe and myself.

We discussed the non compliance issues and agreed to use voluntary compliance measures in order to achieve compliance this time. The company has submitted an amendment to EAAB.

No further action at this time.

Links & Comments:	
Attachments Names.	

Date & Time of Incident	**Incident Date Confirmation?** Actual 2009/11/17		
Source Type:		**Sector Type:**	
Nearest Watercourse:		**Watershed Category Code:**	
Environmental Impact:			

Nature of Impact:			
Incident Cause:		Incident Reason:	
Damaged Party:	No		
What effluent types are being assessed?			

Contaminants Table

Contaminant Name	Code	UN#	Limit	Quantity	[units]	[freq]

Controller of Material:		Owner of Material:	
Estimated Clean Up Cost:		Who Cleaned Up:	
% Clean Up:	%	Agencies Involved:	

Voluntary / Mandatory Abatement

Is there Voluntary Abatement Activity?	● Yes	○ No	○ To be determined

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList
VA	4032-83SSC7	submit amendment to Industrial se...	2010/04/08	2010/04/08

Offence(s)

Suspected Violation(s)/Offence(s):	
Act - Regulation - Section, Description {General Offence}	

Provincial Officer:

Name: Tracy Hart
Badge No: 1045

Work Unit:
District/Area Office: Ottawa District Office
Date: 2010/04/22

Signature:



Area Supervisor:

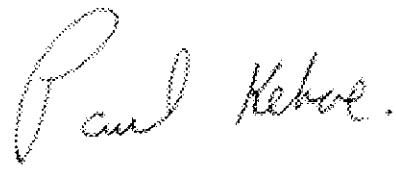
Name: Paul Kehoe

Work Unit:

District/Area Office: Ottawa District Office

Date: 2010/04/26

Signature:



Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Circular Waste Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103 Client #: 1032-BMERB6, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Circular Waste Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa Site #: 5981-BMERE9, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Environmental Compliance Manager
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2018/03/15		
Inspection Start Date:	2020/02/27	**Inspection Finish Date:**	2020/03/27
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment, Conservation and Parks conducted a Non-Hazardous Waste Transfer Processing Inspection at Circular Waste Canada Ltd. (referred to herein as the "Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (referred to herein as the "Site"). The purpose of the inspection was to assess compliance with Environmental Compliance Approval No. 2766-7HEPSZ (ECA), dated September 16, 2009, as amended.

The focus of the inspection was on conditions related to the management of non-hazardous organic waste. The Site is not currently producing compost therefore conditions specifically related to composting were not applicable and assessed at this time. The Site generates Non-Agricultural Source Material (NASM) which is tested and applied to met agricultural requirements of the Nutrient Management Act and Ontario Regulation 267/03 regulated by the Ontario Ministry of Agricultural, Food and Rural Affairs and the Ministry of the Environment, Conservation and Parks.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (Monday to Fridays) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details: The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case

No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

Notice #4 - Issued on April 18, 2017
Details: The amendment was to reflect the re-evaluation of financial assurance required as per Condition 1(20.)

2.1 SITE OPERATION:

Specifics:
2. SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2018 and 2019 Annual Reports state that the Facility is in compliance with Condition 2(1) by only accepting waste from the City of Ottawa and local Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA. Mass balances were provided for both the 2018 and 2019 operating years which confirmed all sources of incoming source separated organic waste to be compliant with Condition 2(1).

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2018 and 2019 Annual Reports state that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

In 2019 the Facility and the City of Ottawa sought an agreement to allow for the collection of source separated organics in plastic bags and pet waste as part of the Green bin Collection Program within the City of Ottawa. On July 2, 2019 the City of Ottawa announced pet waste and the use of plastic bags for source separate organics for collection and disposal is permitted.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2018 and 2019 Annual Reports provided the monthly and annual tonnages for the 2018 and 2019 operating year. As part of the inspection the Inspecting Officer reviewed the mass balance for the 2018 and 2019 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in ECA.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the processing of organic waste were located inside the confines of the Processing Building.

No issues identified.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment, Conservation and Parks issued Notice #3 to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

In 2019 the Ministry of the Environment, Conservation and Parks was informed of the inclusion of plastic bags and

pet waste as part of the changes to the City of Ottawa Green Bin Collection Program. As required by Condition 2(11) of the ECA, the Facility was required to submit reasonable notice to the District Manager for the acceptance of the new waste type as well as supporting information about the waste and the operational modifications, if needed, to process the waste. Notification was provided to the MECP in January 2019 and on February 15, 2019 the MECP requested documentation to support the new waste acceptance. On February 26, 2019 the Facility provided the required documentation to support the new waste.

In order to ensure the Ottawa Facility would be able to manage the increase of plastic bags and the new waste source, the Facility undertook a waste trial using Toronto source separated organics which contained plastic and pet waste. A total of 552 metric tonnes of Toronto organic waste containing plastic bags and pet waste was processed through the Facility mixed with the City of Ottawa waste feedstock. Stack inspections and odour assessments were completed using an Odour Wheel indicating no change to odour characteristics. No complaints were received by the Ministry of the Environment, Conservation and Parks or the Facility during the trial. The Facility sampled the waste and confirmed the results were within the ECA and NASM limits.

The Facility constructed additional tunnels for processing/storage and installed new equipment (biofilter, screening line, ammonia scrubber) to accommodate the new waste stream. The installation of the new equipment was captured under Condition 2 of Air Environmental Compliance Approval Number 1631-A2ELCQ. No amendments were required under the waste ECA for the upgrade to the Site. The installation of the new equipment was completed in the summer of 2019 to support the change in the City of Ottawa Green Bin Program.

In March of 2020, the Facility provided the Ministry of the Environment, Conservation and Parks notice of intent to commence accepting two new waste sources at the Ottawa Facility. The new sources were outlined as City of Toronto and Region of York source separated organics. Both sources are associated with the municipal waste collection programs previously sent to the London Facility, however, planned to be diverted to the Ottawa Facility as a result of COVID-19 pandemic resulting in capacity concerns at the London Facility. Supporting documentation, previously requested as part of prior new waste sources notifications, was provided to the District Manager. Acknowledge was provided to the Facility for both new waste sources in March of 2020.

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility has a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. However, as discussed in the 2019 Annual Report a name change occurred in 2020 from Renewi to Convertus Canada Ltd. The 2019 Annual Report states the Facility will ensure all signage present at the Site is change to reflect the new name.

Verification of the change of the sign will be completed in future inspections of the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

The Site has installed a fence with a lockable gate to restrict access to the Site. The 2018 and 2019 Annual Reports confirmed compliance with Condition 4 of the ECA. No issues were observed with site security during the inspection.

5. SITE OPERATIONS

(3) **Rejected Waste handling:**

(a) In the event that waste is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that all Rejected Waste:

(i) is stored in a way that ensure that no adverse effects result from such storage;
(ii) is segregated from all other waste;
(iii) is handled and removed from the Site in accordance with *O. Reg. 347* and the *EPA* ;
(iv) is removed from the Site within three (3) days of its receipt or as acceptable to the District Manager

(b)

(i) In the event that Rejected Waste is advertently accepted at the Site, a record shall be made in the daily log book or in an electronic file of the reason why the waste was rejected and of the origin of the waste, if known.

(ii) The District Manager shall be notified in writing of the receipt of unacceptable waste within four (4) business days of its receipt. The following information shall be included in the notification to the District Manager:

- quantity and type of Rejected Waste;
- source of the Rejected Waste, if known;
- final destination of the Rejected Waste; and
- date of receipt and time and date of removal from the Site.

In 2018 four events occurred of excessive contamination being received from Metro grocery store locations at the Site. The waste consisted of styrofoam and plastic packaging. The Facility arranged for the waste to properly disposed of at a waste disposal site with notification provided to both Metro and the Ministry of the Environment, Conservation and Parks.

During the inspection it was discussed that an event of rejected waste occurred on July 25, 2019 but notification was not provided to the District Manager as required by Condition 5(3)(b)(ii). This issue was discussed at the time of the inspection and on March 4, 2020 the Facility sent a notification email to the District Manager provided information on the rejected load.

****Please see Section 5.0 of this Report****

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin

Upon arriving to and entering the Site, no litter, presence of vector and vermin, run-off or presence of fugitive dust was observed. Security fence and property line appeared to be in good working order.

The Facility has the required documents and procedures which speak to the Facility's inspection program for the above condition. The previous inspection incorporated a review of the procedures and records associated with the

above condition with no concerns identified. No changes were made for the 2018 and 2019 operating year therefore the Inspecting Officer did not review the records as part of the inspection.

In 2019 the following documents were reviewed and updated:

- Emergency Response & Contingency Plan for Spills, Odours, Process Upsets, Fires, Power Failure, and Labour Disruptions (revised report provided to the Ministry of the Environment, Conservation and Parks)
- Spill Contingency and Pollution Prevention Plan - Stormwater Site Management System and Process Water Recirculation System
- Site Plan, Services, and Grading Plan

(4) Should outdoor storage of leaf & yard waste be undertaken, the following handling procedures must be followed:

(a) The Owner shall ensure that, if needed, the leaf & yard waste storage stockpiles are turned at a rate frequent enough to reduce the likelihood of anaerobic conditions arising within the stockpiles.

(b) Upon the receipt of the leaf & yard waste at the Site, the Owner shall inspect the received waste, separate potentially odourous components and immediately transfer these potentially odourous components into the Processing Building.

(c) Should anaerobic conditions arise in a leaf & yard waste pile, or, in a specific portion of a leaf & yard waste pile, the Owner shall ensure that this portion of leaf & yard waste is prioritized for use within the composting process within twenty four (24) hours of anaerobic conditions occurring, or, if this is not practical, the Owner shall remove of the waste from the Site within twenty four (24) hours.

At the time of the inspection no outdoor storage of leaf and yard waste was occurring. The 2018 and 2019 Annual Reports confirmed no outdoor leaf and yard waste occurred in 2018 and 2019.

(5) Residual Waste handling:

(a) The Owner shall ensure that storage of solid Residual Waste resulting from processing of Organic Waste at the Site is undertaken within the confines of the Processing Building.

At the time of the inspection all solid Residual Waste was stored inside the Processing Building.

(6) Waste Processing:

(a) The Owner shall ensure that all Organic Waste pre-processing, composting, screening and curing of Immature Compost are undertaken within the confines of the Processing Building.

At the time of the inspection all Organic Waste processing was occurring inside the Processing Building. No operations were occurring outside.

(7) Odour Control:

(a) The Owner shall maintain and monitor a negative air pressure atmosphere within the Processing Building at all times in accordance with the documents in Schedule "A". In the event that adequate negative air pressure cannot be maintained within the Processing Building, the Owner shall cease accepting additional Organic Waste waste and shall keep the loading bay doors and the air intake louvers closed until such time that negative pressure is re-established.

(b) The Owner shall ensure that the outside loading bay doors into the Small Truck and Large Truck Halls of the Processing Building are kept closed at all times except to permit the entry or exit of waste transportation vehicles.

(c) The Owner shall ensure that the loading bay doors into the Compost Curing Storage Hall of the Processing Building are kept closed at all times except to permit the entry or exit of Compost transportation equipment.

(d) The Owner shall maintain an air lock when Organic Waste is received in the Small Truck Receiving Hall of the Processing Building.

(e) The Owner shall ensure that, at all times, the air from the Processing Building is exhausted through an appropriate air pollution control equipment approved by the Ministry in the Certificate of Approval (Air/Noise).

(f) If in the opinion of the District Manager, the air emissions originating from the leaf & yard waste stockpile in the future outdoor storage area result in odour complaint(s), the Owner shall within two (2) days of the receipt of the written notification from the District Manager move the leaf & yard waste from the future outdoor storage area into the Processing Building.

(g) The Owner shall ensure that no equipment handling Organic Waste or their storage containers are kept outside, unless they have been washed to prevent odours.

The 2018 and 2019 Annual Reports confirmed the Facility operated in compliance with Condition 5(7) for the 2018 and 2019 operating years. No concerns identified during the inspection.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.
(b) On an emergency basis, the Owner may use equipment utilized in processing of incoming Organic Waste to process the Immature Compost / the Finished Compost and the Compost provided that the equipment has been cleaned to prevent the Immature Compost / the Finished Compost and the Compost from being contaminated by the incoming Organic Waste.

The 2018 and 2019 Annual Reports state the Facility is in compliance with the above condition by keeping incoming organic waste separated from finished product. During the inspection all finished NASM product is stored within the Curing Hall, separate from any pre-processed organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

(b) The incoming Organic Waste shall be re-characterized following any process changes, operational issues or other factors that may affect the quality of the incoming Organic Waste from the pre-approved source/stream.

The 2018 and 2018 Annual Reports state the Facility is in compliance with the above condition and sends incoming source separated organic waste for testing to ensure compliance with the ECA conditions. No process changes, operational issues or other factors occurring in the 2018 and 2019 operating years required the re-characterization of incoming organic waste.

Finished compost quality criteria outlined in additional sections of Condition 7 of the ECA was not incorporated into the inspection as the Facility is not currently producing compost as defined by the Ontario Compost Quality Standards. The Site is currently producing Non-Agricultural Source Material (NASM) which is not defined as a type of compost in the ECA or the Ontario Compost Quality Standards.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2018 and 2019 Annual Reports, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2018 and 2019 Annual Reports, the Facility provides rakes, brooms and a pressure washer, if necessary, to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2018 and 2019 Annual Reports confirms that during the 2018 and 2019 operating years the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2018 and 2019 Annual Reports state that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site. No concerns identified.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the Site the roads on-site were snow covered. The Facility retains a company to conduct road sweeping and washing.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. NASM material is stored within the confines of the Processing Building.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost

stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection as the inspection was conducted during the winter season and covered in snow. However, no complaints of dust have been reported to the Ministry of the Environment, Conservation and Parks to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2015 the Operations Manual was updated due to changes to operating procedures and equipment. A copy of the updated manual was provided to the Ottawa District Office. With the recent installation of equipment, the Facility will need to determine whether revisions to the Operations Manual are required.

****Please see Section 6.0 of this Report****

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure which was updated and provided to the Ministry of the Environment, Conservation and Parks in 2019. No issues identified.

11. EMERGENCY SITUATIONS RESPONSE AND REPORTING

(1) **The Company shall immediately take all necessary measures, as outlined in the Emergency Response and Contingency Plan, to handle the emergency situations occurring at the Site.**

(2) **The Company shall ensure that the equipment and materials outlined in the Emergency Response and Contingency Plan are immediately available at the Site at all times and are in a good state of repair and fully operational.**

(3) **The Company shall ensure that all Site personnel are fully trained in the use of the equipment and materials outlined in the Emergency Response and Contingency Plan, and in the procedures to be employed in the event of an emergency.**

(4) **All Spills, as defined in the *EPA* , shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book as to the nature and cause of the spill, and the action taken for clean-up, correction and prevention of similar future occurrences.**

(5) **Should a Spill, as defined in the *EPA* , occur at the Site, in addition to fulfilling the requirements from the *EPA* , the Company shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.**

In the 2018 operating year the Facility did have a spill to air requiring the activation of the Emergency Response and Contingency Plan. A fire of processed organic waste occurred on February 5, 2018 within the Processing Building. Notification and information was provided to the District Ministry as required by Condition 11. The waste material was managed by re-processing in the tunnels and disposing as NASM.

No spills occurred during the 2019 operating year.

12. RECORDS KEEPING

Annual Report

(9) **By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:**

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2018 and 2019 Annual Reports was found to be complete as required. The 2018 Annual Report was submitted to the Ministry of the Environment, Conservation and Parks in March of 2019 and the 2019 Annual Report was submitted to the Ministry of the Environment, Conservation and Parks in March 2020.

2.2 FINANCIAL ASSURANCE:

Specifics:
Condition 1(20.) of the ECA outlines the amount of financial assurance required for the operation of a solid non-hazardous waste transfer processing Site. In April of 2017, the ministry issued Notice #4 - ECA amendment to reflect a re-evaluation of the financial assurance needed for the site. The Facility submitted the remaining amount which forms the new total of financial assurance from the previous re-evaluation. The next re-evaluation of financial assurance is scheduled for April 30, 2020 and future re-evaluations at 3 year intervals.

In 2018, the Facility updated their surety bonds to reflect the previous name change from Orgaworld Canada Ltd. to Renewi Canada Ltd. and in 2019, the Facility updated their surety bonds to reflect the name change from Renewi Canada Ltd. to Circular Waste Canada Ltd. In March 2020, the Facility updated their surety bonds to reflect the current name of Convertus Canada Ltd.

2.3 SITE SERVICE AREA:

Specifics:
The Facility is approved to operate a waste disposal site (transfer processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste as outlined in Condition 2 of the ECA..

2.4 APPROVED SITE CAPACITY:

Specifics:
The Facility is approved to operate a waste disposal site (processing) for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste as outlined in Condition 2(3) of the ECA.

Below is a summary of incoming organics waste and outgoing NASM, product and residual waste for the 2018 and 2019 operating years:

2018 Operating Year (January 1, 2018 to December 31, 2018):

Incoming
City of Ottawa Green Bin Program = 76,571 tonnes
IC&I Sector = 2,191 tonnes
Total = 78,762 tonnes (97% municipal, 3% IC&I)

Outgoing
NASM = 10,861 tonnes
Bedding = 11,710 tonnes
Mids = 13,881 tonnes
Structural Mids = 3,871 tonnes
Residual = 18,911 tonnes
Total = 59,234 tonnes

2019 Operating Year (January 1, 2019 to December 31, 2019):

Incoming
City of Ottawa Green Bin Program = 80,321 tonnes
City of Toronto (trial) = 526 tonnes
IC&I Sector = 2,043 tonnes
Total = 82,860 tonnes (98% municipal, 2% IC&I)

Outgoing
NASM = 5,876 tonnes
Bedding = 15,343 tonnes

Mids = 9,186 tonnes
Residual = 12,493 tonnes
Total = 42,898 tonnes

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completed the Non-hazardous Waste Transfer Processing Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the inspection, the following action item is required to be reviewed and addressed by the Facility:

1. The Facility must ensure all future rejected waste events are reported to the District Manager as per Condition 5(3)(b)(ii) of Environmental Compliance Approval Number 2766-7HEPSZ

6.0 OTHER INSPECTION FINDINGS

The following recommendation is provided for the Facility to review and taken action if necessary:

1. The Facility must review the Operations Manual to determine the need for revisions to reflect the installation of new equipment.

7.0 INCIDENT REPORT

Not Applicable

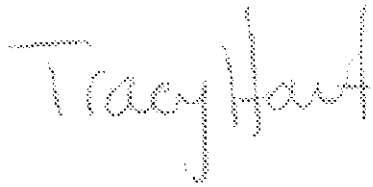
8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2020/04/01
Signature



REVIEWED BY:
District Supervisor:
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2020/06/02

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

We want to hear from you. Please tell us about the quality of your interaction with our staff. You can provide feedback at 1-888-745-8888.

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

Air Facility Inspection Report

Client:	Circular Waste Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, Extension: 103 Client #: 1032-BMERB6, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Circular Waste Canada Ltd. Address: 5123 Hawthorne Rd, Ottawa, City, K1G 3Y3 District Office: Ottawa LIO GeoReference: Zone: 18, UTM Easting: 456665.94, UTM Northing: 5016595.9, Latitude: 45.301529, Longitude: -75.55272 Site #: 5981-BMERE9, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Environmental Compliance Manager
Contact Telephone:	(519) 663-4446 **ext** 103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2018/03/15		
Inspection Start Date:	2020/02/27	**Inspection Finish Date:**	2020/02/27
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

The Ministry of the Environment, Conservation and Parks (MECP) conducted an Air Facility Inspection at Circular Waste Canada Ltd. (referred to herein as the "Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (referred to herein as the "Site"). The purpose of the inspection is to assess compliance with Environmental Compliance Approval No. 1631-A2ELCQ, Ontario Regulation 419/05, NPC-300 and the Environmental Protection Act (EPA).

The focus of the inspection was on conditions related to the equipment associated with air treatment from emission generated by the processing of source separated organics (SSO).

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The inspection incorporated the entire operations of the Site as it relates to the air and noise emissions.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

Yes, the facility is in a target sector identified in Schedule 5.

☐ NAICS exemption

Note that s. 1(2) of Reg. 419/05 sets out exemptions for facilities whose activities would not be captured in NAICS 221112 (Fossil-Fuel Power Generation) and NAICS 5622 (Waste Treatment and Disposal)

Specifics:

The Facility operates under North American Industry Classification System (NAICS) code 562210 - Waste Treatment & Disposal for the operation of land fill sites, incinerators, or other treatment or disposal facilities for non-hazardous or hazardous waste. Establishments that integrate the collection, treatment and disposal of waste are also included.

The Facility is currently processing SSO from the City of Ottawa's Green Bin Collection Program, parts of the City of Toronto and York Region municipal collection program and selected Industrial, Commercial & Institutional sectors for the production of Non-Agricultural Source Material (NASM). The NASM is applied to the agricultural operations as a soil conditioner under approved NASM Plans, issued by the Ontario Ministry of Agriculture and Rural Affairs, or used as an animal bedding product.

2.0 INSPECTION OBSERVATIONS

Specifics:

Condition 2 of the ECA outlines the modifications that are permitted under the Limited Operational Flexibility. In reviewing the modification log for the 2018 and 2019 operating year it was observed the following modifications occurred:

2018: No modifications were conducted during the 2018 operating year.

2019:
April 2019
- Decommission existing ammonia scrubber resulting in an increased ammonia concentration to atmosphere. ESDM updated to reflect new ammonia concentration

July 2019
- Installation of 3 new ammonia scrubbers to provide additional treatment for ammonia resulting in a reduction of ammonia concentration. ESDM updated to reflect new ammonia concentration

July 2019
- Installation of two composting tunnels (#7 & #8) resulting in negligible impact on air emissions. ESDM Report updated based on November 2019 source testing results.

August 2019
- Replacement of screening line resulting in no impact on air emissions.

September 2019
- Installation of new biofilter (#3) to reduce air emissions. ESDM Report updated resulting in a reduction of concentrations of compounds

November 2019
- Installation of 2 new storage tunnels (#9 & #10) resulting in no impact on air emissions

2.1 SITE CONDITIONS

Operating

Specifics:

At the time of the inspection the Site was processing SSO for the production of NASM and animal bedding.

Odour: During the inspection the air treatment equipment was observed. The equipment operating included the biofilters (3), ammonia scrubbers (3) and bioscrubber. The emissions from the equipment, after treatment, is discharged through the stack to the environment. The stack is equipped with a odour port to assess the odours being discharged from the Site. An assessment of the odour was conducted at the time of inspection which noted the emission to not be odourous resulting in an adverse effect.

At the time of the inspection the Facility was operating and processing organic waste. Both air treatment processes, the bioscrubber and biofilters, were operating. The Facility operates under negative pressure therefore all odours are contained within the confines of the building and discharged through the pollution control equipment. The odour sampling port connected to the discharge stack was assessed at the time of the inspection and found not to be discharging emissions that would be considered an adverse effect.

The 2019 Source Testing Report was reviewed to determine the outcome of the odour assessment. Based on the results, the Facility is well within the frequency of odour exceedances allowable at the sensitive receptors.

Noise: During the inspection the air treatment equipment was observed. The equipment operating included the biofilters (3), ammonia scrubbers (3) and bioscrubber. The noise from the equipment is audible within the Process Building. Upon walking outside of the Site, noise was audible but not at levels that the Inspecting Officer would consider excessive.

As part of the inspection, the 2019 Acoustic Assessment Summary was requested and provided. In reviewing the summary, all sensitive receptors noise levels were below the limits of 45 Leq as outlined in NPC-300.

Vibration: No vibration issues were noted during the inspection, both inside and outside the building.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number 1631-A2ELCQ (ECA) with Limited Operational Flexibility until December 10, 2025.

The ECA approves the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

Based on the inspection, the Facility has not modified or installed equipment outside of the description of the ECA requiring an amendment.

In the event changes to the operations, outside the scope of the ECA as outlined in Condition 2, the Facility will need to amend the ECA prior to making changes or modifications.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

The Environmental Protection Act and the ECA outlines requirements for notifications to the Ministry of the Environment, Conservation and Parks. In reviewing the spills and complaints for the 2018 operating year, the Facility has met the notification requirements.

In 2019, the Facility had one (1) complaint related to odour. On July 2, 2019 the Facility received an odour complaint and on July 3, 2020 was reported to the District Manager as per Condition 8.2 of the ECA. On August 8, 2019 the Facility provided the report as per the requirements of the above referenced condition and reported the investigation concluded the odour complaint was determined to be caused by fugitive odour emissions from a temporary wall opening across from tunnels 7 & 8 as a result of construction activities to support upgrades to the Site. Following the complaint, the temporary wall was closed and other sections of the Site inspected and reinforced to ensure fugitive odour is not escaping the building envelop.

No further complaints were received by the Facility or the MECP to date.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 11 of the ECA requires the completion of annual source testing of the emissions. In 2018 and 2019 source testing at the Site was completed by the Facility and submitted to the MECP.

Condition 2 of the ECA and Ontario 419/05 under the Environmental Protection Act requires the Facility to complete annual ESDM and Acoustic Assessment Report updates to ensure modifications and changes in standards are up to date. As part of the inspection, a copy of the 2018 & 2019 ESDM Summary Table and AAR Summary Table were requested and provided. Based on the review of the summary tables, the Site is compliant with Condition 2 and Ontario Regulation 419/05.

Is an annual ESDM report on site?

● Yes ○ No

Specifics:

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of the ECA requires the Facility to submit Annual Written Summary Report to the MECP. The submission of the Annual Written Summary is to be submitted no later than May 31st of each year. It was confirmed the 2018 and 2019 Annual Written Summary Reports were submitted as required.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

As part of the inspections a review of the 2019 ESDM Emission Summary and Acoustic Assessment Summary was requested and received. The review concluded the Site is operating within compliance with emission standards and noise limits.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

A copy of the Operation Manual was requested and provided as required by Condition 7 of the ECA. Based on the review of the Operations Manual, the Site is in compliance with the requirements of Condition 7.

As a result of the installation of new air treatment equipment (ie. ammonia scrubber, biofilter), the Facility was informed to review the Operation Manual to ensure the document is reflective of the current equipment at the Site. This was also identified during the Non-Hazardous Waste Transfer Processing Inspection Report conducted on the same date.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of the ECA outlines the record keeping requirements for the operation of the Site and other conditions within the ECA.

During the inspection records were available for review. As discussed in previous inspections, the Facility has numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. No concerns identified in the way records are managed and retained on-site.

The Facility utilizes SCADA to program, adjust, measure and monitoring the organic waste processing. The SCADA system also records the data collected during the processing process.

Copies of specific documents were requested as part of the inspection and reviewed for completeness. No concerns were identified during the review.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated as of February 15, 2019.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

N/A

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required at this time.

6.0 OTHER INSPECTION FINDINGS

N/A

7.0 INCIDENT REPORT

○ Applicable ● Not Applicable

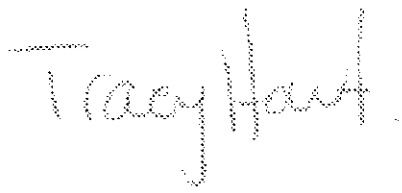
8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2020/04/02
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tracy Hart
District Office:	Ottawa District Office
Date:	2020/06/02

Signature:	

File Storage Number:	SI OT GL HA 101

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

We want to hear from you. Please tell us about the quality of your interaction with our staff. You can provide feedback at 1-888-745-8888.

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Subject Waste Generator Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext:**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:			
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted a Subject Waste Generator Inspection at Orgaworld Canada Inc.'s Ottawa Facility (the"Facility"), located at 5123 Hawthorne Road, Ottawa, Ontario (the "Site"), to determine compliance with regulatory requirements for the management of subject waste of Ontario Regulation 347 under the Environmental Protection Act.

No previous Subject Waste Generator Inspection had been completed by the ministry prior to the inspection.

2.0 INSPECTION OBSERVATIONS

Generator Registration Report No(s):

ON3338779

Date of last registration:

2018/01/24

2.1 REGISTERED WASTES

Has the generator properly registered?

☒ Yes. The generator has properly registered.
☐ No. The generator is exempt from generator registration.
☐ No. The generator has not registered and is not exempt.
☐ No. The generator has incorrectly classified the subject waste.
☐ No. The generator is currently registered, but not for all applicable subject wastes.
☐ No. The generator has incorrectly registered by not completing other required information on HWIN, or by mail-in registration.
☐ No. The generator has not properly registered all land disposal restriction (LDR) wastes.

The Facility has renewed their HWIN registration for the 2018 operating year. According to the Facility's HWIN account, the following waste classes are registered for generation at the Site:

113-L : Acid Waste - Other Metals
Description of Generating Process - Removal of airborne ammonia using an ammonia scrubber

147-L : Chemical Fertilizer Wastes
Description of Generating Process - Odour abatement system - ammonia scrubber

251-L : Oil Skimmings & Sludges
Description of Generating Process - Catch basin

252-L : Waste Oils & Lubricants
Description of Generating Process - Equipment

270-L - Other Specified Organics
Description of Generating Process - Organic composting (liquid leachate waste from sources separated organics)

2.2 DESCRIPTION OF PROCESS GENERATING WASTE MATERIALS

The subject waste generated at the Site is produced as a result of maintenance of equipment, on-site infrastructure (catch basins) and from the generation of leachate from the production of non-agricultural source material.

2.3 MANIFESTING

Has the generator properly released and manifested all subject waste shipped off site for disposal or reclamation?

☒ Not applicable
☐ Yes. The generator has properly released and manifested all subject waste shipped off site for disposal and/or reclamation.
☐ No. The generator has transported subject waste itself, without a proper Certificate of Approval for the waste type(s).
☐ No. The generator has released subject waste to a carrier without a proper Certificate of Approval for the waste type(s).
☒ No. The generator has not completed, or properly completed manifest(s).
☐ No. The generator has not properly notified the Ministry of the waste shipped.
☐ No. The generator has used paper manifests and has not retained the green copies for two years.

During the inspection waste manifest were reviewed for the 2017 operating year. In reviewing the manifest, only 1 manifest was found to missing Copy 6 (brown) - RS77263, dated April 4, 2017.

The Facility is currently following up with the receiver to determine the status of the missing Copy 6 manifest.

2.4 LAND DISPOSAL RESTRICTION (LDR)

Has the generator complied with the land disposal restriction requirements of Reg. 347?

☒ Not applicable

☐ Yes. The generator is in compliance with the applicable land disposal restriction requirements of Reg. 347.

☐ Yes. The generator is a small quantity generator.

☐ No. The generator is diluting wastes.

☐ No. The generator has shipped fully treated characteristic waste without providing a simple statement to the receiver.

☐ No. The generator has not notified the receiver of land disposal restriction waste shipments on or before the first shipment of the waste stream.

☐ No. The generator is mixing, blending or bulking waste not for the purposes of treating waste to land disposal restriction standards and does not have a Certificate of Approval that allows mixing, blending or bulking.

Comments:

The Facility has not registered any subject waste subject to land disposal restrictions of Ontario Regulation 347.

Is treatment required to meet land disposal restriction standards?

○ Yes ● No

2.5 ON-SITE STORAGE

Has the generator been storing all subject waste in accordance with Reg. 347 and in a secure manner as required by the Environmental Protection Act?

☐ Not applicable

☒ Yes. All subject wastes are stored in accordance with Reg. 347 and in a secure manner.

☐ No. The generator has not provided a notice to the Regional Director for subject waste stored for greater than 3 months.

☐ No. Wastes are stored in such a manner that there is a potential for fire, or explosions.

☐ No. Wastes are stored in such a manner that there is a potential for a spill that could adversely impact the natural environment.

☐ No. Wastes are not secured at the site and have been released to the natural environment.

☐ No. Wastes have been spilled from this site and have had, or are having an adverse impact on the natural environment.

☐ No. The generator has stored subject waste for a period greater than 24 months without applying for or not in accordance with a Certificate of Approval.

Subject waste is stored in low traffic areas and in a manner acceptable to the ministry.

2.6 OTHER PERTINENT CERTIFICATE(S) OF APPROVAL FOR THE SITE

The Facility operates a source separated organic composting operation under Environmental Compliance Approval No. 2766-7HEPSZ.

Does on-site disposal of subject waste(s) occur at this site?

○ Yes ● No

2.7 DISCHARGE OF WASTES TO MUNICIPAL SEWER(S)

Does the generator discharge subject waste to municipal sewers?

☒ No. Subject waste is not discharged to the municipal sewers.

☐ Yes. Subject waste is discharged to the municipal sewers, but the municipality is aware of this practise and the generator is properly registered for all hazardous waste.

☐ Yes. Subject waste is discharged to municipal sewers, but the municipality is not aware of this practise.

☐ Yes. Hazardous waste is discharged to municipal sewers, but is not registered.

The Site is not municipally serviced therefore the Facility is unable to discharge to municipal sewers.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous Subject Waste Generator Inspection therefore no review of previous non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate ?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

● Yes ○ No

Specifics:

Copy 6 of Manifest No. RS77263 was not received by the generator from the receiver site

5.0 ACTION(S) REQUIRED

As a result of the inspection the following actions are required by the Facility:

1. Confirm Copy 6 of Manifest No. RS77263 was received from the receiver site

6.0 OTHER INSPECTION FINDINGS

1. It is recommended the Facility provide further information on the description of waste generation section within their

HWIN account.

7.0 INCIDENT REPORT

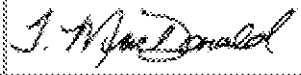
● Applicable ○ Not Applicable
3125-AWWNYQ

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2018/03/16
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2018/04/11
Signature:	

File Storage Number:	SI OT GL HA 700

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted a Non-Hazardous Waste Transfer Processing Inspection at Orgaworld Ottawa to assess compliance with Environmental Compliance Approval No. 2766-7HEPSZ (ECA), dated September 16, 2009, as amended.

The focus of the inspection was on conditions related to the management of non-hazardous organic waste and not compost production. The Facility is not currently producing compost therefore conditions specifically related to composting were not applicable and assessed at this time.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details: The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

Notice #4 - Issued on April 18, 2017
Details: The amendment was to reflect the re-evaluation of financial assurance required as per Condition 1(20.)

2.1 SITE OPERATION:

Specifics:
SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2017 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa and the Industrial, Commercial & Institutional (IC&I) sector which is within the approved service area outlined in ECA. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2017 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

The Facility and the City of Ottawa is currently seeking agreement to allow for the collection of source separated organics in plastic bags and pet waste as part of the Green bin Collection Program within the City of Ottawa. If approved, the Facility will need to comply with conditions outlined in the ECA and assess whether the inclusions of

the new waste stream will require amendments to existing Environmental Compliance Approvals and other applicable approvals for the Site.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2017 Annual Report provided the monthly and annual tonnages for the 2017 operating year As part of the inspection the Inspecting Officer reviewed the mass balance for the 2017 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in ECA.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the processing of organic waste were located inside the confines of the Processing Building.

No issues identified.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2017 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding the Site's approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may

decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice #3 to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

3. SIGNS

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued ECA by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

It was discussed in the 2017 Annual Report of re-branding will take place in 2018 from Orgaworld to Renewi. The Facility is aware of the notifications requirements and physical changes required to ensure compliance with the conditions of the ECA.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

5. SITE OPERATIONS

(3) Rejected Waste handling:

(a) In the event that waste is not approved under this Certificate is inadvertently accepted at the Site, the Owner shall ensure that all Rejected Waste:

(i) is stored in a way that ensure that no adverse effects result from such storage;
(ii) is segregated from all other waste;
(iii) is handled and removed from the Site in accordance with *O. Reg. 347* and the *EPA* ;
(iv) is removed from the Site within three (3) days of its receipt or as acceptable to the District Manager

On December 13, 2017 a total of 2.05 tonnes of waste was received from Metro and was rejected by the Facility due to contamination (Styrofoam and plastic packaging). The waste was shipped to landfill after Metro was notified of the

infraction. No rejected waste was accepted for processing or incorporated into the Facility's outgoing material.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin

Upon arriving to and entering the Site, no litter, presence of vector and vermin, run-off or presence of fugitive dust was observed. Security fence and property line appeared to be in good working order.

The Facility has the required documents and procedures which speak to the Facility's inspection program. The previous inspection incorporated a review of the procedures and records associated with the above conditions with no concerns identified. No changes were made for the 2017 operating year therefore the Inspecting Officer did not review the records as part of the inspection. Future inspections may include a review.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.
(b) On an emergency basis, the Owner may use equipment utilized in processing of incoming Organic Waste to process the Immature Compost / the Finished Compost and the Compost provided that the equipment has been cleaned to prevent the Immature Compost / the Finished Compost and the Compost from being contaminated by the incoming Organic Waste.

The 2017 Annual Report states the Facility is in compliance with the above condition by keeping incoming organic waste separated from finished product. The use of a stream pressure washer is used in the event of an emergency when process equipment used for incoming organic waste needs to be used for immature or finished compost. The inspecting Officer is not aware of an emergency event where this was required for the 2017 operating year.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

(b) The incoming Organic Waste shall be re-characterized following any process changes, operational issues or other factors that may affect the quality of the incoming Organic Waste from the pre-approved source/stream.

The 2017 Annual Report states the Facility is in compliance with the above condition and sends incoming organic waste for testing to ensure compliance with the ECA and the Ontario Compost Quality Standards. No process changes, operational issues or other factors occurring in the 2017 operating year requiring the re-characterization of incoming organic waste.

Finished compost quality criteria outlined in additional sections of Condition 7 of the ECA was not incorporated into the inspection as the Facility is not currently producing compost. The Site is currently producing Non-Agricultural Source Material (NASM) which is not defined as a type of compost in the ECA or the Ontario Compost Quality Standards.

8. NUISANCE IMPACT CONTROL & HOUSEKEEPING

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2017 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2017 Annual Report, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2017 Annual Report confirms that during the 2017 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2017 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the Site the roads on-site did appear to be swept/washed as required. No dust was observed to be generated from vehicle traffic or wind conditions. The Facility retains a company to conduct road sweeping and washing.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. No concerns identified.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection. No complaints of dust have been reported to the ministry to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2016 the Operations Manual was updated due to changes to operating procedures and equipment. A copy was provided to the Ottawa District Office of the updated manual. No concerns identified.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. No issues identified and no revisions occurred in 2017.

11. EMERGENCY SITUATIONS RESPONSE AND REPORTING

(1) The Company shall immediately take all necessary measures, as outlined in the Emergency Response and Contingency Plan, to handle the emergency situations occurring at the Site.

(2) The Company shall ensure that the equipment and materials outlined in the Emergency Response and Contingency Plan are immediately available at the Site at all times and are in a good state of repair and fully operational.

(3) The Company shall ensure that all Site personnel are fully trained in the use of the equipment and materials outlined in the Emergency Response and Contingency Plan, and in the procedures to be employed in the event of an emergency.

(4) All Spills, as defined in the *EPA* , shall be immediately reported to the Ministry's Spills Action Centre at 1-800-268-6060 and shall be recorded in the log book as to the nature and cause of the spill, and the action taken for clean-up, correction and prevention of similar future occurrences.

(5) Should a Spill, as defined in the *EPA* , occur at the Site, in addition to fulfilling the requirements from the *EPA* , the Company shall submit to the District Manager a written report within three (3) calendar days outlining the nature of the Spill, remedial measure taken and the measures taken to prevent future occurrences at the Site.

In the 2017 operating year the Facility did not have a spill requiring the activation of the Emergency Response and Contingency Plan.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2017 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2018.

2.2 FINANCIAL ASSURANCE:

Specifics:
Condition 1(20.) of the ECA outlines the amount of financial assurance required for the operation of a solid non-hazardous waste transfer processing Site. In April of 2017, the ministry issued Notice #4 - ECA amendment to reflect a re-evaluation of the financial assurance needed for the site. The Facility submitted the remaining amount which forms the new total of financial assurance from the previous re-evaluation. The next re-evaluation of financial assurance is scheduled for April 30, 2020 and future re-evaluations at 3 year intervals.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (transfer processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste as outlined in Condition 2 of the ECA..

2.4 APPROVED SITE CAPACITY:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste as outlined in Condition 2(3) of the ECA.

2017 Operating Year (January 1, 2017 to December 31, 2017):

Incoming
City of Ottawa Green Bin Program = 77,505 tonnes
IC&I Sector = 5,264 tonnes
Total = 82,769 tonnes

Outgoing
NASM = 18,850 tonnes
Bedding = 13,447 tonnes
Orgapower = 653 tonnes
Residual = 16,530 tonnes
Total = 49,480 tonnes

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required at this time.

6.0 OTHER INSPECTION FINDINGS

The Site is approved for the purpose of compost production and is required to comply with the compost production conditions within the ECA as well as the Ontario Compost Quality Standards. Since the implementation of the Ontario Compost Quality Standards in 2015, the Site is unable to produce compost that meet the standards. As a result, the Facility is producing NASM for land application under approved NASM Plans.

As a recommendation, the Facility should re-evaluate the equipment and processes at the Site and determine modifications that could be implemented in order to producing a compost product that meet the requirements of the ECA and the Ontario Compost Quality Standards. If the Facility wishes to continue to produce NASM then the intent of the ECA is no longer applicable and therefore should be amended to reflect the actual waste processing activities from compost to NASM.

7.0 INCIDENT REPORT

Not Applicable

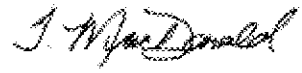
8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2018/03/27
Signature



REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2018/04/11

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext**103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change (MOECC) conducted an Industrial Sewage Works inspection at Orgaworld Canada Limited (the "Facility") on March 15, 2018 to assess compliance with issued Environmental Compliance Approval No. 2844-9YNGZC (ECA) issued on February 1, 2017. The Facility operates a waste organic processing site located at 5123 Hawthorne Road, Ottawa, Ontario (the "Site"). The Site receives organic waste from the City of Ottawa's Green Bin Collection Program and the Industrial, Commercial, and Institutional Sector.

The Site currently produces Non-Agricultural Source Material (NASM) for the use at agricultural operations and animal bedding.
A previous inspection occurred on September 29, 2016.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
N/A

Sector Type:
Other

Specify Other:
Organic Waste Processing

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT - issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA - issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD - issued May 30, 2011

Industrial Sewage Works Environmental Compliance Approval No. 2844-9YNGZC - issued February 1, 2017

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-Site open ditch system leading to a stormwater management pond that discharges off-Site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek system.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

The Site was issued the ECA for the following industrial sewage works system:

existing sewage works for the collection, transmission, treatment and disposal of stormwater runoff & process / wash water from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central stormwater management (SWM) facility off-Site (i.e. at the adjacent Hawthorne Industrial Park) which subsequently discharges to the Findlay Creek through a roadside ditch, for all storm events up to and including the 100 year return storm, consisting of the following:

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-Site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by Site operations staff as to disposal point (ditch/pond, into plant, or hauled off-Site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

Part I Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (metre)	Storage Volume (cubic metres)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- one (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

- inlet structure: A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

- overflow channel: A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- one (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- one (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- one (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- one (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- an open ditch/swale system with sufficient capacity to convey up to the 100-year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the Site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- a minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- one (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet

structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the Site are as follows:

Storm Events	2-year	5-year	25-year	100-year
Existing flows, pre-development (L/s)	206	351	606	848
Post-development flows (L/s)	1,118	1,651	2,410	3,067
Post-development attenuated flows (L/s)	56	89	189	283

Part II Process Water Recirculation System

- a **Process Water Recirculation System** (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply.

- piping for percolate/washdown water supply to the composting area including a sprinkling system;

- an odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

The above, including all other controls and appurtenances essential for the proper operation of the aforementioned Works.

No modifications, alterations, or additions were noted during the inspection which would trigger the need for an amendment to Environmental Compliance Approval No. 7251-8GKRPD. No concerns identified.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 5(5) of the ECA requires the Facility to analyse the stormwater management pond to the parameters listed in Table 2 - Trigger Parameters (see below) and meet the limits prior to discharging the effluent off-Site.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N	2.93
$CBOD_5$	15
Total Phosphorus (TP)	0.4
Total Suspended Solids (TSS)	15
E-coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

In the 2017 operating year the Facility discharged effluent on three (3) occasions. As part of the inspection the Inspecting Officer requested the sample results for the effluent discharge events and were provided by the Facility. In reviewing the results and the 2017 AR, the following periods of discharge occurred:

Discharge Period	Sample Date	Pass / Fail
April 18, 2017 to May 15, 2017	April 10, 2017	Pass
July 26, 2017 to July 31, 2017	July 6, 2017	Pass
December 21, 2017 to December 31, 2017	December 14, 2017	Pass

Based on a comparison between Table 2 - Trigger Parameters and the sample results collected for the discharge events, the Facility is in compliance with Condition 5 of the ECA.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2015	Year 2 2016	Year 3 2017
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

N/A

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?

Certificate of Approval/Permit

Does the facility meet sampling requirements?

No

Condition 4 of the ECA outlines the requirements for the Facility to monitoring, on a monthly basis, the water quality of the Stormwater Management Pond.

4. SURFACE WATER MONITORING AND RECORDING

(1) The Owner shall, upon commencement of operation of the Works, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analyzed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD_5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen (TAN)	Chromium	Temperature
Total Kjeldahl Nitrogen (TKN)	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus (TP)	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-coli		
Oil & Grease		

pH		

In 2017 monthly samples were collected by the Facility and sent for analysis for the parameters listed in Table 1 - Effluent Monitoring SWM Pond. As part of the inspection copies of the sample results were requested and received. All monthly samples were collected with the exception of January, February and October 2017. It was explained in the 2017 Annual Report samples were unable to be collected due to frozen pond conditions for January and February. The October monthly sample was not collected as it was reported that due to heavy precipitation, an accurate reading could not be collected.

****Please see Section 5.0 of this Report****

Condition 9 of the ECA outlines the requirement for the Facility to implement the groundwater monitoring program for the unconfined shallow aquifer and deep bedrock aquifer. As part of the ECA requirements, the Facility must complete an annual report outlining the completion of the groundwater monitoring program and the findings of the program of the operating year.

On March 22, 2018 the MOECC received a copy of the 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018. The report outlines the following conclusions and recommendations with respects to the findings of the 2017 report:

Conclusions:

1. Based on the groundwater elevations gathered in June and November 2017, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.
2. Analytical results for the hallow unconfined aquifer samples indicate that groundwater quality at the Site is being altered by Facility operations. The distribution of elevated concentrations of ammonia, DOC, iron, and manganese are consistent with a contaminant plume related to an organic contaminant source emanating from the Facility.
3. Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. Increasing trends of ammonia concentrations during previous monitoring periods have been observed downgradient of the Facility, however recent results show a reversal in these trends.
4. Surface water sample results indicate that surface water quality downstream of the Site was unaltered by Site activities during the 2017 monitoring period.
5. Surface water was discharged three times from the on-Site Stormwater Management Pond during the 2017 monitoring period (April, July, and December). In the April, July, and December samples collected from the Stormwater Management Pond all parameters were below their respective trigger levels listed in the Site ECA.

Recommendations:

1. Operation of the groundwater extraction system should continue, removing as much impacted groundwater from the shallow flow system as is practical.
2. Future monitoring reports should assess the effectiveness of the extraction well and provide recommendations for continued operation or expansion, as appropriate, of the current remediation system.
3. Tier II confirmatory sampling should be completed during the spring of 2018 sampling event at MW5-09, MW102-09, MW105-13, TW-4, and TW-8.

The 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018, will be sent to the MOECC's Regional Technical Support Section's Groundwater Unit for review. Once the review is completed comments will be provided to the Facility.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?

Certificate of Approval/Permit

Does the facility meet reporting requirements?

Yes

Condition 10 of the ECA outlines the reporting requirements for the Facility:

10. REPORTING

(1) The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting

documentation available to Ministry staff.

(2) The Owner shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the Works and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the District Manager requires from time to time.

At the time of the inspections records were available to the ministry for review (daily inspections, analytical results).

On March 22, 2018 The Facility submitted the annual performance report for the 2017 operating year which included the 2017 Annual Groundwater and Surface Water Monitoring Report - Orgaworld Ottawa, ECA No. 2844-9YNGZC, dated March 15, 2018. The 2017 Annual Report Organics Composting Facility was reviewed as part of the inspection and found to complete to satisfy the requirements of Condition 10.

2.6 FLOW MEASUREMENT

The ECA does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
The approved works was not discharging at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
Yes

Were all the spills reported to the ministry?
Yes

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ and Environmental Compliance Approval 2844-9YNGZC, the Facility is required to develop and implement an Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Plans outline protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan and Spill Contingency and Pollution Prevention Plan was observed to be on-Site and updated to reflect current operations (updated 2016).

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:
1. Failure to collect monthly sample for the month of October as per the requirements of Condition 4 of the ECA

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following action items are required to be addressed by the Facility as a result of the inspection findings above:

1. Orgaworld Canada Inc. must ensure monthly samples are collected regardless of precipitation events. Please confirm, in writing by April 27, 2018, future monthly samples are collected regardless of precipitation events.

2. Orgaworld Canada Inc. must review the sampling protocol and sewage works system to determine an alternative solution to sample collection during periods of ice covered conditions. It is understood health and safety of staff is priority however alternative solutions are available to prevent iced cover conditions (aeration, bubblers, etc.). By December 2018 provide a response to the undersigned outlining the options explored in a proposal on how the Facility plans to satifiy the requirements of the ECA.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Applicable
0885-AXBR46 ☐

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2018/03/29
Signature



REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2018/04/11

Signature:



File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	David Veinot	**Title:**	Compliance Officer
Contact Telephone:	(519) 663-4446 **ext** 103	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2016/09/29		
Inspection Start Date:	2018/03/15	**Inspection Finish Date:**	2018/03/15
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

The Ministry of the Environment and Climate Change conducted an Air Facility Inspection at Orgaworld's Ottawa Facility (the "Facility"), located at 5123 Hawthorne Road, Ottawa, On (the "Site"), to assess compliance with issued Environmental Compliance Approval No. 1631-A2ELCQ, Ontario Regulation 419, environmental regulations, guidelines and policies.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

○ Entire Facility ● Part of the Facility

Specifics:

The inspection focussed on the bioscrubber and biofilter air treatment process for the organic waste processing operation at the Site. The Site has one (1) bioscrubber and two (2) biofilters servicing the emission from the organic waste processing operations.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

Yes, the facility is in a target sector identified in Schedule 5.

☐ NAICS exemption — Note that s. 1(2) of Reg. 419/05 sets out exemptions for facilities whose activities would not be captured in NAICS 221112 (Fossil-Fuel Power Generation) and NAICS 5622 (Waste Treatment and Disposal)

Specifics:

The Facility operates under North American Industry Classification System (NAICS) code 562210 - Waste Treatment & Disposal for the operation of land fill sites, incinerators, or other treatment or disposal facilities for non-hazardous or hazardous waste. Establishments that integrate the collection, treatment and disposal of waste are also included.

The Facility is currently processing source separated waste from the City of Ottawa's Green Bin Collection Program and selected Industrial, Commercial & Institutional sectors for the production of Non-Agricultural Source Material (NASM). The NASM is applied to the agricultural operations as a soil conditioner under an approved NASM Plan, issued by the Ontario Ministry of Agriculture and Rural Affairs, or used as an animal bedding product.

2.0 INSPECTION OBSERVATIONS

Specifics:

Condition 2 of the ECA outlines the modifications that are permitted under the Limited Operational Flexibility. In reviewing the modification log for the 2016 operating year it was observed the following modifications occurred:

Composting Exhaust Stack - Change in exit diameter from 2m to as-built 1.47m
Emergency Generator - Generator relocated to north side of the building
Storage Piles (leaf & yard waste) - Not stored outdoors, no longer a significant source
Building dimension changed - Building parameters change slightly (Building height 11.00m to 11.58m)

Based on the modifications listed and completed in 2016, the Facility updated the figures, tables and dispersion modelling in the Emission Summary and Dispersion Modelling Report. This information was provided in the 2016 Written Summary Form required to be submitted to the ministry annual on May 31st.

No concerns identified.

2.1 SITE CONDITIONS

Operating

Specifics:

The following observations were noted during the inspections:

Odour: At the time of the inspection the Facility was operating and processing organic waste. Both air treatment processes, the bioscrubber and biofilters, were operating. The Facility operates under negative pressure therefore all odours are contained within the confines of the building and discharged through the pollution control equipment. The odour sampling port connected to the discharge stack was assessed during the inspection and found not to be discharging emissions that would be considered an adverse effect.

Noise: Noise from the Facility was not audible to a level that would cause impacts off-site at the time of the inspection. All doors of the Facility were closed at the time of the inspection. No concerns identified.

Dust: The roads and paved areas of the Site were observed to be clean to prevent fugitive dust. Unpaved surfaces surrounding the Site were damp or snow covered given the time of the year. No concerns identified.

Vibration: Vibration was not detected during the inspection and is not anticipated to be an issue with the operations occurring on-site.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015, the Facility received Environmental Compliance Approval No.1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

Based on the review of the equipment approved under the ECA, the Facility and Site has the required approval for the discharge of contaminants to air.

In the event changes to the operations, outside the scope of the ECA as outlined in Condition 2 of the ECA, the Facility will need to amend the ECA prior to making changes or modifications.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

The Environmental Protection Act and the ECA outlines requirements for notifications to the Ministry of the Environment and Climate Change. In reviewing the spills and complaints for the 2017, the Facility has met the notification requirements.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 10 of the ECA requires the Facility to monitoring the parameters of the Air Pollution Control Equipment. As part of the inspection the process data was requested for the biofilters and bioscrubber for the dates of January 18, 2017, March 15, 2017, May 1, 2017, July 3, 2017, September 29, 2017 and November 30, 2017. Based on the review of the records indicate the parameters of the Air Pollution Control Equipment are being monitored and recorded as required.

Condition 11 of the ECA requires the Facility to conduct source testing to determine the rates of odour, hydrogen sulphide and total mercaptans from the exhaust stack from the exhaust stack for the pollution control equipment (ammonia scrubber, biofilters & bioscrubber). On December 14, 2015 the Facility requested a reduction of the source testing parameters (removal of hydrogen sulphide and total mercaptans) and frequency of testing based on previous approval and source testing results. On December 15, 2015 the ministry issued a letter approving the request for a reduction in source testing parameters and a change in frequency from 6 months to 12 months.

On December 14, 2017 source testing was conducted by GHD Limited with a completed report received at the Ottawa District Office on February 22, 2018. The report is currently under review by the ministry's Standards Development Branch with comments to be followed once complete.

Is an annual ESDM report on site?

● Yes ○ No

Specifics:

N/A

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31, 2016 for the 2016 operating year.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the updated ESDM Report and Acoustic Assessment Report, the Facility demonstrates compliance with the ministry air emission standards and noise guidelines.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

The Facility provided a copy of 'Operating Procedures and Maintenance Program for Odour and Noise for Compliance with ECA (Air) No. 1631-A2ELCQ" dated February 2016, outlining the operating procedures and monitoring program for the pollution control equipment. A copy of 'Operations and Maintenance Manual, Version 2, dated March 2016, was provided outlining the maintenance procedures and inspections for all the equipment, support units, paved areas and monitoring equipment. The submission also included the procedure for responding and recording of environmental

complaints.

The document satisfies the requirements of Condition 7 of the ECA.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

During the inspection records were available for review and requested. The Facility had available numerous binders containing records related to process data, inspections, repair, maintenance, annual updates to ESDM and Acoustic Assessment Reports, training logs, etc. No concerns identified in the way records are managed and retained on-site.

As part of the inspection records associated with Condition 7 - Operation and Maintenance and Condition 10 - Monitoring were requested following the inspection. Records were requested for the biofilters and bioscrubber as it relates to inspection and maintenance for random selected dates provided below:

January 18, 2017	March 15, 2017	May 1, 2017
July 3, 2017	September 29	November 30, 2017

Daily Site Inspection - Observed to be completed as required.

Odour Abatement Weekly Inspection - Observed to be completed as required. It was noted in all odour abatement weekly inspections the man Door Seals need to be replaced.

Maintenance Daily Sheet - Observed to be completed outlining maintenance activities for the odour abatement equipment and process equipment.

Process Data - The Facility utilizes SCADA to program, adjust, measure and monitoring the organic waste processing. The SCADA system also records the data collected during the processing process. In reviewing the process data, the records were collected as required and indicate the biofilters and bioscrubber are being properly operated and monitored.

Training: The Inspecting Officer was provided the training records for an employee and the training matrix that provides all the training requirements per position acceptance anion (ex. ECA training, contingency and emergency response, operations manual and procedures, and wasted shipment protocols) and re-training frequency.

Original Acoustic Assessment Report, dated May 2014, was confirmed to be on-site as required.
Original Emission Summary and Dispersion Modelling Report, dated May 2014, was confirmed to be on-site as required.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone

numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

The Ministry of the Environment and Climate Change is not aware of any Beyond Compliance Projects for the Site.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

In reviewing the previous Air Facility Inspection Report, the Facility was required to ensure copies of the Emission Summary Table and Acoustic Assessment Summary Table is available to the ministry and public upon request as per Condition 5.3 of the ECA. The inspection confirmed these records are available as part of the annual update requirement in Condition 5 of the ECA.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by the Facility at this time.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

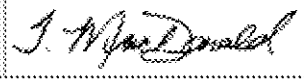
○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2018/03/29
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2018/04/11
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext**143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (the "Facility") is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing, through aerobic composting, of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The purpose of the inspection is to assess compliance with the Facility's Environmental Compliance Approval Number 2766-7HEPSZ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 347 under the above referenced *Act*. The inspection consisted of a district file review, site visit and discussions with Orgaworld Canada Limited representatives.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions to promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and processed organic waste. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The processed organic waste size material is placed in the compost curing area where it is required to cure for 21 days and subsequently tested to ensure it meets all requirements under Environmental Compliance Approval Number 2766-7HEPSZ and the Ontario Compost Quality Standards. Upon achieving the requirements of the approval and the standards, the material is deemed finished compost and removed from the site for use in accordance with the Ontario Compost Quality Standards. It

should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

The Facility started accepting organic material at the Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa Source Separated Organics collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the source separated organic waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the source separated organics and sending it to Orgaworld in April 2010. The Facility receives additional source separated organics from the industrial, commercial and institutional sector, in plastics, which started in February 2015. Environmental Compliance Approval Number 2766-7HEPSZ allows for the receipt of source separate organics in plastic as a result of an Environmental Review Tribunal decision which was reflected in an notice to Environmental Compliance Approval Number 2766-7HEPSZ on February 6, 2015.

It should also be noted that the Facility met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the *Environmental Protection Act*) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, the Facility ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed the Facility to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-Agricultural Source Material Plans. As of mid 2013, the Facility has worked with their clients in obtaining Non-Agricultural Source Material Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the *Environmental Protection Act* for the transportation of the 12-20 material.

On July 1, 2015 the Ministry of the Environmental and Climate Change implemented the entire Ontario Compost Quality Standards for the remaining standards for foreign matter content, compost maturity and compost labelling. In 2013 the Facility implemented Phase I of the Ontario Compost Quality Standards for metals in compost, quality of feedstock and pathogens. It was known through discussion with the Facility that the implementation of Phase II Ontario Compost Quality Standards would pose challenges for the production of AA compost given the requirements of the Ontario Compost Quality Standards. The challenges included compost technology and operations at the Site, capacity for the storage and curing of processed organic waste, and duration of time needed to meet the new requirements. As a result, the Ottawa District provided the Facility an opportunity to submit a Voluntary Abatement Plan to address the challenges and provide an abatement program to demonstrate the Facility's commitment to comply with the Ontario Compost Quality Standards and a strategy to land apply processed organic waste to reduce risk to human health and the environment. The Voluntary Abatement Plan submitted provided a program in which previously deemed unrestricted compost (pre-July 2015) to be land applied to agricultural operations within the legislative framework of the *Nutrient Management Act* and Non-agricultural Source Material. The Voluntary Abatement Plan outlined the Facility would enter into an agreement with the agricultural operators to submit a Non-agricultural Source Material Plan for land application of processed organic waste generated at the Site to the Ministry of Agriculture, Food and Rural Affairs and in the meantime, submit the supporting documentation to the Ottawa District Office to allow for land application prior to receiving approval under the Non-agricultural Source Material process. In addition to the Voluntary Abatement Plan, the Facility was required to retain the services of approval waste management systems to transport processed organic waste from the point of generation to the application site. The Ministry of the Environment and Climate Change reviewed and accepted the Voluntary Abatement Plan for period of six (6) months ending on December 31, 2015. To date, no off-site or environmental impacts were reported to the ministry during the duration of the Voluntary Abatement Plan which is now expired. Any further land application of processed organic waste is subject to the approval process outlined in the *Nutrient Management Act* .

Since December 31, 2015, the Facility has not produced AA compost and has continued to produce non-agricultural source material for the Ontario agricultural sector under NASM Plans and for the Quebec agricultural sector.

The inspection consisted of a district file review, site visit and discussions with Orgaworld Ottawa representatives.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):
Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice #1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice #2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice #3 - Issued on February 6, 2015
Details - The amendment was issued to reflect the decision of the Environmental Review Tribunal decision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The decision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

2.1 SITE OPERATION:

Specifics:

SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2015 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined in Environmental Compliance Approval Number 2766-7HEPSZ. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2015 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional

sector in plastic bags after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2015 Annual Report provided the monthly and annual tonnages for the 2015 operating year As part of the inspection the Inspecting Officer reviewed the mass balance for the 2015 operating year. The data provided in the mass balance confirms the Facility is in compliance with tonnage limits outlined in Environmental Compliance Approval Number 2766-7HEPSZ.

No issues identified.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2015 Annual Report states that in the 2015 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in Environmental Compliance Approval Number 2766-7HEPSZ was also confirmed by the Facility staff during the inspection.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the composting process were located inside the confines of the Processing Building.

No issues identified.

(6)Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.
(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of

its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2015 Annual Report states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

In May of 2016 the Ottawa District Office of the Ministry of the Environment and Climate Change received a complaint from a motorist reporting Orgaworld Ottawa odours along Hawthorne Road. The complaint form was completed outlining the actions taken by the company with notification to the ministry once completed. The complaint was deemed to be invalid due to the location of the Facility in comparison to wind direction.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2015 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice, previously referred to as Notice #3, to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) **name of the Owner;**
(b) **this Certificate number;**
(c) **hours during which the Site is open;**
(d) **waste types that are approved to be accepted at the Site;**
(e) **Owner's telephone number (a hotline) to which complaints may be directed;**
(f) **Owner's twenty-four hour emergency telephone number (if different from above);**
(g) **a warning against unauthorized access;**
(h) **a warning against dumping at the Site.**

(2) **The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.**

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued Environmental Compliance Approval Number 2766-7HEPSZ by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) **All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.**

(2) **The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.**

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) **Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:**

(a) **loading/unloading area of the leaf & yard waste storage pad;**
(b) **parking lot area for evidence of run-off from the leaf & yard waste storage pad;**
(c) **Processing Building and the air pollution control equipment;**
(d) **security fence and property line;**
(e) **on-site roads for presence of leaks and drips from the waste delivery trucks;**
(f) **presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;**
(g) **on and off-site litter;**
(h) **presence of vector and vermin**

At the time of the inspection the Inspecting Officer requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The Inspecting Officer also reviewed procedures provided by the Facility located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system. The program was observed to be updated to reflect current operations.

No concerns identified.

(3) **The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.**

A copy of the preventative maintenance program was available for review at the time of the inspection. The program was observed to be updated to reflect current operations.

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost, finished compost and NASM are located separate from incoming organic waste. No issues identified.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the Inspecting Officer inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that new sources/streams of incoming organic waste began in February 2015 from the Industrial, Commercial and Institutional Sector. Sample analysis documentation was provided and determined to be compliant with the Ontario Compost Quality Standards. In February of 2015 Orgaworld requested and received approval from the ministry to start accepting the new source of organic waste received in plastic bags. No issues identified.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

The Facility is not currently producing compost, as defined by the Ontario Compost Quality Standards, therefore no records of analytical results were requested.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

The Facility is not currently producing compost, as defined by the Ontario Compost Quality Standards, therefore no records of analytical results were requested

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the Inspecting Officer requested information on how the Facility complies with the above condition. The Inspecting Officer was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. Inspecting Officer was able to verify this information by being provided screenshots of the SCADA system for the above process monitoring parameters during the 2015 inspection. The Inspecting Officer observed the SCADA system during the 2016 inspection which confirmed process monitoring is continuing to occur.

No issues were identified.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

Temperature monitoring is completed by use of temperature probes located in the compost tunnels. The Facility uses the SCADA system to monitoring and record temperatures during the compost process. No concerns identified.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2015 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2015 Annual Report, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2015 Annual Report confirms that during the 2015 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2015 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. Inspection reports are completed and retained on-site.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

Upon arriving to the site a water truck was on-site washing the paved areas. No dust concerns identified.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

No compost was being stored at the time of the inspection. No concerns identified.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. Fugitive dust was not observed to be of concern during the inspection. No complaints of dust have been reported to the ministry to date.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

In 2016 the Operations Manual was updated due to changes to operating procedures and equipment. A copy was provided to the Ottawa District Office of the updated manual. No concerns identified.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. No issues identified.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2015 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2016.

2.2 FINANCIAL ASSURANCE:

Specifics:

Financial Assurance re-evaluation was submitted by Orgaworld Ottawa in 2015 and is currently under review by the

ministry.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No outstanding non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld Canada Limited at this time.

6.0 OTHER INSPECTION FINDINGS

It is recommended Orgaworld Canada Limited continue their efforts in implementing procedural changes, modifications, and/or technology upgrades in order to meet the Ontario Compost Quality Standards.

7.0 INCIDENT REPORT

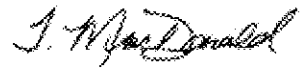
Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Kyle Straberger**
District Office:	**Ottawa District Office**
Date:	**2016/10/14**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2016/10/17**
Signature:	
File Storage Number:	SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext**143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for a minimum of 21 days, tested to ensure it meets all requirements of the waste Environmental Compliance Approval Number 2766-7HEPSZ and Ontario Compost Quality Standards and then removed from the site as finished compost or non-agricultural source material (NASM). All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process is recirculated with excess kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the source separated organic waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional source separated organics in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on September 29, 2016.

The purpose of this inspection is to assess compliance with issued Industrial Sewage Works Environmental

Compliance Approval Number 7251-8GKRPD and applicable environmental legislation such as the *Ontario Water Resources Act* .

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not Applicable

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Certificate of Approval Number(s):
Yes
C of A Number(s):

Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off-site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek.

Process water generated inside the building is stored in leachate holding tanks buried on the east-side of the building. Should the Facility need to use water in their process (wetting the composting material), the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied, the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives, the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued Environmental Compliance Approval Number 7251-8GKRPD for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in closed position during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m,

discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2 - year	5-year	25-year	100-year
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post -development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply

- Piping for percolate/washdown water supply to the composting area including a sprinkling system;

- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

No modifications, alterations, or additions were noted during the inspection which would trigger the need for an amendment to Environmental Compliance Approval No. 7251-8GKRPD. No concerns identified.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6(5) of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

In March of 2016 the Facility discharged stormwater effluent from the sewage works in accordance with Table 2 - Trigger Parameters. A copy of the sample analysis was provided to the Inspecting Officer for review. In reviewing the results, all parameters were below their respected trigger levels. No concerns identified.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2015	Year 2 2016	Year 3 2017
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

Environmental Compliance Approval Number 7251-8GKRPD does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. No issues were identified.

No changes to the operation of the Works took place in 2016 requiring amendments to Environmental Compliance Approval Number 7251-8GKRPD.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Facility to monitor stormwater within the Stormwater Management Pond at a monthly frequency and compare against Table 1 - Effluent Monitoring SWM Pond provided below:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

The Stormwater Management Pond monitoring program was completed in 2015 and outlined in Industrial Sewage Works Inspection Report, dated December 21, 2015. The monitoring data for the 2016 operating year will be reviewed pending the submission of the 2016 Performance Report to the ministry's Ottawa District Office.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2015 operating year and was submitted to the ministry in 2016. The report was provided to the ministry Technical Support Section for groundwater comments. At the time of the inspection ministry comments were not complete but will be provided upon completion.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of Environmental Compliance Approval Number 7251-8GKRPD outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

After completing the inspection the Inspecting Officer reviewed the district file and determined the annual report required by the above condition was submitted for the 2015 operating year on March 18, 2016. The 2015 Annual Report outlined operational issues encountered during the 2015 operating year which are outlined below:

1. Blockages of the solids interceptor located west of the stormwater pond were identified and rectified.

2. The submersible pump used to pump water from the stormwater management pond to the fire suppression tanks was replaced due to age and observed effectiveness.
3. On-site trench was cleaned out by Orgaworld personnel as a result of vegetation growth and residual matter build-up.

No concerns identified.

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

Environmental Compliance Approval Number 7251-8GKRPD requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the Inspecting Officer reviewed the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or Orgaworld in relation to the operation of the industrial sewage works)
- One (1) discharge event occurred in the 2016 operating year with analytical results supporting compliance with

Table 2 - Trigger Parameters

2.6 FLOW MEASUREMENT

Environmental Compliance Approval Number 7251-8GKRPD does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?

No

Reason:

The Industrial Sewage Works was not discharging effluent at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?

No

Has the facility had any spills since the last inspection?

No

Were all the spills reported to the ministry?

N/A

Does the facility's operations or spill history suggest that a SPCP be developed?

No

Comments:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the Industrial Sewage Works Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld Canada Limited at this time.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2016/10/11
Signature

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2016/10/14**

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Nick Pora	**Title:**	Ontario Operations Manager
Contact Telephone:	(519) 649-4446 **ext** 143	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/12/21		
Inspection Start Date:	2016/09/29	**Inspection Finish Date:**	2016/09/29
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material is placed in the compost curing area where it is required to cure for a minimum of 21 days, tested to ensure it meets all requirements under the waste Environmental Compliance Approval and Ontario Compost Quality Standards and then removed from the site as finished compost or non-agricultural source material (NASM). All process air and air from the receiving hall is directed through the pollution control equipment. Leachate generated as a result of the composting process is recirculated with excess kept within on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28th, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics (SSO) collection program which includes leaf and yard waste. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste. In 2015 Orgaworld started excepting industrial, commercial and institutional SSO in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on September 29, 2016.

The purpose of this inspection is to assess compliance with Environmental Compliance Approval No.1631-A2ELCQ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Orgaworld Ottawa representatives.

An Industrial Sewage Works Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with issued Environmental Compliance Approval Number 1631-A2ELCQ which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements. The Environmental Compliance Approvals outlines the approved operations for the Site as follows:

An aerobic composting facility, consisting of the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

The operations approved under the current Environmental Compliance Approval are not subject to the regulatory requirements for Schedule 4 or Schedule 5 targeted facilities of Ontario Regulation 419/05 under the *Environmental Protection Act* until the year 2020 in which schedule 3 standards will apply..

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Facility staff provided a tour of the facility incorporating an overview of the air pollution control devices for the treatment of air emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure treatment of emissions. The system is outlined below:

1.) Fans are located throughout the building, these fans draw air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and the composting tunnels goes through an ammonia scrubber, one of two biofilters, a bioscrubber, prior to discharging from a 40 meter stack located at the Site.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (elevated pH level) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is dry requiring the Facility to operate in a water negative environment in the summer and as such leachate generated in the operation of the Facility is re-circulated within the process. If the Facility requires additional water the Site draws from the stormwater management pond on-site.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack located at the Site is 40 meters high with a sampling port positioned outside at the bottom of the stack in order to sample air prior to entering the stack. There is an additional sampling port inside prior to the bioscrubber.

There are several odour ports throughout the Facility to monitor the process and effectiveness of the pollution control equipment.

2.1 SITE CONDITIONS

Operating

Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could pose potential impacts off-site. It was noted that noise levels outside the Site were at a level anticipated to not pose a concern to surrounding properties. No concerns identified.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing or could result in impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved areas were currently being washed. The Facility monitors the paved areas and provides dust control measures if needed. No concerns identified.

Odour: At the time of the inspection odour was assessed to determine if the operations of the Facility is causing odour impacts off-site. As part of the tour of operations at the Site, the Inspecting Officer and Facility staff exited the building to gain access to a separate area of the Site. During this time, the Facility was in operations and no odour was detected. The Facility also has a odour port located at the base of the stack which did not produce any odours that the Inspecting Officer believed were significant.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection. No concerns identified.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On December 10, 2015, the Facility received Environmental Compliance Approval Number 1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/15		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

The Limited Operational Flexibility Environmental Compliance Approvals, previous referred to as Basic Comprehensive Environmental Compliance Approvals, allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions and noise to ensure compliance with applicable standards and limits outlined in the approval, Ontario Regulation 419/05 and NPC-300. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

The Facility submitted an application, dated May 21, 2014, to the ministry for renewal of their Limited Operational Flexibility Environmental Compliance Approval which was approved replacing and revoking Environmental Compliance Approval Number 7021-7HQNDE issued September 16, 2009. On December 10, 2015 the ministry issued Environmental Compliance Approval Number 1631-A2ELCQ the Facility.

As a result of the inspection the Inspecting Officer did not observe any new additions, alterations or modifications to equipment that would be subject to an amendment of the issued Environmental Compliance Approval Number 1631-A2ELCQ.

No modifications permitted under Condition 2 - Limited Operational Flexibility of Environmental Compliance Approval Number 1631-A2ELCQ occurred in the 2016 operating year to date.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer reviewed the district file review prior to completing the inspection. As a result of the file review no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility for the 2016 operating year.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1 of Environmental Compliance Approval Number 1631-A2ELCQ, the Facility is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:

- June & December 2010
- July & December 2011
- November 2012
- November 2013
- November 2014
- November 2015

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements.

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number1631-A2ELCQ and as a result, the Facility requested to continue the previous ministry approved reduction in the frequency of source testing and removal of hydrogen sulfide and mercaptions from the testing parameters. On December 14, 2015 the Facility was granted permission for the reduction in source testing frequency and removal of specific testing parameters. The last source test was completed in November of 2015 with copies provided to the Ministry of the Environment and Climate Change's Ottawa District Office and Standards Development Branch in January 2015.

Source testing has been scheduled for November 2016.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility submitted the Written Summary prior to May 31, 2016 for the 2015 operating year in which Limited Operational Flexibility conditions were in place for a portion of the year.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the submitted updated Emission Summary Table and Acoustic Assessment Table, no exceedance of a legal limit was identified.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 7 of Environmental Compliance Approval Number 1631-A2ELCQ outlines the requirements for the development and implementation of operational and maintenance requirements for all processes with significant environmental aspects. In conducting the inspection, it was noted that not no changes were made within the inspection period requiring revisions. No concerns identified.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of Environmental Compliance Approval Number 1631-A2ELCQ outlines the requirements for the Facility to conduct record keeping of specific documents and records associated with the operations under the Environmental Compliance Approval. The following records are to be provided in a timely manner:

- Original ESDM Report and each updated version
- A copy of each version of the Acoustic Assessment Report
- Supporting information used in the emission rate calculations performed in the ESDM Reports and Acoustic Assessment Reports
- Copies of each Written Summary Form provided to the Ministry under Condition 6.1 of this Approval
- Records of maintenance, repair and inspection of Equipment related to all Processes with Significant Environmental Aspects
- All reports of Source Testing
- All records generated from the monitoring of the Air Pollution Control Equipment
- All records related to environmental complaints made by the public as required by Condition 8 of this Approval

As part of the inspection, the above reports and monitoring records were discussed. A majority of the reports and data are recorded/stored electronically through monitoring and recording software and can be made available upon request.

Updated Emission Summary Table and Acoustic Summary Table was not available at the time of the inspection and therefore the Inspecting Officer requested to be submitted to the ministry post inspection. On October 6, 2016 the Inspecting Officer was provided the updated Acoustic Assessment Summary Table, dated March 23, 2016, indicating compliance with ministry noise standards. On October 6, 2016 the Inspecting Officer was provided the updated Emission Summary Table, dated April 2016, indicating compliance with ministry air standards.

****Please see Section 5.0 of this Report for actions required****

Records of completed inspection of the equipment referenced in Environmental Compliance Approval Number 1631-A2ELCQ were reviewed at the time of the inspection with no issues identified. All records are completed in paper formed and filed on-site.

One environmental complaint was received in 2016 regarding odour from a motorist detecting odours when driving past/near the Facility. The complaint form was completed by Orgaworld Ottawa outlining the actions taken by the company with notification to the ministry once completed. The complaint was deemed to be invalid due to the wind direction in reference with the location of the Facility.

No concerns identified.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility is not required under Ontario Regulation 227/07 under the Environmental Protection Act to develop a Sills Prevention and Contingency Plan. The Facility

As a requirement of Environmental Compliance Approval No. 2766-7HEPSZ, the Facility is required to develop and implement an Emergency Response and Contingency Plan which includes procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation. The Emergency Response and Contingency Plan also outlines protocols with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry;s District Office and the Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response.

At the time of the inspection the Emergency Response and Contingency Plan was observed to be on-site and updated to reflect current operations.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No ongoing non-compliance issues were identified during the file review prior to the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

● Yes ○ No

Specifics:

Copy of Emission Summary Table and Acoustic Assessment Summary was not available on-site as required by Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ.

5.0 ACTION(S) REQUIRED

The following action item(s) are required to be addressed by Orgaworld Ottawa Facility:

1. Orgaworld Ottawa must ensure hardcopies of the Emission Summary Table and Acoustic Assessment Summary Table is available to the ministry and public upon request as per Condition 5.3 of Environmental Compliance Approval No. 1631-A2ELCQ.

6.0 OTHER INSPECTION FINDINGS

No other inspecting findings noted.

7.0 INCIDENT REPORT

● Applicable ○ Not Applicable

8448-AEMP9Q

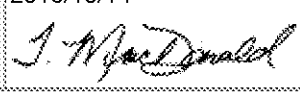
8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office

Date:	2016/10/11
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2016/10/14
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Michael Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(613) 822-2056 **ext**143	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements of the waste Environmental Compliance Approval Number 2766-7HEPSZ and Ontario Compost Quality Standards and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the source separated organic waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional source separated organics in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Industrial Sewage Works Inspection. The site visit for the inspection was conducted on December 21, 2015.

The purpose of this inspection is to assess the sites compliance with issued Industrial Sewage Works Environmental Compliance Approval Number 7251-8GKRPD and applicable environmental legislation such as the *Ontario Water Resources Act* .

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
Not Applicable

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat)

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually enters into Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the east-side of the building. Should the facility need to use water in their process (wetting the composting material) the Facility uses the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the Facility retains the services of a ministry approved waste management system to pick up and dispose of the leachate at a ministry approved waste disposal site. The Hazardous Waste Information Network Generator Number for the Site is ON3338779, and indicates that the leachate is classified as waste class 270 L - Other specified organic sludges, slurries and solids. According to Facility representatives the Facility operates in a water negative environment in the summer but has found that they collect leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued Environmental Compliance Approval Number 7251-8GKRPD for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m^3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m^3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m^3/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in closed position during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m^3 and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m^3/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	2 - year	5-year	25-year	100-year
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post -development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:

- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m^3 each;

- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m^3 respectively;

- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply

- Piping for percolate/washdown water supply to the composting area including a sprinkling system;

- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition

piping for pH control; and

- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6(5) of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

The Facility indicated during the inspection that the stormwater management pond did not have a discharge event which would require the effluent to meet the Table 2 - Trigger Parameters during the 2014 and 2015 operating year.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2014	Year 2 2015	Year 3 2016
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

Environmental Compliance Approval Number 7251-8GKRPD does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. No issues were identified.

No changes to the operation of the Works took place in 2014 or 2015 which would require amendments to Environmental Compliance Approval Number 7251-8GKRPD.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD outlines the requirements for the Facility to monitor stormwater within the Stormwater Management Pond at a monthly frequency and compare against Table 1 - Effluent Monitoring SWM Pond provided below:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

As part of the file review, the Inspecting Officer reviewed the sample analysis provided in the 2014 Groundwater and Surface Water Monitoring Report and requested sample analysis for the 2015 operating year. Sampling data collected during the 2014 and 2015 operating year was compared against Table 1 - Effluent Monitoring SMW Pond of Environmental Compliance Approval Number 7251-8GKRPD.

In reviewing the data the following observations were noted:

2014 SWMP:

- Samples were not collected during the months of January, February, March and December (may be a result of frozen conditions or health and safety reasons - **See Section 6.0 of this Report**)
- **September** - Inorganic metals were not tested due to a lab error at ALS Laboratory (outlined in the 2014 Annual Report)
- **November** - Oil & grease was not analysed as per Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD

2015 SWMP:

- Samples were not collected during the months of January, February and March (may be a result of frozen conditions or health and safety reasons - **See Section 6.0 of this Report**)
- All parameters were sampled and analysed as per Condition 5 of Environmental Compliance Approval Number 7251-8GKRPD

****Please see Section 5.0 of this Report****

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in

accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2014 operating year which was submitted to the in 2015. The report was provided to the ministry Technical Support Section for groundwater and surface water comments. At the time of the inspection ministry comments were not complete but will be provided upon completion.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of Environmental Compliance Approval Number 7251-8GKRPD outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

After completing the inspection the Inspecting Officer reviewed the district file and determined the annual report required by the above condition was not submitted for the 2014 operating year on March 31, 2015. The Inspecting Officer informed the Facility of the non-compliance event and on March 10, 2016 the Inspecting Officer received a copy of the 2014 Annual Report. The 2014 Annual Report outlined not operational issues were encountered during the 2014 operating year and inspections of the works were completed indicating no maintenance work required. No effluent was discharged from the sewage works.

The 2015 annual report is not required to be submitted until March of 2016 and did not form part of the inspection. Additional information was requested after the inspection report to confirm compliance with the above subsection of the condition which is outlined below:

(a) a description of any operating problems encountered and corrective actions taken

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the Works;

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

- All analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9, was submitted in a separate report for the 2014 operating year. The analytical results and water elevation data is currently under review by the ministry's Technical Support Section Groundwater and Surface Water Units.

(e) any other information the District Manager requires from time to time.

- No information was required to be submitted to the District Manager for the 2014 operating year

****Please see Section 5.0 of the Report****

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

Environmental Compliance Approval Number 7251-8GKRPD requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the Inspecting Officer reviewed the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or Orgaworld in 2014 or 2015)
- No discharge events occurred at the SWMP in the 2014 or 2015 operating year

2.6 FLOW MEASUREMENT

Environmental Compliance Approval Number 7251-8GKRPD does not require the construction and operation of flow monitoring or measurement equipment.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
The Industrial Sewage Works was not discharging effluent at the time of the inspection.

2.8 FINANCIAL ASSURANCE

The Industrial Sewage Works is not subject to the requirements of Financial Assurance. It should be noted that under Environmental Compliance Approval Number 2766-7HEPSZ (Waste Disposal Site) the Facility is required to submit financial assurance in an amount sufficient to satisfy the Director.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
No

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
As referenced in Section 2.5 of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The Inspecting Officer confirmed this information as part of the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No outstanding non-compliance issues or actions were identified prior to completing the inspection. As referenced in the previous inspection report, dated January 29, 2015, the Facility has submitted the required documentation in the form of an application to amend the existing Environmental Compliance Approval Number 7251-8GKRPD to include a groundwater compliance and trigger level program and monitoring program to satisfy condition 9(8) of the approval. The application is currently under review by the Ministry of the Environment and Climate Change's Environmental Approvals Branch.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

1.) Non-compliance - Condition 5(1) of Environmental Compliance Approval No. 7251-8GKRPD by failing to analyse monthly samples per the parameters outlined in Table 1 - Effluent Monitoring SWM Pond for the 2014 operating year.

2.) Non-compliance - Condition 10(3) of Environmental Compliance Approval No. 7251-8GKRPD by failing to prepare and submit a performance report for the 2014 operating year by March 31, 2015.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the Industrial Sewage Works Inspection completed at the Site, the following action items require attention by Orgaworld:

1. 1. Orgaworld must continue to ensure all parameters are analysed as per Condition 5 of the ECA.
2. 2. Orgaworld shall ensure Annual Reports, as outlined in Condition 10 of the ECA, are completed and submitted to the Ottawa District Office by no later than March 31 annually.

6.0 OTHER INSPECTION FINDINGS

As noted in Section 2.4 of this Report, sample collection was not completed during certain operating months in 2014 and 2015. In past years, outlined in annual reports and inspection reports, samples were not collected during these months due to ice-covered conditions with risk to human health if sampling was to occur. It is recommended that Orgaworld revisit the monitoring program and determine if amendments or modifications a required to ensure compliance with Environmental Compliance Approval No. 7251-8GKRPD is obtained moving forward.

7.0 INCIDENT REPORT

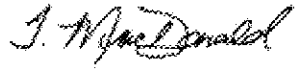
Applicable
5433-A7HJUS ☑

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2016/03/17**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**

Date: **2016/03/30**

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Mike Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(519) 663-4446 **ext** 104	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval Number 2766-7HEPSZ for the production of compost. Organic waste is brought to the Site, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste Environmental Compliance Approval and Ontario Compost Quality Standards and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

The Facility first started accepting organic material at their Site on January 28th, 2010. The Site is currently receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste. In 2015 Orgaworld stated excepting industrial, commercial and institutional SSO in small quantities.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information requested prior to and after the completion of the Air Facility inspection. The site visit for the inspection was conducted on December 21th, 2015.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval No.1631-A2ELCQ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Nick Pora, Plant Manager.

An Industrial Sewage Works Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with issued Environmental Compliance Approval Number 7021-7HQNDE from the period of January 2014 to December 9, 2015 and with issued Environmental Compliance Approval Number 1631-A2ELCQ for the period of December 10, 2015 to December 31, 2015 which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements. The Environmental Compliance Approvals outline the approved operations for the Site:

An aerobic composting facility, consisting of the following processes and support units:

- receipt of organic materials and leaf and yard waste;
- pre-processing of the organic materials and leaf and yard waste;
- composting of the pre-processed materials in composting tunnels;
- removal of the materials from the composting tunnels at end of the composting process, and screening and curing of the finished compost inside the enclosed building;

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

The operations approved under the current Environmental Compliance Approval are not subject to the regulatory requirements for Schedule 4 or Schedule 5 targeted facilities of Ontario Regulation 419/05 under the *Environmental Protection Act* under the year 2020.

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Facility staff provided a tour of the facility incorporating an overview of the air pollution control devices for the treatment of air emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure treatment of emissions. The system is outlined below:

1.) Fans are located throughout the building, these fans draw air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and the composting tunnels goes through an ammonia scrubber, one of two biofilters, a bioscrubber, prior to discharging from a 40 meter stack located at the Site.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air

temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (elevated pH level) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is dry requiring the Facility to operate in a water negative environment in the summer and as such leachate generated in the operation of the Facility is re-circulated within the process. If the Facility requires additional water the Site draws from the stormwater management pond on-site.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.
Stack:

The stack located at the Site is 40 meters high with a sampling port positioned outside at the bottom of the stack in order to sample air prior to entering the stack. There is an additional sampling port inside prior to the bioscrubber.

There are several odour ports throughout the Facility to monitor the process and effectiveness of the pollution control equipment.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns identified.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing or could result in impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear cleaned and the trucks on-site were not generating dust. The Facility monitors the paved areas and provides dust control measures if needed. No concerns identified.

Odour: At the time of the inspection odour was assessed to determine if the operations of the Facility is causing odour impacts off-site. As part of the tour of operations at the Site, the Inspecting Officer and Facility staff exiting the building to gain access to a separate area of the Site. During this time, the Facility was in operations and no odour was detected. The ministry nor the Facility has received any odour complaints during the 2014 and 2015 operating year. No concerns identified.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection nor experienced when completing odour surveys in the surround area. No concerns identified.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

On September 16, 2009 the Facility received Environmental Compliance Approval Number 7021-7HQNDE for the operation and pollution control equipment to manage and treat air emissions. The approval issued provided conditions that allowed for Limited Operational Flexibility which would allow modifications to be completed provided that the modifications were within the scope of the approval and Section 20.6 (1) of the Environmental Protection Act. The Limited Operational Flexibility conditions expiry after 5 years of the issuance date which after the expiry date no longer apply until an application is submitted and approved for renewal.

In May of 2014 the Facility submitted an application to the ministry's Environmental Approvals Branch to renew the Limited Operational Flexibility conditions as these conditions were set to expire on September 16, 2014.

On December 10, 2015, the Facility received Environmental Compliance Approval Number 1631-A2ELCQ as a result of the application submitted in 2014. Environmental Compliance Approval Number 1613-A2ELCQ was approved providing for Limited Operational Flexibility for a period of 10 years from the issuance date (December 10, 2025).

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16		
Environmental Compliance Approval - Comprehensive	1631-A2ELCQ	2015/12/10		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☒ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

The Limited Operational Flexibility Environmental Compliance Approvals, previous referred to as Basic Comprehensive Environmental Compliance Approvals, allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

The Facility submitted an application, dated May 21, 2014, to the ministry for renewal of their Limited Operational Flexibility Environmental Compliance Approval which was approved replacing and revoking Environmental Compliance Approval Number 7021-7HQNDE issued September 16, 2009. On December 10, 2015 the ministry issued

Environmental Compliance Approval Number 1631-A2ELCQ the Facility.

As a result of the inspection the Inspecting Officer did not observe any changes or equipment implemented that would be subject to an amendment of the issued Environmental Compliance Approval Number 1631-A2ELCQ. The Facility was not required to submit a 2014 Written Summary as the condition that permits modifications had expired resulting in no modifications completed in 2014 therefore not requiring a submission. The 2015 Written Summary is not required to be submitted until May 31, 2016. The Inspecting Officer reviewed the modification logs provided by the Facility for 2015.

2015: The Facility completed one (1) modification to the operations / equipment at the Site during the 2015 operating year.

- Replace electrical shredder with diesel shredder - Updated ESDM Report and Acoustic Assessment Report - Changes reflected in 2015 ESDM Report

As previously mentions, the condition in Environmental Compliance Approval Number 7021-7HQNDE permitting modifications to be completed under Limited Operational Flexibility expired as of September 16, 2014 restricting the ability for modifications to be completed until an amendment is approved by the ministry. In May 2014 the Facility submitted an amendment to renew their Limited Operational Flexibility and did not receive an approval until December 2015. The Facility completed a modification in September 2015 resulting in a contravention of Section 20.6(1) and Condition 2.1 of ECA No. 7021-7HQNDE.

Please see Section 5.0 of this Report

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer reviewed the district file review prior to completing the inspection. As a result of the file review no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility for the 2014 and 2015 operating year.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the Facility is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:

- June & December 2010
- July & December 2011
- November 2012
- November 2013
- November 2014
- November 2015

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements.

On December 10, 2015 the Facility was issued Environmental Compliance Approval Number1631-A2ELCQ and as a result, the Facility requested to continue the previous ministry approved reduction in the frequency of source testing and removal of hydrogen sulfide and mercaptions from the testing parameters. On December 14, 2015 the Facility was granted permission for the reduction in source testing frequency and removal of specific testing parameters. The

last source test was completed in November of 2015 with copies provided to the Ministry of the Environment and Climate Change's Ottawa District Office and Standards Development Branch in January 2015. Upon completion of the ministry's review, comments will be provided to the Facility.

The next source testing is scheduled for November 2016.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 6 of Environmental Compliance Approval Number 1631-A2ELCQ requires the Facility to provide the Director no later than May 31 of each year, a Written Summary Form to be submitted to the Ministry of the Environment and Climate Change's website that shall include the following:

a. a declaration of whether the Facility was in compliance with section 9 of the *Environmental Protection Act* , Ontario Regulation 419/05 and the conditions of Environmental Compliance Approval Number 1631-A2ELCQ
b. a summary of each Modification satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a Point of Impingement for any Compound of Concern or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception

The Facility is not required to comply with the above conditions until May 31, 2016 for the 2015 operating year in which Limited Operational Flexibility conditions were in place.

In 2014 the Facility was required to submit a similar Written Summary under Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE requiring the following information and documentation:

a. a signed statement that the *Facility* was in compliance with the *Performance Limits;*
b. a summary of each *Modification* that took place in the previous calendar year and resulted in a change in the previously calculated concentration at the *Point of Impingement* for any *Compound of Concern* or resulted in a change in the sound levels reported in the *Acoustic Assessment Summary Table* at any *Point of Reception;*
c. a list of each *Compound of Concern* submitted to the *Air Standards Manager* for review in the previous calendar year;
d. a review of any changes to a *Ministry Point of Impingement Limit* undertaken in the previous calendar year that affect a *Compound of Concern* emitted from the *Facility;*
e. a tabulated summary of the changes in the emission rate of any *Compound of Concern* and the resultant increase or decrease in the *Point of Impingement* concentration reported in the *ESDM Report* over the previous calendar year; and
f. the *Emission Summary Table* and *Acoustic Assessment Summary Table* for the *Facility* as of December 31 from the previous calendar year.

In reviewing the district file the 2014 Written Summary was not submitted to the District Manager of the Ottawa District Office as required by Condition 5.

****Please see Section 5.0 of this Report****

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

In reviewing the most updated Emission Summary & Dispersion Modelling Report (May 2014), no exceedance of a ministry limit was observed. The review of the Emission Summary & Dispersion Modelling Report was completed by the ministry's Environmental Approvals Branch which accompanied the Facility's application to renew their Limited Operational Flexibility condition.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

The Inspecting Officer was informed that the above referenced documents are current and no changes have been made requiring revisions with the exception to the *Site Inspection and Monitoring Program* and *Operations Manual* for the modification that includes the replacement of an electric shredder to a diesel shredder. Provided the recent issuance of Environmental Compliance Approval Number 1631-A2ELCQ, Condition 7.1 requires an updated operations and maintenance manual to be completed by March 10, 2016.

No issues identified.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Condition 9 of Environmental Compliance Approval Number 1631-A2ELCQ (formerly Condition 8 of Environmental Compliance Approval Number 7021-7HQNDE) outlines the requirements for the Facility to conduct record keeping of specific documents and records associated with the operations under the Environmental Compliance Approval. The following records are to be on-site:

- Original ESDM Report and each updated version
- a copy of each version of the Acoustic Assessment Report
- supporting information used in the emission rate calculations performed in the ESDM Reports and Acoustic Assessment Reports
- copies of each Written Summary Form provided to the Ministry under Condition 6.1 of this Approval
- records of maintenance, repair and inspection of Equipment related to all Processes with Significant Environmental Aspects
- all reports of Source Testing
- all records generated from the monitoring of the Air Pollution Control Equipment
- all records related to environmental complaints made by the public as required by Condition 8 of this Approval

As part of the inspection the Inspecting Officer reviewed the district file, requested confirmation, and was provided documents to confirm compliance with the above condition. Upon reviewing the information, the Inspecting Officer noted the above documentation was available with the exception of the 2014 Written Summary.

Please see Section 5.0 of this Report

The Ottawa District Office and the Facility did not receive any environmental complaints for the 2014 operating year. In July 2015, the ministry was made aware of an incident involving a small fire located in Tunnel 8 of the building. The Ottawa Fire Department responded to the incident and the material was extinguished. No complaints or concerns were reported to the Ministry of the Environment and Climate Change nor to the Facility as a result of the fire. No fires have been reported since July 2015.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was deemed acceptable.

No spills were reported to the ministry for the 2014 and 2015 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

No

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

No

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

● Yes ○ No

Specifics:

1. Modifications were completed in September 2015 after the expire date associated with Section 20.6 (1) of the Environmental Protection Act and Condition 2.1 of Environmental Compliance Approval Number 7021-7HQNDE and prior to receiving the new Environmental Compliance Approval Number 1631-A2ELCQ, revoking and replacing Environmental Compliance Approval Number 7021-7HQNDE, renewing the Limited Operational Flexibility conditions.

2. The 2014 Written Summary was not provided to the District Manager by May 31, 2015 as required by Condition 5 of Environmental Compliance Approval Number 7021-7HQNDE.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

As a result of the Air Facility Inspection the following actions are required to be addressed:

1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.

2. By May 31, 2016, the Facility must submit the 2014 Written Summary to the undersigned Inspecting Officer

1. 1. The Facility must ensure all modifications are completed pursuant to Section 20.6 (1) of the Environmental Protection Act and Condition 2 of Environmental Compliance Approval Number 7021-7HQNDE.
2. 2. By May 31, 2016, the Facility must submit the 2014 Written Summary to the undersigned Inspecting Officer

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

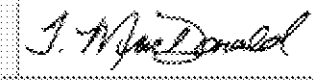
● Applicable ○ Not Applicable
8383-A7MRXR

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2016/03/17
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2016/03/30
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB, NAICS: 562210		
Contact Name:	Michael Rooke / Nick Pora	**Title:**	Compliance Officer / Plant Manager
Contact Telephone:	(519) 663-4446 **ext**104	**Contact Fax:**	(519) 649-7757
Last Inspection Date:	2015/01/29		
Inspection Start Date:	2015/12/21	**Inspection Finish Date:**	2015/12/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (the "Facility") is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing, through aerobic composting, of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The purpose of the inspection is to assess compliance with the Facility's Environmental Compliance Approval Number 2766-7HEPSZ and applicable environmental legislation such as the *Environmental Protection Act* and Ontario Regulation 347 under the above referenced *Act*. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Nick Pora, Plant Manager.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions to promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and processed organic waste. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The processed organic waste size material is placed in the compost curing area where it is required to cure for 21 days and subsequently tested to ensure it meets all requirements under Environmental Compliance Approval Number 2766-7HEPSZ and the Ontario Compost Quality Standards. Upon achieving the requirements of the approval and the standards, the material is deemed

finished compost and removed from the site for use in accordance with the Ontario Compost Quality Standards. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

The Facility started accepting organic material at the Site on January 28, 2010. The Site is currently receiving waste from the City of Ottawa Source Separated Organics collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the source separated organic waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the source separated organics and sending it to Orgaworld in April 2010. The Facility receives additional source separated organics from the industrial, commercial and institutional sector, in plastics, which started in February 2015. Environmental Compliance Approval Number 2766-7HEPSZ allows for the receipt of source separate organics in plastic as a result of an Environmental Review Tribunal decision which was reflected in an notice to Environmental Compliance Approval Number 2766-7HEPSZ on February 6, 2015.

It should be noted that the Facility met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the *Environmental Protection Act*) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, the Facility ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed the Facility to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-Agricultural Source Material Plans. As of mid 2013, the Facility has worked with their clients in obtaining Non-Agricultural Source Material Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the *Environmental Protection Act* for the transportation of the 12-20 material.

On July 1, 2015 the Ministry of the Environmental and Climate Change implemented the entire Ontario Compost Quality Standards for the remaining standards for foreign matter content, compost maturity and compost labelling. In 2013 the Facility implemented Phase I of the Ontario Compost Quality Standards for metals in compost, quality of feedstock and pathogens. It was known through discussion with the Facility that the implementation of Phase II Ontario Compost Quality Standards would pose challenges for the production of AA compost given the requirements of the Ontario Compost Quality Standards. The challenges included compost technology and operations at the Site, capacity for the storage and curing of processed organic waste, and duration of time needed to meet the new requirements. As a result, the Ottawa District provided the Facility an opportunity to submit a Voluntary Abatement Plan to address the challenges and provide an abatement program to demonstrate the Facility's commitment to comply with the Ontario Compost Quality Standards and a strategy to land apply processed organic waste to reduce risk to human health and the environment. The Voluntary Abatement Plan submitted provided a program in which previously deemed unrestricted compost (pre-July 2015) to be land applied to agricultural operations within the legislative framework of the *Nutrient Management Act* and Non-agricultural Source Material. The Voluntary Abatement Plan outlined the Facility would enter into an agreement with the agricultural operators to submit a Non-agricultural Source Material Plan for land application of processed organic waste generated at the Site to the Ministry of Agriculture, Food and Rural Affairs and in the meantime, submit the supporting documentation to the Ottawa District Office to allow for land application prior to receiving approval under the Non-agricultural Source Material process. In addition to the Voluntary Abatement Plan, the Facility was required to retain the services of approval waste management systems to transport processed organic waste from the point of generation to the application site. The Ministry of the Environment and Climate Change reviewed and accepted the Voluntary Abatement Plan for period of six (6) months ending on December 31, 2015. To date, no off-site or environmental impacts were reported to the ministry during the duration of the Voluntary Abatement Plan which is now expired. Any further land application of processed organic waste is subject to the approval process outlined in the *Nutrient Management Act* .

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Facility staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

Notice 3 - Issued on February 6, 2015
Details - The amendment was issued to reflect the decision of the Environmental Review Tribunal descision for Case No. 09-115/09-126, Orgaworld Canada Ltd. v. Director, Ministry of the Environment, dated November 7, 2011. The descision allows for Orgaworld Ottawa to receive Processed Organic Waste that includes sanitary products and human body waste, waste that is collected in plastic bags or pet waste other than waste that incidental to bedding or litter provided that reasonable notice and supporting documentation is submitted and confirmed by the ministry - Condition 2(11)

2.1 SITE OPERATION:

Specifics:

SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2014 Annual Report states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined in Environmental Compliance Approval Number 2766-7HEPSZ. This requirement in the approval was also confirmed by the Facility staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2014 Annual Report states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

In 2015 the Facility began accepting source separated organics from the industrial, commercial and institutional

sector after receiving the ministry's issuance of Notice #3 forming part of Environmental Compliance Approval Number 2766-7HEPSZ as a result of the Environmental Review Tribunal decision.

No issues identified.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2014 Annual Report provided the monthly and annual tonnages for the 2014 operating year As part of the inspection the Inspecting Officer requested the mass balance for the 2015 operating year to further determine compliance with conditions outlined in Environmental Compliance Approval Number 2766-7HEPSZ which included the above referenced condition. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in Environmental Compliance Approval Number 2766-7HEPSZ.

No issues identified.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2014 Annual Report states that in the 2014 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in Environmental Compliance Approval Number 2766-7HEPSZ was also confirmed by the Facility staff during the inspection.

No issues identified.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of the composting process were located inside the confines of the Processing Building.

No issues identified.

(6) Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.
(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2014 Annual Report states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the Inspecting Officer was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment and Climate Change did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2014 Annual Report stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

(11) Before the Owner accepts any new source of Organic Waste at the Site that includes:

(i) sanitary products and human body waste,
(ii) waste that is collected in plastic bags, or
(iii) pet waste other than waste that is incidental to bedding or litter,

The Owner shall provide the District Manager with reasonable notice in advance of the Owner's intent to commence acceptance of the new waste source at the Site. The Owner shall also provide the District Manager with such information as the District Manager confirm in writing is required respecting the new waste source, which may include the name and location of the source generator, the date the Owner proposes to commence accepting the waste at the Site, a description of the constituent components of the waste being accepted, confirmation whether inclusion of the waste components referenced above in (i) (ii) and (iii) are characterized as incidental or inadvertent, and information related to the storage of the waste prior to its delivery to the Site, together with any operational plans the Owner proposes for integrating the processing of waste from the new source into the waste stream then currently being processed at the Site. For purposes of this condition a new source also included any sources or Organic Waste already being accepted at the Site that will be changed to introduce, or increase the waste components referenced above in (i) (ii) and (iii). For purposes of this condition, the Director may decided the length of the advanced notice reasonably required under this condition, and provide the Owner with written notice of the Director's decision in this regard.

In 2015 the Ministry of the Environment and Climate Change issued Notice, previously referred to as Notice #3, to the Facility to began receiving new sources of organic waste collected in plastic from the industrial, commercial and institutional sector. In order for this to occur, documentation was required to be submitted to the ministry as outlined in Condition 2(11). In February of 2015 Orgaworld Ottawa submitted the required information to satisfy the condition and allow for the receipt and processing of the new source of Organic Waste from the new sector. Since the inclusion of the new source of organic waste no complaints or issues were reported to the ministry. The Inspecting Officer reviewed the sample analysis for the new source of organic waste which was deemed compliant with the

Ontario Compost Quality Standards for quality of feedstock.

3. SIGNS

(1) **Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:**

(a) **name of the Owner;**
(b) **this Certificate number;**
(c) **hours during which the Site is open;**
(d) **waste types that are approved to be accepted at the Site;**
(e) **Owner's telephone number (a hotline) to which complaints may be directed;**
(f) **Owner's twenty-four hour emergency telephone number (if different from above);**
(g) **a warning against unauthorized access;**
(h) **a warning against dumping at the Site.**

(2) **The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.**

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of issued Environmental Compliance Approval Number 2766-7HEPSZ by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) **All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.**

(2) **The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.**

At the time of the inspection it was observed that training was completed as per the above referenced condition. The Site has installed a fence with a lockable gate to restrict access to the Site The Inspecting Officer confirmed with Facility staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) **Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:**

(a) **loading/unloading area of the leaf & yard waste storage pad;**
(b) **parking lot area for evidence of run-off from the leaf & yard waste storage pad;**
(c) **Processing Building and the air pollution control equipment;**
(d) **security fence and property line;**
(e) **on-site roads for presence of leaks and drips from the waste delivery trucks;**
(f) **presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;**
(g) **on and off-site litter;**
(h) **presence of vector and vermin.**

At the time of the inspection the Inspecting Officer requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The Inspecting Officer also reviewed procedures provided by the Facility located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system. The Facility must ensure that the equipment and site inspections & maintenance requirements are updated promptly to reflect the inclusion of new equipment associated with the processing of organic waste. It was noted during the inspection that the Site acquired a new diesel powered shredder to replace the existing electrical shredder. The Facility must ensure the equipment and site inspections & maintenance requirements of Condition 6 of Environmental Compliance Approval Number 2766-7HEPSZ is updated to reflect this new equipment.

** Please see Section 5.0 of this Report**

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also requested during the inspection and was provided to the Inspecting Officer for review. No issues identified during the review of the document except to note the requirements to keep updated to reflect the inclusion of new equipment associated with waste processing and new sources of organic waste (i.e. diesel powered shredder).

Please see Section 5.0 of this Report

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste. No issues identified.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the Inspecting Officer inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that new sources/streams of incoming organic waste began in February 2015 from the Industrial, Commercial and Institutional Sector. Sample analysis documentation was provided and determined to be compliant with the Ontario Compost Quality Standards. In February of 2015 Orgaworld requested and received approval from the ministry to start accepting the new source of organic waste received in plastic bags. No issues identified.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the Inspecting Officer requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The Inspecting Officer confirmed incoming feedstock complied with the Ontario Compost Quality Standards through information requested following the inspection.
No issues identified.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the Inspecting Officer requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of Environmental Compliance Approval Number 2766-7HEPSZ *and the Ontario Compost Quality Standards. The Inspecting Officer was provided sample analysis for the finished compost. Observations made during the review are as follows:*

- *Finished compost was sampled and collected as per the frequency outlined in* Environmental Compliance Approval Number 2766-7HEPSZ
- *Finished compost was tested at the frequency and for the parameters outlined in the Ontario Compost Quality Standards and in accordance with Schedule B of* Environmental Compliance Approval Number 2766-7HEPSZ

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the Inspecting Officer requested information on how the Facility complies with the above condition. The Inspecting Officer was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. Inspecting Officer was able to verify this information by being provided screenshots of the SCADA system for the above process monitoring parameters.

No issues were identified.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, the Facility provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2014 Annual Report, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Facility staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. As stated in the 2014 Annual Report, the

Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2014 Annual Report confirms that during the 2014 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2014 Annual Report states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the Inspecting Officer walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis. It was noted in the review of the Site Inspections that on and off-site litter was deemed "Not OK" and follow-up action is to be taken as indicated on the form which was not indicated to be complete on the daily inspection checklist.

- 2015 - April 1st, 7th, 9th & 15ths
- 2015 - November 11th, 25,th, 27th & 30th

Please see Section 5.0 of this Report*

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

The Facility retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts (inspection occurred in the winter therefore dust was not an issue. Inspecting Officer attends quarterly meetings at the Site and has not observed dust to be an issued on-site. The Facility retains a company to clean of the asphalt parking and on-site road areas if and when it is required. The Facility further provided

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the Inspecting Officer observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The Inspecting Officer confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the

fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. OPERATIONS MANUAL & STAFF TRAINING

(1) **The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:**

(a) **outline the responsibilities of the Site personnel;**
(b) **personnel training protocols;**
(c) **waste receiving and screening procedures;**
(d) **unloading, handling and storage procedures;**
(e) **waste processing procedures;**
(f) **sampling and testing procedures;**
(g) **Site inspections and recording procedures;**
(h) **the emergency response procedures;**
(i) **procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.**

At the time of the inspection the Inspecting Officer requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition with the exception of the inclusion of the diesel powered shredder that was installed as a replacement to the electric powered shredder.

See Section 5.0 of this Report*

(2) **A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.**

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) **Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:**

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

Prior to completing the inspection a file review was conducted which incorporated a review of the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. As part of the inspection the Inspecting Officer requested a copy. A revised copy (January 2016) of the document was provided and reviewed. No issues identified.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the 2014 Annual Report was found to be complete as required. The Annual Report was submitted to the Ottawa District Office in March of 2014.

2.2 FINANCIAL ASSURANCE:

Specifics:

At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry. The last submission and ministry review of financial assurance was completed in 2015.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:
1. Daily Inspection Checklist reviewed indicated issues with on and off-site litter with no indication of corrective actions taken.

2. Revisions not completed for Operation & Maintenance Manual and Preventative Maintenance Inspection Program for the inclusion of the new diesel powered shredder.

5.0 ACTION(S) REQUIRED

The following actions are to be taken by Orgaworld Canada Ltd. to address observations noted in the above inspection report:

1. By no later than April 29, 2016, provide a response to the actions taken in regards to the Daily Inspection Checklist indicating a problem with on and off-site litter referenced in Section 2.1 of the Report.

2. By no later than April 29, 2016, complete revisions of all operational and maintenance documents and procedures to reflect the new diesel power shredder in order to ensure proper operation and maintenance. A copy shall be provided to the Ottawa District Office to remain on file.

6.0 OTHER INSPECTION FINDINGS

None at this time.

7.0 INCIDENT REPORT

Applicable
0321-A85RET

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2016/03/17
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2016/03/31

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 630-6324 **ext**	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and

information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on January 29th, 2015.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval # 7021-7HQNDE ("ECA") and applicable environmental legislation such as the Environmental Protection Act ("EPA") and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance and Tanya Minarik, Site Supervisor.

An Industrial Sewage Works Inspection and Waste Disposal (Processing) Inspection were also carried out at the site by the Ministry of the Environment and Climate Change (MOECC). See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with the issued ECA which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements.

The Facility was issued a Limited Flexibility Environmental Compliance Approval (ECA # 7021-7HQNDE) on September 16, 2009. The inspection is focused on information and data collected during the 2013 operating year.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Orgaworld staff provided a tour to the IO which incorporated a detailed overview of the air pollution control devices that treat the emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure proper treatment of emissions. The system is described below:

1.) Fans are located throughout the building, these fans suck air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and

stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the Facility operates in a water negative environment in the summer and as such leachate generated in the operation of the Facility gets re-circulated within the process. If the Facility needs to bring in extra water they take it from the stormwater management pond on-site.

There are several odour ports throughout the Facility.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced September of 201. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns detected.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear recently cleaned and the trucks on-site were not generating dust. No concerns observed.

Odour: Prior to arriving at the Site to conduct the inspection, the IO observed the stack and wind direction to determine if emission from the stack (odours) could be detected downwind of the Facility. After completing the inspection the IO completed a second odour survey downwind of the Facility. No odours were detected during both separate odour surveys. Wind direction was from the SE and odour survey

locations were located on Somme Street & Sappers Ridge.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration issues were detected during the inspection nor experienced when completing odour surveys in the surround area.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16		

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

On September 16, 2009, the Facility was issued a Comprehensive Environmental Compliance Approval No. 7021-7HQNDE for the operation of the equipment that emits contaminants into the natural environment. The equipment approved under the ECA does not meet the requirements of the Environmental Activity Sector Registry.

The comprehensive environmental compliance approvals allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

In 2014 Orgaworld submitted an application to renew the limited operational flexibility of their Environmental Compliance Approval (Basic Comprehensive) and is currently being reviewed by the ministry.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

During the district file review prior to completing the inspection, no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:
June 2010
December 2010
July 2011
December 2011
November 2012
November 2013
November 2014

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements. The last source test was completed in November of 2014.

A report on the outcome of the source testing was provided to the ministry in January of 2015 and will be reviewed by the ministry's Standards Development Branch. Comments will be provided to the Facility once complete.

The next source testing is scheduled for November 2015.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Annual Report:

Condition 5 of the ECA requires the Facility to submit a Written Summary Report of activities undertaken in the previous calendar year by May 31 of each year. On April 28, 2014 the Written Summary Report for the 2013 operating year was submitted to the ministry. The following observations were made during the review of the report:

- No modifications were made during the 2013 operating year that would change the previously calculated concentrations at the Point of Impingement (POI) for any Compounds of Concerns (COC) or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception (POR)
- The Facility was not required to submit a Maximum Concentration Level Assessment to the MOECC during the 2013 operating year
- No changes were made to the MOECC's POI limits that impacted the Facility
- No changes in emission rates in 2013

- Emission Summary Table illustrates contaminants were below the MOECC POIs
- Acoustic Summary Table illustrates noise levels were below the performance limits
- The Facility provided a signed statement acknowledging compliance with the ECA for the 2013 operating year

No issues were identified in the review of the 2013 Written Summary Report.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

The ESDM Report does not show an exceedance of a MOECC standards, guidelines, upper risk thresholds, or limit in the ECA.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer (IO) requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

The IO was informed that the above referenced documents are current and no changes have been made requiring revisions.

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Maintenance:

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

Environmental Complaints:

The Facility has developed a document to address any complaint received as a result of the Site's operation. The document outlines the keystone information needed to record details of the complaint as well as follow-up actions taken to address the problem. The Facility records these complaints in a binder located at the Site. A copy of the procedure for recording environmental complaints was provided to the IO at the time of the inspection.

The Facility has not received a complaint as a result of the operations at the Site for the 2013 operating year,

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was reviewed during the inspection process.

No spills were reported to the ministry for the 2013 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance was identified prior to completing the Air Facility Inspection.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld at this time.

6.0 OTHER INSPECTION FINDINGS

None

7.0 INCIDENT REPORT

○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2015/02/12
Signature:	

REVIEWED BY:

District Supervisor:	

Name:	Jena Leavoy
District Office:	Ottawa District Office
Date:	2015/02/13
Signature:	

File Storage Number:	SI OT GL HA 211

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 663 4446 **ext**104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on January 29, 2015 which incorporated paper work review and a tour of the operations at the

Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA) and applicable environmental legislation such as the Ontario Water Resources Act (OWRA).

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat)

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA) for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ^{O}C

As part of the inspection process the IO reviewed the information provided in the 2013 Annual Report (AR) which outlines the
sampling program completed for the 2013 operating year (date, parameters, analysis). The AR stated that the stormwater
management pond did not have a discharge event which would require the effluent to meet the Table 2 -

Trigger Parameters.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2013	Year 2 2014	Year 3 2015
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2013 operating year. The review noted that the SWMP was inspected and the associated records were available for review during the inspection period.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works,* carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the IO reviewed the 2013 Annual Report. Sampling data collected during the 2013 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison comply with Table 1 outlined above. Please note, Orgaworld was directed during a previous ministry inspection that the monthly sampling of the SWMP was not required during months where ice cover occurs due to health & safety reasons. Sampling events did not occur during December, January, February and March of 2013. As part of the previous inspection Orgaworld was also to include temperature as it was not completed in 2012. The IO confirmed that the field parameter temperature was collecting in the 2013 operating year.

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

Summary: The Facility has completed the groundwater monitoring for the 2013 operating year. A copy of both the 2013 report and Groundwater Assessment and Work Plan was provided to the Ottawa District Office in March of 2014 and was reviewed by the ministry's Technical Support Section. Groundwater and surface water comments were provided to the Facility and the Facility is currently implementing the actions identified in the Groundwater Assessment and Work Plan as well as ministry recommendations.

- In July of 2014 Orgaworld submitted a Groundwater Assessment and Work Plan to address elevated levels of contaminants (ammonia, iron, manganese, dissolved organic carbon, sulfate, total dissolved solids) and to continue working towards compliance with Condition 9(8) of ECA Number 7251-8GKRPD which requires Orgaworld to establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations. The Compliance and Trigger Monitoring Program is to be submitted to the MOECC along with an application to amend the ECA. Currently, Orgaworld has not applied to amend the ECA, as the monitoring data gathered since 2010 to define baseline conditions for the site has been influenced by historic conditions, off-site operations and conditions relating to composting operations. The scope of the report is to provide results of the pre & post monitoring data and to outline a path forward to address the groundwater quality concerns.
- Groundwater and Surface Water reviews were completed and submitted to Orgaworld in 2014. Both Technical Support Review Memorandums support the Groundwater Assessment and Work Plan proposed by Orgaworld with the addition of recommendations to immediately begin surface water quality monitoring to be collected at upgradient and downgradient locations for specific parameters outlined in the memorandum.
- Orgaworld has reviewed the TSS memorandums and is in the process of implementing the items outlined in the Groundwater Assessment and Work Plan.
- At the time of the inspection Orgaworld Staff informed the IO the company is in the process of retaining qualified licensed well drillers to install the monitoring well.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

In March 2014, the Company submitted the 2013 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2013 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011) as stated in previous reports. No addition operating problems were encountered requiring corrective actions to be taken. Berm inspections were completed in 2013 which did not note any additional remediation work required.

- Orgaworld did not encounter any operating issues or problems during the 2013 year.
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works.
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2013 operating year.
- No calibration or maintenance of effluent monitoring equipment was completed in the 2013 operating year as the pond level reading device does not require calibration.
- The groundwater/surface water monitoring and compliance report, prepared by Conestoga-Rovers & Associates (CRA), was submitted in March of 2013. IO submitted the report to the ministry's Technical Support Section for surface water and groundwater review.
- Surface water and Groundwater comments were received and provided to the Facility on September 13, 2013 via email. IO was informed during the inspection that the review comments were provided to their consultant (CRA) and will implement the recommendations outlined in the review.

Groundwater Monitoring:

* Please see Section 2.4 for details of the groundwater monitoring completed by the Facility*

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or the Facility)
- No discharge events occurred at the SWMP in the 2013 operating year

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
No effluent discharge at the time of the inspection

2.8 FINANCIAL ASSURANCE

The Facility is not required to submit financial assurance for the operation of the approved industrial sewage works.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?

No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The IO confirmed this information during the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

Previous non-compliance issues have been addressed. The Company is currently in the process of addressing groundwater and surface water impacts.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:
Non-Compliance with Condition 9(8) of ECA Number 7251-8GKRPD which requires Orgaworld to establish a comprehensive Compliance and Trigger Level Monitoring Program based on groundwater monitoring within two years of operations.
- The Company is currently in the process of addressing groundwater and surface water impacts. Additional information pertaining to the Groundwater Monitoring Program is outlined in Section 2.4 of this Report.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following action is required to be addressed by Orgaworld as a result of the above completed Industrial Sewage Works Inspection:

Condition 9(8) - Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.
(8) After **two (2) years** of operation of the *Works,* the *Owner* shall establish a comprehensive Compliance and Trigger Level Monitoring Program based on the groundwater monitoring, and submit it along with an application to amend this *Certificate* to the *Director* and the *District Manager*.

1. Environmental Compliance Approval No. 7251-8GKRPD Condition 9(8) - As a result of the Groundwater Assessment and Work Plan submitted to the ministry, Orgaworld is required to implement the Work Plan as described in the report as well as implement the recommendations provided by the ministry's Technical Support Section (Groundwater & Surface Water Memorandums). It has been reported that Orgaworld is in the process of implementing the Groundwater Assessment and Work Plan as well as the recommendations provided by the ministry.

1. Implement Work Plan as outlined in the report "Groundwater Assessment and Work Plan", dated July 16, 2014, and implement the recommendations provided by the ministry's Technical Support Section for both the Groundwater Memorandum, dated September 17, 2014, and Surface Water Memorandum, dated October 8, 2014.

6.0 OTHER INSPECTION FINDINGS

There are no other inspection findings to report at this time.

7.0 INCIDENT REPORT

Applicable
8087-9TVQL9

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2015/02/19**
Signature

REVIEWED BY:
District Supervisor:
Name: **Jena Leavoy**
District Office: **Ottawa District Office**
Date: **2015/02/25**

Signature:



File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (519)663-4446, FAX: (519)663-0830, email: mrooke@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc 6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445 Site #: 2167-7FJPKB		
Contact Name:	Michael Rooke	**Title:**	Compliance Officer
Contact Telephone:	(519) 630-6324 **ext**	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2013/11/21		
Inspection Start Date:	2015/01/29	**Inspection Finish Date:**	2015/01/29
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (referred to Orgaworld Ottawa) is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (aerobic composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

It should be noted that Orgaworld Ottawa met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the Environmental Protection Act) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste

generated from organic processing facilities (i.e. composting facilities). As a result, Orgaworld Ottawa ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed Orgaworld Ottawa to continue providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-agricultural Source Material (NASM) Plans. As of mid 2013, Orgaworld Ottawa has worked with their clients in obtaining NASM Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the Environmental Protection Act for the transportation of the 12-20 material.

Orgaworld Ottawa first started accepting organic material at their Site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa Source Separated Organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the Site's compliance with their waste ECA and applicable environmental legislation such as the Environmental Protection Act (EPA) and Ontario Regulation 347 under that same act. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer and Tanya Minarik, Supervisor.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld Ottawa staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval Number 2766-7HEPSZ: Waste Disposal Site
Issued: September 16, 2009

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

2.1 SITE OPERATION:

Specifics:

2. <u>SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE</u>

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;
(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2013 Annual Report (2013 AR) states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

Note: Orgaworld Ottawa is currently in discussions with the Ministry of the Environment and Climate Change for the acceptance of a new source of Organic Waste collected in plastic from the IC&I Sector.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2013 AR states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2013 AR provided the monthly and annual tonnages for the 2013 operating year. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2013 AR states that in the 2013 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and

phases of compost were located inside the confines of the Processing Building.

(6) Organic Waste storage duration is limited to the following:

(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.

(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2013 AR states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the IO was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2013 AR stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of the issued ECA by posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program, the Facility to train staff on conditions outlined in the environmental compliance approvals for the Site. Of the training records reviewed, no issues were identified.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that the Site has installed a fence with a lockable gate to restrict access to the Site The IO confirmed with Orgaworld staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin.

At the time of the inspection the IO requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The IO also reviewed procedures provided by Orgaworld Ottawa located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system.

(2) The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO and were observed to be sufficient. The IO also requested copies of the inspection reports from the inspection program. The IO observed the inspection reports to be sufficient in determining the equipment is operating in good working order at all times and that no off Site impacts are occurring. It should also be noted that no environment complaints have been received by the company or the ministry during the inspection period for the operations at the Orgaworld Ottawa Site.

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also

requested during the inspection and was provided to the IO for review. No issues identified during the review of the document. No changes were made to the preventative maintenance program.

7. **QUALITY CRITERIA , TESTING & MONITORING**

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

At the time of the inspection the IO observed incoming organic waste and the equipment used in handling of the incoming organic waste. The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the IO inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that no new sources/streams of incoming organic waste has been accepted since operation at this time.

Note: Orgaworld Ottawa is currently in discussions with the Ministry of the Environment and Climate Change for the acceptance of a new source of Organic Waste collected in plastic from the IC&I Sector.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the IO requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The IO requested a copy of the month of January, February, March, May, July, September, November & December to compare against Schedule B of the ECA. Analytical results were provided to the IO which confirmed compliance.

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or
(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or
(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the IO requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of the ECA and the Ontario Compost Quality Standards. The IO was provided sample analysis for the finished compost. Observations made during the review are as follows:

- *Finished compost was sampled and collected as per the frequency outlined in the ECA*
- *Finished compost was tested for the parameters outlined in Schedule B of the ECA with the exception of polychlorinated biphenols (PCBs) which did not appear to be analyzed for the sample results provided during the inspection*
- *Finished compost was tested for maturity using the Dewar Method for temperature variance. The results of the Dewar Method were observed to be in compliance with maturity criteria.*

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the IO requested information on how Orgaworld complies with the above condition. The IO was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. IO was able to verify this information by observing the SCADA system at the time of the inspection. The Facility provided screen shots of the SCADA system after the inspection as a request by the IO.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, Orgaworld Ottawa provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2013 AR, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Orgaworld staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. The City of Ottawa vehicle appear to be recently cleaned and odours could not be detected. As stated in the 2013 AR, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site boundary. The 2013 AR confirms that during the 2013 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on

the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2013 AR states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the IO walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

Orgaworld retains the services of a external qualified licensed pest control professional to implement the pest control plan. No concerns identified.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts (inspection occurred in the winter therefore dust was not an issue. IO attends quarterly meetings at Orgaworld and has not observed dust to be an issued on-site. The Facility retains a company to clean of the asphalt parking area if and when it is required.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the IO observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The IO confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. <u>OPERATIONS MANUAL & STAFF TRAINING</u>

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;
(f) sampling and testing procedures;

(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition. A copy of the manual was also available during the district file review.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO reviewed a training program for one of the staff at the Facility. The training program reviewed addresses the requirements of this condition. All training programs for staff are kept electronically as well as a hard copy.

10. EMERGENCY RESPONSE AND CONTINGENCY PLAN

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

At the time of the file review prior to the inspection, the IO reviewed the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. A copy of the procedure will remain on file at the

district office. A copy of the document was also available on-site at the time of the inspection.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the AR was found to be complete as required. The AR was submitted to the Ottawa District Office in March of 2013.

2.2 FINANCIAL ASSURANCE:

Specifics:
At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry.

2.3 SITE SERVICE AREA:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:
Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

As a result of the file review completed prior to conducting the inspection at Orgaworld Ottawa, no ongoing non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

No actions are required by Orgaworld at this time.

6.0 OTHER INSPECTION FINDINGS

None

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2015/02/09
Signature	

REVIEWED BY:

District Supervisor:
Name: Jena Leavoy
District Office: Ottawa District Office
Date: 2015/02/13

Signature:



File Storage Number: SI OT GL HA

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Air Facility Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 663 4446 **ext** 104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		
Status:	Final Signed-Off		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on December 19th, 2012.

The purpose of this inspection is to assess compliance with the Site's Air Facility Environmental Compliance Approval # 7021-7HQNDE ("ECA") and applicable environmental legislation such as the Environmental Protection Act ("EPA") and Ontario Regulation 419/05. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Acting Site Operations Manager and Tanya Minarik, Site Supervisor.

An Industrial Sewage Works Inspection and Waste Disposal (Processing) Inspection were also carried out at the site. See respective reports for details.

1.1 FOCUS OF THE AIR INSPECTION

Is the inspection for the entire facility or is it scoped to part of the facility?

● Entire Facility ○ Part of the Facility

Specifics:

The Air Facility Inspection focused on compliance with the issued ECA which includes all pollution control devices and related performance limits, documentation, reporting, operation/maintenance, complaints recording procedures, and record keeping requirements.

The Facility was issued a Limited Flexibility Environmental Compliance Approval (ECA # 7021-7HQNDE) on September 16, 2009. The inspection is focused on information and data collected during the 2012 operating year.

1.2 TARGET SECTOR IN ONTARIO REGULATION 419/05, AIR POLLUTION - LOCAL AIR QUALITY

Is the facility in a targeted sector identified in Schedule 4 or Schedule 5 of O. Reg. 419/05?

No, the facility is not in a target sector identified in Schedule 4 or Schedule 5.

Specifics:

2.0 INSPECTION OBSERVATIONS

Specifics:

At the time of the inspection Orgaworld staff provided a tour to the IO which incorporated a detailed overview of the air pollution control devices that treat the emission generated as a result of the composting operations. The Site has several pollution control devices in series to ensure proper treatment of emissions. The system is described below:

1.) Fans are located throughout the building, these fans suck air from the building to the pollution control equipment which creates a negative pressure environment within the building. Air from the building and air from the composting tunnels goes through an ammonia scrubber, then one of two biofilters, then a bioscrubber, then the 40 meter stack.

The Facility continuously monitors the process by a SCADA system. This system is remotely accessed to allow the Facility to adjust the system as required. The system uses sensors to monitor parameters such as water content, air temperature, oxygen content, air pressure, and air flow. When the levels being monitored go outside of the preprogrammed acceptable range then an alarm is triggered and a message is sent to the phones of the staff personnel who have the ability to monitor the situation off-site. The SCADA system gives details of operating parameters in each compost tunnel, in the ammonia scrubber, biofilters, bioscrubber and stack.

Ammonia scrubber:

The sulphuric acid tank is located outside the building. The ammonia scrubber circulates a sulphuric acid solution over a media to scrub ammonia from the air into solution. When the ammonia scrubber gets saturated (pH gets too high) it is replaced. The waste ammonia sulfate gets transferred into one of the leachate tanks on site.

The incoming waste composition in Ottawa is such that the material has been very dry, the Facility operates in a water negative environment in the summer and as such leachate generated in the operation of the Facility gets re-circulated within the process. If the Facility needs to bring in extra water they take it from the stormwater management pond on-site.

There are several odour ports throughout the Facility.

Biofilter:

At the time of inspection the Facility was operating two biofilters. According to the supporting documentation for the application, the biofilter media needs to be replaced every 6 months to a year. The media was last replaced November 25, 2012. The waste media from the biofilter is introduced into the composting process of the Facility.

Bioscrubber:

This is the final step before the stack. According to staff water needs to be added to the bioscrubber every 2 to 3 days. At the bottom of the bioscrubber there should be 50-55 cm of water, an alarm goes off if the levels drop bellow 40 cm.

Stack:

The stack is 40 meters high, there is a sampling port placed outside at the bottom of the stack in order to sample air right before it goes into the stack. There is also a sampling port inside just after the bioscrubber.

2.1 SITE CONDITIONS

Operating
Specifics:

The following site conditions were noted during the time of the inspection:

Noise: At the time of the inspection noise was assessed to determine if the operation of the Facility is generating noise levels which could have potential impacts off-site. It was noted that noise levels outside the Site were at a level which would not pose a concern to surrounding properties. No concerns detected.

Dust: At the time of the inspection dust was assessed to determine if the operations at the Facility (truck traffic, unloading/loading of materials, etc) is causing impacts off-site. The paved areas of the Site are routinely swept to ensure dust generated from the incoming and outgoing waste disposal vehicles do not cause dust impacts. At the time of the inspection the paved area appear recently cleaned and the trucks on-site were not generating dust. No concerns observed.

Odour: Prior to arriving at the Site to conduct the inspection, the IO observed the stack and wind direction to determine if emission from the stack (odours) could be detected downwind of the Facility. After completing the inspection the IO completed a second odour survey downwind of the Facility. No odours were detected during both separate odour surveys. Wind direction was from the SE and odour survey locations were located on Somme Street & Sappers Ridge.

Vibration: At the time of the inspection vibration was assessed to determine if the operation of the Facility is generating vibration levels which could have adverse impacts to surrounding properties. No vibration

issues were detected during the inspection nor experienced when completing odour surveys in the surround area.

2.2 AUTHORIZING, CONTROL AND REGISTRATION DOCUMENTATION FOR AIR/NOISE EMISSIONS

Does the facility have authorizing, control and/or registration documents applicable to this inspection?

● Yes ○ No

Specifics:

Type of Document	Number	Date	Limit*	Notes
Environmental Compliance Approval - Comprehensive	7021-7HQNDE	2009/09/16	Yes	

*** Limit in Document**

2.3 EQUIPMENT REQUIRING AUTHORIZING DOCUMENT

Does the facility have the required Environmental Compliance Approval(s)?

If you own, manage or operate a facility with an operation or equipment that emits one or more contaminants into the air as noted under section 9 of the Environmental Protection Act, you are required to have and operate under an Environmental Compliance Approval unless the activity is exempted from the approval process or is eligible for the Environmental Activity and Sector Registry (EASR).

The Environmental Compliance Approval (ECA) replaces the previous Certificate of Approval (Air) commencing October 31, 2011. All existing Certificates of Approval (Air) and their conditions continue to apply. Application for a new Environmental Compliance Approval is needed when you intend to make a change that requires an amendment to the approval.

☐ The facility does not have any required approval(s) for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for discharge of contaminants to air.
☐ The facility requires an amendment or additional approval for activity(s) other than for discharge of contaminants to air.
☒ The facility has the required approval (s) for discharge of contaminants to air (or is not required to obtain them).

Specifics:

On September 16, 2009, the Facility was issued a Comprehensive Environmental Compliance Approval No. 7021-7HQNDE for the operation of the equipment that emits contaminants into the natural environment. The equipment approved under the ECA does not meet the requirements of the Environmental Activity Sector Registry.

The comprehensive environmental compliance approvals allow companies to make changes to their equipment which discharge contaminants to the natural environment. As part of the approval structure, when changes are made, the Facility must model the emissions to ensure compliance with applicable standards and limits outlined in the approval and Ontario Regulation 419/05. Also, as part of the comprehensive approval, the Facility must submit an annual report outlining operations in the reporting operating year.

2.4 LEGISLATIVE NOTIFICATION REQUIREMENTS

Has the facility met all applicable legislative notification requirements for air emissions?

● Yes ○ No ○ Not Required

Specifics:

During the district file review prior to completing the inspection, no issues were identified regarding the notification requirements (legislative, approval condition, etc) for the Facility.

2.5 MONITORING AND REPORTING

Has the facility met its assessment requirements?

● Yes ○ No ○ Not Required

Specifics:

As per Condition 10.1, the company is required to conduct source testing every six (6) months after the start-up date and every (6) months thereafter. The start-up date was January 28th, 2010.

Previous source testing events were completed on:
June 2010
December 2010
July 2011
December 2011
November 2012
November 2013

On February 3, 2011 the Facility requested an amendment to reduce the frequency of source testing per year from every six (6) months to once a year as well as the removal of hydrogen sulfide and mercaptons from the testing parameters. On May 17, 2012 the Facility was granted permission to reduce the source testing requirements. The last source test was completed in November of 2012.

A report on the outcome of the source testing will be provided to the ministry in January of 2014 and will be reviewed by the ministry's Standards Development Branch. Comments will be provided to the Facility once complete.

The next source testing is scheduled for November 2014.

Has the facility met its reporting requirements?

● Yes ○ No ○ Not Required

Specifics:

Annual Report:

Condition 5 of the ECA requires the Facility to submit a Written Summary Report of activities undertaken in the previous calendar year by May 31 of each year. On April 28, 2013 the Written Summary Report for the 2012 operating year was submitted to the ministry. The following observations were made during the review of the report:

- No modifications were made during the 2012 operating year that would change the previously calculated concentrations at the Point of Impingement (POI) for any Compounds of Concerns (COC) or resulted in a change in the sound levels reported in the Acoustic Assessment Summary Table at any Point of Reception (POR)
- The Facility was not required to submit a Maximum Concentration Level Assessment to the MOE during the 2012 operating year
- No changes were made to the MOE's POI limits that impacted the Facility
- No changes in emission rates in 2012
- Emission Summary Table illustrates contaminants were below the MOE POIs
- Acoustic Summary Table illustrates noise levels were below the performance limits
- The Facility provided a signed statement acknowledging compliance with the ECA for the 2012 operating year

No issues were identified in the review of the 2012 Written Summary Report.

2.6 EXCEEDANCE OF A LEGAL LIMIT AND/OR GUIDELINE

Is there information that demonstrates an exceedance of a legal limit and/or guideline for air emissions?

○ Yes ● No

Specifics:

The ESDM Report does not show an exceedance of a MOE standard, guideline, upper risk threshold, or limit in the ECA.

2.7 OPERATIONAL AND MAINTENANCE REQUIREMENTS

Has the facility met its operating/maintenance requirements?

● Yes ○ No ○ Not Required

Specifics:

As part of the inspection process, the Inspecting Officer (IO) requested the Operational & Maintenance Manuals as required by the issued ECA.

The following documents were available at the time of the inspection:

- Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Site Inspection and Monitoring Program *(Orgaworld Ltd. - January 2010 - Conestoga-Rovers & Associates)*
- Operations Manual *(Orgaworld Ltd. - October 2009 - Conestoga-Rovers & Associates)*
- Odour Monitoring Program *(Orgaworld Ltd. - October 2009 - Conestoga Rovers & Associates)*

2.8 RECORD KEEPING REQUIREMENTS

Has the facility met its record keeping requirements?

● Yes ○ No ○ Not Required

Specifics:

Maintenance:

A maintenance schedule and inventory list is kept on site. Maintenance work orders are generated as needed and inspection log sheets are filled out by staff. All paperwork is kept in binders on site and overviewed by the site manager.

Environmental Complaints:

The Facility has developed a document to address any complaint received as a result of the Site's operation. The document outlines the keystone information needed to record details of the complaint as well as follow-up actions taken to address the problem. The Facility records these complaints in a binder located at the Site. A copy of the procedure for recording environmental complaints was provided to the IO at the time of the inspection.

The Facility has not received a complaint as a result of the operations at the Site for the 2012 operating year,.

2.9 SPILLS PREVENTION AND CONTINGENCY PLAN

Is the facility required to have a Spill Prevention Contingency Plan (SPCP) under Ontario Regulation 224/07, Spill Prevention and Contingency Plans?

○ Yes ● No

Specifics:

The Facility has developed and implemented a procedure entitled "Contingency Plans for Odours, Spills, Fires, Power Failures and Labour Disruptions". The procedure has been provided to the ministry and was reviewed during the inspection process.

No spills were reported to the ministry for the 2012 operating year.

2.10 BEYOND COMPLIANCE

Are there any Beyond Compliance Projects being implemented at the facility?

○ Yes ● No

Specifics:

None at this time.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous or ongoing non-compliance items to address.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

○ Yes ● No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

○ Yes ● No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

○ Yes ● No

Specifics:

Was there any indication of minor administrative non-compliance?

○ Yes ● No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

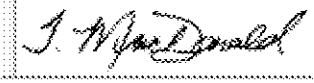
○ Applicable ● Not Applicable

8.0 ATTACHMENTS

PREPARED BY:

Environmental Officer:	
Name:	Kyle Straberger
District Office:	Ottawa District Office
Date:	2013/12/09
Signature:	

REVIEWED BY:

District Supervisor:	
Name:	Tara MacDonald
District Office:	Ottawa District Office
Date:	2013/12/10
Signature:	

File Storage Number:	SI OT GL HA 210

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 630 6324 **ext**104	**Contact Fax:**	(519) 663 0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on November 21, 2013 which incorporated paper work review and a tour of the operations at the Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works (ISW) Environmental Compliance Approval (ECA) and applicable environmental legislation such as the Ontario Water Resources Act (OWRA).

An Air Facility Inspection and Waste Disposal (Processing) Site Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Process, Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
No

Findlay Creek is considered a local sensitive receiver (cold water habitat

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA -ISW) for the following System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater run-off and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels, discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

  1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

  2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high

channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ?C

As part of the inspection process the IO reviewed the information provided in the 2012 Annual Report (AR) which outlines the
sampling program completed for the 2012 operating year (date, parameters, analysis). The AR stated that the stormwater
management pond did not have a discharge event which would require the effluent to meet the Table 2 - Trigger Parameters.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1 2010	Year 2 2011	Year 3 2012
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2012 operating year. The review noted that the soil berm was completed as outlined in the previous Industrial Sewage Works Inspection Report and the SWMP inspections, completed by the Facility, and were recorded and available for review at the time of the inspection.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
No

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	Inorganics	Field Parameters
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the

IO reviewed the 2011 Annual Report. Sampling data collected during the 2011 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison is outlined below:

- Monthly samples were not collected for the months of January, February, and December 2012. The IO was informed that monthly samples were not collected for the above noted months due to health and safety concerns.

- The field parameter temperature did not appear to be measured during sample collection as the data provided to the IO did not include temperature. Temperature was also not measured and reported during the previous inspection.

****Please see Section 5.0 of this Report****

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate*, the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has completed the groundwater monitoring for the 2012 operating year. A copy of the 2012 report was provided to the Ottawa District in March 2013 and is currently under review by the ministry's Technical Support Section and comments will be provided to the Facility once complete (anticipated completion date January 2014)..

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;
(b) a summary of all maintenance carried out on any major structure, equipment, apparatus,

mechanism or thing forming part of the *Works;*
(c) a summary of all effluent monitoring results undertaken in the reporting period;
(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;
(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;
(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and
(e) any other information the *District Manager* requires from time to time.

In March 2013, the Company submitted the 2012 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2012 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011) as stated in previous reports. No addition operating problems were encountered requiring corrective actions to be taken
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2012 operating year
- No calibration or maintenance of effluent monitoring equipment was completed in the 2011 operating year as the pond level reading device does not require calibration
- The groundwater/surface water monitoring and compliance report, prepared by Conestoga-Rovers & Associates (CRA), was submitted in March of 2013. IO submitted the report to the ministry's Technical Support Section for surface water and groundwater review
- Surface water comments were received and provided to the Facility on September 13, 2013 via email. IO was informed during the inspection that the review comments were provided to their consultant (CRA) and will implement the recommendations outlined in the review
- Effluent Monitoring Results - Appendix 1 - the results from the effluent monitoring comparison is outlined in Section 2.4 of this Report
- Groundwater review is still ongoing and will be provided to the Facility once received

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public (no environmental complaints were received by the ministry or the Facility)
- No discharge events occurred at the SWMP in the 2012 operating year

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
No effluent discharge at the time of the inspection

N/A

2.8 FINANCIAL ASSURANCE

The Facility is not required to submit financial assurance for the operation of the approved industrial sewage works.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office and the Spills Action Centre. The IO confirmed this information during the inspection.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No previous non-compliance issues were identified prior to completing the inspection.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

The field Parameter temperature was not collected nor reported during the 2012 operating year. The 2012 Annual Report Appendix 1 provided analytical results which did not include temperature results. Temperature was not measured and reported during the previous inspection period.

Was there any indication of a potential for environmental impairment during the inspection and/or the review

of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following action item is required to be address, **by no later than January 3, 2014**, by Orgaworld Ottawa and submitted to the undersigned:

1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

1. 1. Develop and implement a procedure to ensure temperature is measured and recorded during the monthly sample collection of the SWMP effluent monitoring program as required by Condition 5 of the ECA. This procedure, once reviewed by the undersigned, shall be implemented immediately to ensure compliance with the monitoring program for the upcoming 2014 operating year.

6.0 OTHER INSPECTION FINDINGS

In March of 2013 the Facility submitted the 2012 Annual Report which was sent to the Ministry of the Environment's Technical Support Section (Surface Water & Groundwater) for review and comment. On September 13, 2013 Surface Water comments were provided to the Facility for implementation of the recommendations made by B.W. Metcalfe, Senior Environmental Officer, Water Resources Unit, Surface Water Group. The IO was informed at the time of the inspection that the memorandum was sent to the Facility's consultant (CRA) to implement the recommendations outlined in the memorandum.

Groundwater review is anticipated to be completed in early January 2014. Once received the IO will provide the Facility with the comments and recommendations made by the Groundwater Unit, Technical Support Section of the Ministry of the Environment.

7.0 INCIDENT REPORT

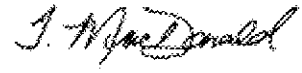
Applicable
2746-9E3LUL

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**

District Office: Ottawa District Office
Date: 2013/12/04
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2013/12/06

Signature: 

File Storage Number: SI OT GL HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: Lot: 27, Concession: 6 From Rideau River, 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: 45.3057, Longitude: -75.5445		
Contact Name:	Michael Rooke	**Title:**	Plant Manager
Contact Telephone:	(519) 663-4446 **ext**104	**Contact Fax:**	(519) 663-0830
Last Inspection Date:	2012/12/19		
Inspection Start Date:	2013/11/21	**Inspection Finish Date:**	2013/11/21
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd.'s Organics Composting Facility (referred to Orgaworld Ottawa) is a 10.12 hectare Waste Disposal Site (Processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (aerobic composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 per year of Organic Waste.

The organic waste is brought to the site located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 20+ (which includes large pieces of material that have not composted), 12-20 material (which is medium sized material), incidental waste, and compost. The 20+ material is used as inoculate and mixed in with fresh material in the Mixing Hall, or further shredded and run through the screener again. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost. It should be noted that the material sized as 12-20 is also referred to as "10-100" material as that was the original screen size.

It should be noted that Orgaworld Ottawa met an exemption in Ontario Regulation 347 which permitted the sale of 12-20 material (previous defined as a waste subject to Part V of the Environmental Protection Act) as long as it met a realistic market demand. This material was sold to farmers as a soil conditioner as it provided a benefit in the agricultural sector. As of January 1, 2013, the exemption in Ontario Regulation 347 was amended to exclude waste generated from organic processing facilities (i.e. composting facilities). As a result, Orgaworld Ottawa ceased all shipments of 12-20 to their clients. An alternative solution was sought which allowed Orgaworld Ottawa to continue

providing the material as a soil conditioner under an approval process regulated by the Ontario Ministry of Agriculture and Rural Affairs entitled Non-agricultural Source Material (NASM) Plans. As of mid 2013, Orgaworld Ottawa has worked with their clients in obtaining NASM Plans in order to apply the 12-20 material and is operating within the requirements of Part V of the Environmental Protection Act for the transportation of the 12-20 material.

Orgaworld Ottawa first started accepting organic material at their Site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste commingled with the SSO waste. It should be noted that the City of Ottawa started commingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the Site's compliance with their waste ECA and applicable environmental legislation such as the Environmental Protection Act (EPA) and Ontario Regulation 347 under that same act. The inspection consisted of a district file review, site visit and discussions with Michael Rooke, Compliance Officer, acting Plant Manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld Ottawa staff throughout the year and during the inspections.

An Air Facility Inspection and an Industrial Sewage Inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s):

Environmental Compliance Approval No. 2766-7HEPSZ

Notice 1 - Issued on October 21, 2010
Details: The amendment was issued to allow the Facility to operate a mobile shredder unit on-site.

Notice 2 - Issued on May 2, 2012
Details: The amendment was issued for a change to allow the Facility to receive and remove waste between the hours of 6am to 8pm (M-F) and between the hours of 7am to 8pm on Saturdays - Condition 5.1

2.1 SITE OPERATION:

Specifics:

2. <u>SERVICE AREA, APPROVED WASTE TYPES, RATES & STORAGE</u>

(1) The Site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste from the Provinces of Ontario and Quebec, limited to the following Organic Waste:

(a) Source-separated Organic Waste limited to the following:

(i) Food wastes: fruit, vegetable and general table scraps, meat and fish products, dairy products, egg shells, confectionery products, sauces, bones, pet food, fat, bread and grains, rice, pasta, coffee grounds, filters;

(ii) Paper fibres: soiled paper towels, tissues, paper plates, soiled paper food packaging items such as boxboard, cardboard, newspaper, and other packaging materials;

(iii) Miscellaneous: houseplants and yard wastes, dryer lint and hair, pet fur, sawdust and wood shavings and litter or bedding.

(b) Organic Waste from the food processing industry and other industries that produce food wastes;
(c) Organic Waste from the commercial sector, including but not be limited to food waste from restaurants, hotels, institutions, commercial operations that collect organic wastes;

(d) Leaf & yard waste;
(e) Organic sludges, including but not be limited to starches and paper wastes, but excluding sewage sludge and biosolids.

The 2012 Annual Report (2012 AR) states that the Facility is in compliance with Condition 2.(1) by only accepting waste from the City of Ottawa which is within the approved service area outlined the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(2) (i)The Owner shall not accept at the Site sanitary products and human body waste.
(ii) The Owner shall not accept at the Site any waste that is collected through a waste collection program that allows use of plastic bags.
(iii) The Owner shall not accept at the Site any waste that is classified as hazardous waste or liquid industrial waste in accordance with *O. Reg. 347* .

The 2012 AR states that the Facility is in compliance with the above referenced condition by not accepting sanitary products, human body waste, plastic bags, hazardous waste and liquid industrial waste as defined in Ontario Regulation 347. Orgaworld, required by specific conditions in the ECA, inspects incoming organic waste to ensure the above noted waste types are not accepted.

(3) The Owner is only approved to receive Organic Waste in quantities that are not to exceed:
(a) a maximum of 1,200 tonnes on a daily basis; and
(b) a maximum of 150,000 tonnes per year.

The 2012 AR provided the monthly and annual tonnages for the 2012 operating year. The data provided in the report confirms the Facility is in compliance with tonnage limits outlined in the ECA. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(4) The Owner is approved to store the following amounts of waste at the Site:
(a) unprocessed Organic Waste stored within the Processing Building awaiting processing shall not exceed 3,000 tonnes;
(b) leaf & yard waste stored at the Site shall not exceed 1,500 tonnes;
(c) Organic Waste, including leaf & yard waste and biofilter medium waste, undergoing Composting in the composting tunnels shall not exceed 5,040 tonnes;
(d) Immature Compost in various stages of curing shall not exceed 10,000 tonnes;
(e) Residual Waste and Rejected Waste shall not exceed 1,000 tonnes.

The 2012 AR states that in the 2012 operating year the Facility was in compliance with the approved waste storage amounts outlined in this condition. This requirement in the ECA was also confirmed by Orgaworld staff during the inspection.

(5) Waste storage at the Site is subject to the following limitations:

(a) unprocessed Organic Waste, excluding leaf & yard waste, shall be stored within the confines of the Processing Building;
(b) leaf & yard waste shall be stored within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site;
(c) Immature Compost in various stages of curing shall be stored within the confines of the Processing Building;
(d) solid Residual Waste shall be stored in lugger bins located within the confines of the Processing Building;
(e) solid putrescible waste generated through activities not relating to the handling and processing of Organic Waste (ie. office, lunch room, etc.) may be stored in a covered bin outdoors and it shall be removed from the Site as required in accordance with *O. Reg 347* and the *EPA* .

At the time of the inspection no waste was observed to be stored outside the Processing Building. All waste and phases of compost were located inside the confines of the Processing Building.

(6)Organic Waste storage duration is limited to the following:
(a) The maximum storage duration of the leaf & yard waste shall not exceed thirty (30) days from the time of its receipt.

(b) The maximum storage duration of the purchased wood amendment materials shall not exceed ninety (90) days from the time of their receipt.

(c) The maximum storage duration of the Organic Waste within the Processing Building prior to loading into the aerated composting tunnels shall not exceed the time period that is required to accumulate enough Organic Waste to fill one (1) composting tunnel.

(d) The Owner shall not store the Residual Waste at the Site in excess of thirty (30) days from the date of its generation, or as directed by the District Manager.

(e) If in the opinion of the District Manager, the duration of waste storage from (a) and/or (b) and/or (d), above, results in odour complaint(s), the Owner, in consultation with the District Manager shall undertake appropriate steps, including reducing waste storage duration, so that odour complaint(s) are eliminated.

The 2012 AR states that the storage duration of the leaf & yard waste, purchased wood amendment materials, organic waste within the Processing Building and Residual waste did not exceed the storage duration limits as outlined by the above condition.

(7) No outside waste storage other than that described in Condition (5), above, is approved under this Certificate.

At the time of the inspection it was noted that waste was not being stored outside other than that described in Condition (5).

(8) The Company shall ensure that all waste storage is undertaken in a manner that does not cause an adverse effect or a hazard to the environment or any person.

At the time of the inspection the IO was informed that no environmental impacts or complaints were received as result of the composting operation at the Site. It should also be noted that the Ministry of the Environment did not receive environmental complaints regarding the storage of waste at the Site. During the inspection no hazards to the environment or any persons were observed.

(9) In the event that Organic Waste cannot be processed at the Site and the Site is at its approved waste storage capacity, the Owner shall cease accepting additional Organic Waste. Receipt of additional Organic Waste may be resumed once such receipt complies with the waste storage limits approved in this Certificate.

The 2012 AR stated compliance with the above reference condition. At the time of the inspection the Facility was in operation and was not exceeding its approved waste storage capacity.

3. <u>SIGNS</u>

(1) Prior to receipt of waste at the Site, the Owner shall ensure that a sign is posted at the entrance to the Site. The sign shall be visible from the main road leading to the Site. The following information shall be included on the sign:

(a) name of the Owner;
(b) this Certificate number;
(c) hours during which the Site is open;
(d) waste types that are approved to be accepted at the Site;
(e) Owner's telephone number (a hotline) to which complaints may be directed;
(f) Owner's twenty-four hour emergency telephone number (if different from above);
(g) a warning against unauthorized access;
(h) a warning against dumping at the Site.

(2) The Owner shall ensure that appropriate signs are posted at the Site clearly identifying the waste and stating warnings about the nature of the waste and any possible hazards.

At the time of the inspection it was noted that the Facility is in compliance with Condition 3 of the issued ECA by

posting a sign at the entrance of the Site outlining the above required information from a-h. A similar sign is also present at the exit of the Site. No issues were identified with the information displayed on the signs entering and exiting the Site.

4. SITE SECURITY

(1) All unloading and loading of waste and all waste processing activities at the Site shall at all times be undertaken by Trained Personnel.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO. As part of the training program, the Facility to train staff on conditions outlined in the environmental compliance approvals for the Site. Of the training records reviewed, no issues were identified.

(2) The Owner shall ensure that access to the Site is regulated and that all entrances are secured by lockable gates to restrict access only to authorized personnel when the Site is not open.

At the time of the inspection it was observed that the Site has installed a fence with a lockable gate to restrict access to the Site The IO confirmed with Orgaworld staff that the Site is secured after the hours of operation.

6. EQUIPMENT AND SITE INSPECTIONS & MAINTENANCE

(1) Prior to receipt of any waste at the Site, the Owner shall prepare a comprehensive written inspection program which includes inspections of all aspects of the Site's operations including the following:

(a) loading/unloading area of the leaf & yard waste storage pad;
(b) parking lot area for evidence of run-off from the leaf & yard waste storage pad;
(c) Processing Building and the air pollution control equipment;
(d) security fence and property line;
(e) on-site roads for presence of leaks and drips from the waste delivery trucks;
(f) presence of excessive fugitive dust emissions from the on-site roads or the Compost stockpiles;
(g) on and off-site litter;
(h) presence of vector and vermin.

At the time of the inspection the IO requested documents and procedures which speaks to the Facility's inspection program. The Facility provided a copy of the inspection program during the inspection which address the above condition. The IO also reviewed procedures located in the district file which speaks to maintenance and inspections of the pollution control devices and industrial sewage works system.

(2) The inspections are to be undertaken daily by Trained Personnel in accordance with the inspection program to ensure that all equipment and facilities at the Site are maintained in good working order at all times and that no off Site impacts are occurring. Any deficiencies detected during these regular inspections must be promptly corrected.

At the time of the inspection the IO requested training logs for the staff that work at the Facility. Training logs were provided to the IO and were observed to be sufficient. The IO also requested copies of the inspection reports from the inspection program. The IO observed the inspection reports to be sufficient in determining the equipment is operating in good working order at all times and that no off Site impacts are occurring. It should also be noted that no environment complaints have been received by the company or the ministry during the inspection period.

(3) The Owner shall develop and implement a preventative maintenance program for all on-Site equipment associated with the processing and managing of waste and control of odour and dust emissions. The preventative maintenance program shall be maintained up-to-date and shall be available for inspection by a Provincial Officer upon request.

A copy of the preventative maintenance program was provided to the Ottawa District Office and was reviewed during the district file review prior to completing the inspection. The documentation required by this condition was also requested during the inspection and was provided to the IO for review. No issues identified during the review of the document.

7. QUALITY CRITERIA , TESTING & MONITORING

(1) Cross-Contamination Prevention

(a) The Owner shall ensure that the incoming Organic Waste and the equipment used in handling of the incoming Organic Waste are kept separate and do not come in contact with the Immature Compost / the Finished Compost and the Compost except where the Immature Compost / the Finished Compost and the Compost are being fed back into the composting process.

At the time of the inspection the IO observed incoming organic waste and the equipment used in handling of the incoming organic waste. The operation of the equipment and the staff present to inspection incoming organic waste is completed in a manner to prevent cross-contamination. Immature compost & finished compost are located separate from incoming organic waste.

(2) Quality Control Monitoring of Organic Waste at the generator site:

(a) Prior to being accepted at the Site for the first time, the incoming Organic Waste from a new source/stream shall be characterized in accordance with the Ministry's regulatory requirements for sampling and testing to ensure that the incoming Organic Waste complies with the quality criteria specified in this Certificate. The incoming Organic Waste may be considered a pre-approved waste source/stream once the incoming Organic Waste meets the required quality criteria and has been classified as such by the Company.

At the time of the inspection the IO inquired to determine if any new sources of incoming organic waste from a new source/stream has been received. Orgaworld staff stated that no new sources/streams of incoming organic waste has been accepted since operation at this time. The Facility has been approached by a federal entity for the composting of shredded paper. The Facility has yet to accept this new waste stream however are aware of the requirements of the above condition to ensure the waste is characterized in accordance with the ministry's regulatory requirements for sampling and testing prior to accepting this new waste source.

(3) Quality Control Monitoring of the Incoming Organic Waste

(a) The Owner shall not accept for composting any individual Organic Waste source or an additive necessary for composting that exceeds the following quality parameters set out in "Schedule B" of this Certificate:

(i) trace elements;
(ii) organic chemicals.

At the time of the inspection the IO requested copies of the sample results from the analysis of incoming organic waste as required by this condition. The IO requested a copy of the month of September to compare against Schedule B of the ECA and was provide analytical results from samples collected on September 30th, 2013. The following observations were made during the review:

- *Sample collection of incoming organic waste occurred on September 30th, 2013 and was sent to Caduceon Environmental Laboratories for analysis*
- *Incoming organic waste sample was analyzed for Trace Elements and sample results were in compliance with the concentration limits in Schedule B*
- *Incoming organic waste is required to be analyzed for Organic Chemicals polychlorinated biphenols (PCBs) however sample results indicate the incoming organic waste was not analyzed for PCBs.*

****Please see section 5.0 of this Report for actions required by Orgaworld****

Finished Compost Quality Criteria

(4) Finished Compost is considered to be a Compost when it meets the following compost quality criteria:

(a) compost quality criteria set out in Schedule "B" of this Certificate; and
(b) curing duration of a minimum of twenty one (21) days and compliance with one (1) of the following three (3) maturity criteria:

(i) the respiration rate is less than, or equal to, 400 milligrams of oxygen per kilogram of volatile solids (or organic matter) per hour; or

(ii) the carbon dioxide evolution rate is less than, or equal to, 4 milligrams of carbon in the form of carbon dioxide per gram of organic matter per day; or

(iii) the temperature rise of the compost above ambient temperature is less than 8°C.

At the time of the inspection the IO requested information regarding the sample collection and analysis of the finished compost to ensure compliance with Schedule B of the ECA and the Ontario Compost Quality Standards. The IO was provided sample analysis for the finished compost. Observations made during the review are as follows:

- *Finished compost was sampled and collected as per the frequency outlined in the ECA*
- *Finished compost was tested for the parameters outlined in Schedule B of the ECA with the exception of polychlorinated biphenols (PCBs) which did not appear to be analyzed for the sample results provided during the inspection*
- *Finished compost was tested for maturity using the Dewar Method for temperature variance. The results of the Dewar Method were observed to be in compliance with maturity criteria.*

****Please see Section 5.0 of this Report for actions required by Orgaworld Ottawa****

Process Monitoring

(8) The Owner shall ensure that the following process parameters are monitored:

(a) temperature of the composting Organic Waste in the composting tunnels;
(c) inlet air temperature;
(d) outlet air temperature;
(e) relative humidity in the composting tunnels;
(f) air flow into the tunnels;
(g) oxygen content in the air; and
(h) temperature of the Immature Compost in the curing piles.

At the time of the inspection the IO requested information on how Orgaworld complies with the above condition. The IO was informed that the Facility is equipped with a SCADA system that monitors all processes as it relates to the composting process. IO was able to verify this information by observing the SCADA system at the time of the inspection. The Facility provided screen shots of the SCADA system after the inspection as a request by the IO.

(10) As a minimum, the Owner shall monitor the temperature of the Immature Compost within the curing stockpiles daily. The measurements shall be taken one (1) metre inside the curing stockpile mass and at points sufficient to provide a temperature profile of the Immature Compost.

As part of the inspection process, Orgaworld Ottawa provided documentation to ensure temperature monitoring is completed daily. No issues were noted during the review of this information.

8. <u>NUISANCE IMPACT CONTROL & HOUSEKEEPING</u>

(1) The Owner shall ensure that all vehicles that have delivered waste to the Site are not leaking or dripping waste when leaving the Site.

As stated in the 2012 AR, during periods where organic waste is delivered at the Site, vehicles are inspected during and after by trained Orgaworld staff.

(2) The Owner shall ensure that the exterior of all trucks delivering waste to the Site is cleaned prior to leaving the Site, as needed, to prevent odours. Truck washing shall occur only in the dedicated wash down area of the processing building.

At the time of the inspection no truck washing operations were occurring. The City of Ottawa vehicle appear to be recently cleaned and odours could not be detected. As stated in the 2012 AR, the Facility provides rakes, brooms and a pressure washer if necessary to ensure the exterior is clean.

(3) The Owner shall ensure that there is no queuing or parking of vehicles that are waiting to enter the Site on any roadway that is not a distinct part of the Site.

At the time of the inspection no vehicles entering the Facility were parked or queuing on roads outside the Site

boundary. The 2012 AR confirms that during the 2012 operating year the Facility is in compliance with this condition.

(4) Should the Owner become aware that the truck(s) delivering waste to the Site have leaked wastewater on the municipal roadways, the Owner shall immediately notify the owner of the leaking vehicle(s) and the District Manager about the leak problem.

Prior to the inspection, a district file review was completed and the District Manager had not been notified of any wastewater impacts to municipal roadways. The 2012 AR states that this was not noticed during the reporting period.

(5) The Owner shall:
(a) take all practical steps to prevent the escape of litter from the Site;
(b) pick up litter around the Site on a daily basis, or more frequently if necessary; and
(c) if necessary, erect litter fences around the areas causing a litter problem.

At the time of the inspection the IO walked a portion of the property and observed no litter issues. As part of the Facility's inspection program, trained staff monitor litter on a daily basis.

(6) Prior to the receipt of any waste at the Site, the Owner shall:
(a) implement necessary housekeeping procedures to eliminate sources of attraction for vermin and vectors; and
(b) hire a qualified, licensed pest control professional to design and implement a pest control plan for the Site. The pest control plan shall remain in place, and be updated from time to time as necessary, until the Site has been closed and this Certificate has been revoked.

At the time of the inspection the IO requested procedures and records of vermin and vector control. The IO was informed that the Facility retains the services of Holistech and conducts monthly site visits so the Facility can control vermin and vector.

(7) The Owner shall ensure that all on-Site roads and operations/yard areas are regularly swept/washed to prevent dust impacts off-Site.

At the time of the inspection the entrance, roads on-site, and exit were clear with no signs of dust impacts. The Facility retains a company to clean of the asphalt parking area if and when it is required.

(8) (i) The Owner shall store Compost within the confines of the Processing Building, or in accordance with the requirements of Condition 6.(14) of the Certificate of Approval (Industrial Sewage) for this Site.

At the time of the inspection the IO observed compost to be stored within the confines of the Processing Building. No outside storage of compost was observed. The IO confirmed the storage requirements of compost with Facility staff at the time of the inspection.

(ii) Notwithstanding the requirements of Condition 8.(8)(i), above, the Owner shall ensure that the Compost stockpiles are not a source of fugitive dust emissions. If the proposed Compost storage features are deemed insufficient to control the fugitive dust emissions from the Compost stockpiles, the Owner shall provide additional covers or spray the stockpiles with water, or use any other method to minimize the fugitive dust emissions.

At the time of the inspection dust was assessed to determine if the operations and procedures currently in place are effectively controlling fugitive dust. It was noted that fugitive dust was being significantly control as no dust was observed.

9. <u>OPERATIONS MANUAL & STAFF TRAINING</u>

(1) The Owner shall prepare an Operations Manual for use by the Site personnel. The Operations Manual shall contain the following:

(a) outline the responsibilities of the Site personnel;
(b) personnel training protocols;
(c) waste receiving and screening procedures;
(d) unloading, handling and storage procedures;
(e) waste processing procedures;

(f) sampling and testing procedures;
(g) Site inspections and recording procedures;
(h) the emergency response procedures;
(i) procedure for handling complaints as described in the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO requested procedures and manuals as required by the above referenced condition. The Operations Manual developed by the Facility outlines the all the requirements of this condition. A copy of the manual was also available during the district file review.

(2) A copy of this Operations Manual shall be kept at the Site, must be accessible to personnel at all times and must be updated, as required.

(3) (a) All operators of the Site shall be trained with respect to the following:

(i) terms, conditions and operating requirements of this Certificate;
(ii) operation and management of the Site, or area(s) within the Site, as per the specific job requirements of each individual operator, and which may include procedures for receiving, screening and identifying waste, refusal, handling, processing and temporarily storing wastes;
(iii) an outline of the responsibilities of Site personnel including roles and responsibilities during emergency situations;
(iv) the Emergency Response and Contingency Plan including exit locations and evacuation routing, and location of relevant equipment available for emergency situations;
(v) environmental, and occupational health and safety concerns pertaining to the wastes to be handled;
(vi) emergency first-aid information;
(vii) relevant waste management legislation and regulations, including the *EPA* and *O. Reg. 347* ;
(viii) recording procedures as required by this Certificate;
(ix) equipment and site inspection procedures, as required by this Certificate;
(x) nuisance impact control & housekeeping procedures, as required by this Certificate; and
(xi) procedures for recording and responding to public complaints as required by the Certificate of Approval (Air/Noise) for this Site.

At the time of the inspection the IO reviewed a training program for one (3) of the staff at the Facility. The training program reviewed addresses the requirements of this condition. All training programs for staff are kept electronically.

10. <u>EMERGENCY RESPONSE AND CONTINGENCY PLAN</u>

(1) Within six (6) months from the date of this Certificate, the Company shall submit to the District Manager an Emergency Response and Contingency Plan. The Emergency Response and Contingency Plan shall be prepared in consultation with the District Manager, the local Municipality and the Fire Department and as a minimum it shall include the following information:

(a) emergency response procedures to be undertaken in the event of a spill, process upset, power failure, fire or any other emergency situation, including specific clean up methods for wastes expected to be generated from the emergency situation;
(b) a list of equipment and clean up materials available for dealing with the emergency situations;
(c) notification protocol with names and telephone numbers of persons to be contacted, including persons responsible for the Site, the Ministry's District Office and Spills Action Centre, the local Fire Department, the local Municipality, the local Medical Officer of Health, and the Ministry of Labour, and the names and telephone numbers of waste management companies available for emergency response;
(d) procedures and actions to be taken should the incoming Organic Waste not meet the quality criteria specified by this Certificate;
(e) procedures and actions to be taken should the outgoing Residual Waste not meet the quality criteria required by the specified by this Certificate;
(f) procedures and actions to be taken should the composted Organic Waste fail to meet the compost quality criteria specified by the Certificate;
(g) procedures and actions to be taken should the occurrence of the complaints require the Company to suspend the waste processing activities at the Site.

At the time of the file review prior to the inspection, the IO reviewed the "Contingency Plan for Odours, Spills, Fires, Power Failures and Labour Disruptions" procedure. A copy of the procedure will remain on file at the

district office. A copy of the document was also available on-site at the time of the inspection.

12. RECORDS KEEPING

Annual Report

(9) By March 31st following the end of each operating year, the Owner shall prepare and submit to the District Manager and the Public Liaison Committee (PLC), an Annual Report summarizing the operation of the Site covering the previous calendar year. This Annual Report shall include, as a minimum, the following information:

(a) a monthly mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destinations;
(b) an annual summary mass balance of the Organic Waste received, processed and transferred from this Site, including waste type, quantity, sources and/or disposal destination;
(c) an annual summary of any deficiencies, items of non-compliance or process aberrations that occurred at this Site and any remedial/mitigative action taken to correct them;
(d) a descriptive summary of any spills, incidents or other emergency situations which have occurred at this Site, any remedial measures taken, and the measures taken to prevent future occurrences;
(e) a summary describing any Rejected Waste including quantity, waste type, reasons for rejection and origin of the Rejected Waste;
(f) any environmental and operational problems, that could negatively impact the environment, encountered during the operation of the Site or identified during the facility inspections and any mitigative actions taken;
(g) any changes to the Emergency Response and Contingency Plan, the Operations Manual or the Closure Plan that have been approved by the Director since the last Annual Report;
(h) any recommendations to minimize environmental impacts from the operation of the Site and to improve Site operations and monitoring programs in this regard;
(i) a summary of any complaints received and the responses made, as required by the Certificate of Approval (Air/Noise);
(j) an update on the amount of Financial Assurance which has been provided to the Director;
(k) update on activities of the PLC;
(l) a condition-by-condition analysis of compliance with all Conditions of this Certificate.

As part of the file review process the AR was found to be complete as required. The AR was submitted to the Ottawa District Office in March of 2013.

2.2 FINANCIAL ASSURANCE:

Specifics:

At the time of the inspection a file review was completed which determined that Orgaworld Ottawa has submitted an adequate amount of financial assurance in an appropriate form accepted by the Ministry of the Environment and is located on file with the ministry.

2.3 SITE SERVICE AREA:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste.

2.4 APPROVED SITE CAPACITY:

Specifics:

Orgaworld Ottawa is approved to operate a waste disposal site (processing) serving the Provinces of Ontario and Quebec, for the temporary storage, transfer and processing (composting) of solid non-hazardous, domestic, commercial, institutional or industrial organic waste at a maximum rate of 1,200 tonnes per day and 150,000 tonnes

per year of Organic Waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

As a result of the file review completed prior to conducting the inspection at Orgaworld Canada, no ongoing non-compliance issues were identified.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?
Yes

Specifics:

Incoming Organic Waste & Finished Compost - Sample results indicate Orgaworld did not complete the required analysis as required by the ECA. Sample parameter polychlorinated biphenols (PCBs), as outlined in Schedule B of the ECA, were not observed to be completed in the samples results provided to the IO as part of the inspection.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?
No

Specifics:

Was there any indication of minor administrative non-compliance?
No

Specifics:

5.0 ACTION(S) REQUIRED

The following actions are required to be completed by Orgaworld Ottawa to ensure compliance with issued Environmental Compliance Approval No. 2766-7HEPSZ:

1. Effective immediately upon receiving the inspection, ensure all incoming organic waste and finished compost samples are analyzed for parameters outlined in Schedule B of the ECA.

2. By no later than December 12, 2013, provide the IO with copies of sample results from incoming organic waste and final compost for the months of March, June and October of 2013 to determine if sample results indicate further lack of sampling for polychlorinated biphenols (PCBs) parameter.

1. 1. Incoming Organic Waste - incoming organic waste is to be sampled and analysed for the parameters outlined in Schedule B of the ECA. The sample results provided to the Inspecting Officer did not provide sample results for the parameter polychlorinated biphenols (PCBs).

2. 2. By no later than December 12, 2013, provide the IO with copies of sample results from incoming organic waste and final compost for the months of March, June and October of 2013 to determine if sample results indicate further lack of sampling for polychlorinated biphenols (PCBs) parameter

6.0 OTHER INSPECTION FINDINGS

None at this time

7.0 INCIDENT REPORT

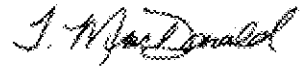
Applicable
0053-9DZLKX

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: **Kyle Straberger**
District Office: **Ottawa District Office**
Date: **2013/12/03**
Signature

REVIEWED BY:
District Supervisor:
Name: **Tara MacDonald**
District Office: **Ottawa District Office**
Date: **2013/12/06**

Signature:



File Storage Number: SI OT GL HA 610

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 5123 Hawthorne Rd, Ottawa, Ontario, Canada, K1G 3Y3 Physical Address: 5123 Hawthorne Rd, Ottawa, City, Ontario, Canada, K1G 3Y3 Telephone: (613)822-2056, FAX: (613)822-2058, email: gmariotti@orgaworld.ca Client #: 0746-8A7NQ5, Client Type: Corporation		
Inspection Site Address:	Orgaworld Canada Ltd. Ottawa Composting Facility Address: 5123 Hawthorne Rd Lot 27 Conc.6 Reference Plan 2003 Official Plan, Geographic Township: GLOUCESTER, Ottawa, City District Office: Ottawa GeoReference: Map Datum: NAD83, Zone: 17, UTM Easting: 456540, UTM Northing: 5016400, , LIO GeoReference: Zone: , UTM Easting: , UTM Northing: , Latitude: , Longitude:		
Contact Name:	Greg Mariotti	**Title:**	Site Manager
Contact Telephone:	(613) 822-2056 **ext**	**Contact Fax:**	(613) 822-2058
Last Inspection Date:	2011/09/19		
Inspection Start Date:	2012/12/19	**Inspection Finish Date:**	2012/12/19
Region:	Eastern		

1.0 INTRODUCTION

Orgaworld Canada Ltd. (referred to as the "Facility"), located at 5123 Hawthorne Road in the City of Ottawa (the "Site"), is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste Environmental Compliance Approval ("ECA") for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The Facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was conducted on December 19, 2012 which incorporated paper work review and a tour of the operations at the Facility.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works ECA and applicable environmental legislation such as the Ontario Water Resources Act ("OWRA").

An Air Facility Inspection and Non-Hazardous Waste Transfer Processing Inspection were also carried out at the Site. See respective reports for details.

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:

Sector Type:
Waste Disposal

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
Yes

Select the most important type of sensitive receptor.
None of the above

cold water stream

Certificate of Approval Number(s):
Yes
C of A Number(s):
Industrial Sewage Works Environmental Compliance Approval No. 9465-7NVRWT
- issued September 16, 2009

Industrial Sewage Works Environmental Compliance Approval No. 7032-88XPRA
- issued September 7, 2010

Industrial Sewage Works Environmental Compliance Approval No. 7251-8GKRPD
- issued May 30, 2011

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

General Description:

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has previously been retaining the services of Lacombe Environmental Services to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the Facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

Environmental Compliance Approval Number 7251-8GKRPD:

The Site has been issued **Environmental Compliance Approval Number 7251-8GKRPD** (ECA - ISW) for the following Industrial Sewage Works System:

"the establishment of stormwater management *Works* for the collection, transmission, treatment and disposal of stormwater runoff and process/wash sewage from a catchment area of 10.14 hectares, to provide Normal water quality protection (Level 2) and to attenuate post-development peak flows to pre-development levels,
discharging to a roadside ditch, then to a central SWM facility off site (adjacent Hawthorne Industrial Park), and subsequently discharging through a ditch to Findlay Creek, for all storm events up to and including the 100 year return storm, consisting of the following:

PROPOSED WORKS

- one (1) submersible pump capable of pumping up to 229 m3/day of stormwater collected from the south ditch of the Site. The pumped stormwater is transferred via a sub-surface 50 mm PVC forcemain to underground storage tanks located on the east side of the Facility for integration into the process water stream or transported off-site for final treatment.

- one (1) terrain tank located on the north side of the Facility, adjacent to the north ditch, having an approximate volume of 45 m3. Initial stormwater run-off will drain from a portion of the asphalt pad on the north side of the Facility into the tank for assessment by site operations staff as to disposal point (ditch/pond, into plant, or hauled off-site). As the tank fills, tank will spill-over (after initial flush) into the north ditch and travel to the wet detention pond.

- installation of aerators in the south-east portions of the wet detention pond to be operated as required, in order to maintain the stormwater management pond water quality trigger parameters below trigger levels.

EXISTING WORKS

Part I - Stormwater Management Works

- one (1) wet extended detention stormwater pond in U shape with approximately base dimensions as follows: 120 m long and 12 m wide, and a maximum depth of 2.0 m, to permanent pool level and 3.4 m to overflow weir elevation (emergency elevation), with 4:1 side slopes, with the following volume structure:

Stage Storage	Elevation (m)	Storage Volume (m^3)
Permanent Pool	90.25 – 91.25	5,385
Extended Detention	91.25 – 91.45	1,311
Quantity	91.45 – 92.25	6,080
Emergency	92.25 – 92.65	3,532

and equipped with the following structures:

- One (1) forebay approximately 65 m long and 12 m wide in U shape, and a maximum depth of 1.0 m to permanent pool level and 3.4 m to overflow weir elevation, equipped with two inlet structures:

1. Inlet structure. A 12.5 m long 900 mm diameter concrete storm inlet pipe with concrete headwall, connected through the Vortechs unit before entering the sedimentation forebay

at an invert elevation of 89.60 m, designed to convey up to a maximum 714 L/s;

2. Overflow channel. A 9.0 m wide (base), 1.5 m long and approximately 250 mm high channel connecting the open ditch system to the forebay at an invert elevation of 92.45 m, designed to convey up to a maximum 3.07 m³/sec.

- One (1) 150 mm diameter orifice plate set at an elevation of 91.25 m for quality control. This flow restrictor is installed within a 2400 mm diameter maintenance hole (MH2) and attached at the downstream end of a 300 mm diameter PVC pipe, equipped with a cast iron sluice gate valve (Armtec series 20-10C), which will be in **closed position** during normal operation periods;

- One (1) 825 mm diameter concrete pipe and 3.8 m length for quantity control up to the 100-year post-development flow set at an elevation of 91.45 m.

- One (1) 4.0 m wide 250 mm high emergency overflow spillway set at an elevation of 92.25 m, discharging to a concrete stabilized swale and ultimately the roadside ditch draining to the Findlay Creek, a tributary to Shields Creek.

- One (1) precast concrete oil/grit separator (Vortechs Model 16000) designed to handle stormwater runoff to convey up to 714 L/s storm flows, providing a sediment storage capacity of 5.43 m³ and having interior dimensions of 5.49 m long, 3.66 m widen and 2.13 m high, designed to provide over 80% total net annual TSS removal, discharging to a forebay of the wet pond;

- An open ditch/swale system with sufficient capacity to convey up to the 100-□ year storm event (estimated at 3.07 m³/sec), with approximately 1,000 m length of a trapezoidal shaped perimeter ditch along the site boundaries, having a top width of approximately 1.0 m wide flat bottom ditch and side slopes of 3V:1H up to 10:1 with variable widths and depths, running through three culverts of 18 to 30 m in length and 600 mm diameter concrete sewers, and discharging through a 2400 mm diameter maintenance hole (MH1) connecting to the oil/grit separator described above;

- A minor drainage system of storm sewers and appurtenances designed to capture and convey runoff during frequent storm events up to the 10-year storm event with PVC sewers ranging from 150 mm to 300 mm diameter sewers. The minor drainage system connects the organics composting facility through approximately 200 m length 300 mm diameter sewer to the MH5 for further discharge into the inlet structures.

- One (1) maintenance access road for operational, inspection and maintenance purposes, consisting of a 4 m wide gravel/grassed access lane located around the perimeter of the facility and a 70 m long gravel lane to the inlet structures at the northwest corner of the pond to the outlet structures.

The simulated modelling estimate and drainage pattern of the site are as follows:

Storm Events	**2-year**	**5-year**	**25-year**	**100-year**
1. Existing flows, pre-development (L/s)	206	351	606	848
2. Post-development flows (L/s)	1,118	1,651	2,410	3,067
3. Post-development attenuated flows (L/s)	56	89	189	283

The above, including erosion/sedimentation control measures during construction and all other controls and

appurtenances essential for the proper operation of the aforementioned *Works*.

Part II - Process Water Recirculation System

- A Process Water Recirculation System (WRS) to provide optimum humidity levels for the composting process and for odour control system, consisting of the following:
- Six (6) reinforced precast concrete underground storage tanks equipped with level control system with a capacity of 45 m³ each;
- Four (4) plastic above ground storage tanks (bioscrubber, sulphuric acid storage, tank and two ammonium sulphate storage tanks) equipped with level control system with a capacity of 180, 45, 50, and 50 m³ respectively;
- Eight (8) pumps to recirculate collected water from composting tunnels, biofilters and bioscrubber to the composting tunnels, biofilter and bioscrubber and for washdown supply
- Piping for percolate/washdown water supply to the composting area including a sprinkling system;
- An odour control equipment consisting of a biofilters and bio scrubber to recirculate filtrate water and supply of filtered effluent to the washdown lines, and equipped with chemical addition piping for pH control; and
- Piping for the supply of stormwater from the wet pond to the process tanks for composting requirements.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit

Does the facility comply with its limits?
Yes

Condition 6 (5) speaks to the requirements for the Site to compare monitoring results for each and all grab samples with the corresponding trigger level of each parameter listed Table 2 - Trigger Parameters outlined in the below table:

Table 2 - Trigger Parameters	
Parameter	**Trigger Level (mg/L if not specified)**
Ammonia (uniozized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100mL
pH	6.5 to 8.5
Temperature (maximum	23 ?C

At the time of the inspection the IO reviewed the comparison data for the 2011 operating year to ensure discharges were in compliance with Table 2 - Trigger Parameters. It was noted during the file review and inspection that the Site did not discharge the SWMP to the natural environment therefore sampling as per Table 2 - Trigger Parameters were not required.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor does it list any design capacity. In accordance with condition 6(12) the Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

The IO requested the records regarding the annual inspection of the SWM Pond for the 2011 operating year. The review noted that the soil berm was completed as outlined in the previous Industrial Sewage Works Inspection Report and the SWMP inspections, completed by the Facility, and were recorded and available for review at the time of the inspection.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?

Certificate of Approval/Permit

Does the facility meet sampling requirements?

No

5. SURFACE WATER MONITORING AND RECORDING

(1) The *Owner* shall, upon commencement of operation of the *Works*, carry out the following effluent monitoring program. Composite samples comprised of three (3) or more equal volumes of grab samples from different locations of the pond shall be collected from the **SWM Pond at a monthly frequency** and analysed for the following parameters listed in Table 1:

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganics**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature
Total Kjeldahl Nitrogen	Cobalt	
Nitrate - N	Copper	
Nitrite - N	Lead	
Total Phenols	Mercury	
Total Phoshorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

Condition 5 of the ECA speaks to the requirements for monthly sampling of the SWMP. As part of the file review, the IO reviewed the 2011 Annual Report. Sampling data collected during the 2011 operating year was compared against Table 1 - Effluent Monitoring SMW Pond. The results of the comparison is outlined below:

- Samples were not collected during the months of January and February
- Nitrites were not analysed for the month of April, May, August, September, October and December
- Nitrates were not analysed for the month of May and October
- BOD5 was not sampled for the months of November & December
- Chemical oxygen Demand was not analysed for the month of May and October
- Conductivity was not analysed for the months of March, April, May, June, July, August and October
- pH was not analysed for the months of April and May.
- Temperature was not analysed for the sampling program in 2011.
- Dissolved oxygen was not analysed for the months of March, April, May, June, July, August, September, October and November
- The parameter "Oil & Grease" was not analysed as a total but rather only for vegetable and animal products during the months of March, April, May, June, August, September, October, November and December

Please see Section 5.0 of this Report**

9. GROUNDWATER MONITORING

Upon issuance of this *Certificate,* the *Owner* shall establish the following groundwater monitoring program with monitoring wells located as per Figure 1 - Shallow Unconfined Water Table Groundwater and Surface Water Monitoring Locations, dated June 30, 2009, prepared by Conestoga-Rovers Associates.

1) For the unconfined shallow groundwater aquifer, the *Owner* shall establish and maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing eight (8) monitoring wells designated as: MW1-08 to MW5-08; and MW101 to MW103 and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

2) For the confined deep bedrock aquifer, the *Owner* shall maintain in accordance with O.Reg. 903, R.R.O. 1990, as amended from time to time, all existing three (3) monitoring wells designated as: TW-4, TW-7, and TW-8 (within the Orgaworld Canada Ltd. site), and such wells that would be necessary for the appropriate monitoring of the groundwater quality.

4) The *Owner* shall collect groundwater samples twice per year - in May and November - from the

monitoring wells listed at subsections (1) and (2), and increase the sampling frequency to four times per year - in February, May, August and November - for the three new wells MW101, MW102, and MW103.

The Facility has currently completed the groundwater monitoring for the 2011 & 2012 operating year. A copy of the 2012 report will be provided to the Ottawa District in March 2013 and will be reviewed by the ministry's Technical Support Section for comments.

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

Condition 10 of the said ECA -ISW outlines specific reporting requirements that must be completed by the Facility.

10. REPORTING

3) The *Owner* shall prepare a performance report on an annual basis, within **ninety (90) days** following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

(a) a description of any operating problems encountered and corrective actions taken;

(b) a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works;*

(c) a summary of all effluent monitoring results undertaken in the reporting period;

(d) a summary of the quantity of leachate contaminated sewage that was hauled to a municipal sewage treatment plant and the number of times the contents of the SWM Pond were disposed in such manner;

(e) a summary of the calibration and maintenance carried out on all effluent monitoring equipment;

(f) all analytical results and water level elevations obtained from the groundwater monitoring, pursuant to condition 9; and

(e) any other information the *District Manager* requires from time to time.

In March 2012, the Company submitted the 2011 Annual Report as per the requirement under Condition 10 (3). As part of the inspection process, the 2011 Annual Report (Report) was reviewed for completeness and compliance with the above referenced condition.

Findings:

- Remediation works were completed on the berm (spring of 2011). No addition operating problems were encountered requiring corrective actions to be taken.
- No maintenance was carried out on any major structure, equipment, apparatus, mechanics, or think forming part of the Works (not including the remediation of the berm)
- No leachate contaminated sewage was hauled to a municipal sewage treatment plant during the 2011 operating year.
- No calibration or maintenance of effluent monitoring equipment was completed in the 2011 operating year as the

pond level reading device does not require calibration.
- The groundwater/surface water monitoring and compliance report will be submitted in March of 2013 (being prepared by Conestoga-Rovers & Associates)
- Effluent Monitoring Results - Appendix 1 - the results from the effluent monitoring comparison is outlined in Section 2.4 of this Report

---

As part of the reporting requirements for the Facility, the Site must also comply with Condition 6 & 7 of the ECA-ISW regarding Operating and Maintenance of the industrial sewage works systems.

Condition 6 & 7 - Operation and Maintenance

The ECA requires the Facility to develop and implement Operation and Maintenance Manuals for the two sections of the SWMP (Part II - Stormwater Management Works & Part III - Process Water Recirculation System). At the time of the inspection and as part of the file review, the IO requested to review the Operation and Maintenance Manuals for the Industrial Sewage Works System.

- Operation and Maintenance Manuals for the Industrial Sewage Works System was implemented as required
- A Spill Contingency and Pollution Prevention Plan was developed, implemented, and submitted to the ministry
- The Facility has operating procedures in place for routine operation of the industrial sewage works system
- The Facility has logbooks for recording inspection findings, maintenance activities, and/or repairs
- The Facility has also developed and implemented a complaint recording and responding procedures in the event an environmental complaint is received by a member of the public.

Note: At the time of the inspection the IO requested records of any environmental complaint received as a result of the operations at the Site. Facility representative stated that no complaints were received.

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
At the time of the inspection no Ministry of the Environment samples were collected as the industrial sewage works system was not discharging to the natural environment.

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste ECA #2766-7HEPSZ.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:

As referenced in Section of this Report, the Facility has developed, implemented and provided a copy of the Site's Spill Contingency and Pollution Prevention Plan. No spills were reported to the ministry's Ottawa District Office or the Spills Action Centre.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

No remaining non-compliance issues were identified during the file review prior to the completion of this inspection report.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?
No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?
No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?
Yes

Specifics:

1.) The Site has failed to ensure all parameters outlined in Table 1 - Effluent Monitoring SWM Pond were sampled for each month.

2.) The Site has failed to ensure all monthly samples were collected for the 2011 operating year.

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?
No

Specifics:

Was there any indication of minor administrative non-compliance?
Yes

Specifics:

5.0 ACTION(S) REQUIRED

The following action items require addressing by the Facility and must be implemented upon receiving this Report:

1.) Ensure samples are collected on a monthly basis as required by ***Condition 5 - Surface Water Monitoring and Recording***

2.) Ensure monthly samples are analysed for the parameters outlined in ***Table 1 - Effluent Monitoring SWM Pond***

1. 1.) Ensure samples are collected on a monthly basis as required by Condition 5 - Surface Water Monitoring and Recording
2. 2.) Ensure monthly samples are analysed for the parameters outlined in Table 1 - Effluent Monitoring SWM Pond

6.0 OTHER INSPECTION FINDINGS

None at this time.

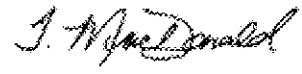
7.0 INCIDENT REPORT

Applicable
0153-93HL97

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:
Name: Kyle Straberger
District Office: Ottawa District Office
Date: 2013/02/19
Signature

REVIEWED BY:
District Supervisor:
Name: Tara MacDonald
District Office: Ottawa District Office
Date: 2013/02/27

Signature: 

File Storage Number: SI OT OT HA 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/09/20	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste certificate of approval, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 100+ (which includes large pieces of material that have not composted -branches, large pieces of incidental plastic), 10-100 material (which is medium sized material), incidental waste, and compost. The 100+ material might get sent to landfill or sent back to the shredder and enter the compost stream at the front of the line. The 10-100 material is used as inoculate and mixed in with fresh material in the Mixing Hall. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste co-mingled with the SSO waste. It should be noted that the City of Ottawa started co-mingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the sites compliance with their Waste Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protection Act (EPA) and Reg 347 under that same act. The inspection consisted of a District file review, site visit and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the time of inspection is listed as September 20th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

An air facility inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s): 2766-7HEPSZ, issued September 16th, 2009

2.1 SITE OPERATION:

Throughout this inspection report, the names allocated to the different areas within the processing building are as described in Figure 5.1 from the document titled: "Application for a Provisional Certificate of Approval for a Waste Disposal Site" dated June 2008.

General site observations from Sept 20th, 2010 :

10-100 material was piled in the Truck Hall, there was also some "fresh" waste that had recently been dropped off. The fresh material appeared to consist mostly of leaf and yard waste, the odd plastic bag was noted. Fresh material was also seen piled in the Receiving and Sorting Hall, a small amount of 10-100 material was seen in the eastern corner of the Receiving Hall. The Mixing Hall was approximately 3/4 full of 10-100 material. Tunnel #4 was being emptied, the front end loader was taking material from tunnel 4 to the screener.

Orgaworld is currently operating 6 compost tunnels. At the time of inspection tunnel #4 was being emptied. Tunnels #7 and 8 are shells, one is being used to store 10-100 material the other is being used to store curing compost.

There are two operating biofilters at the site and a third shell of a biofilter tunnel. Orgaworld has installed doors on the biofilter tunnel shell and has connected duct work to create a negative pressure in the tunnel and plans on using this as storage for 10-100 material or curing compost. This biofilter shell is not currently being monitored by the SCADA system.

According to staff, the increase in leaf and yard waste co-mingled with SSO has caused some operational challenges for Orgaworld as the material does not break down as easily. As a result Orgaworld has been accumulating a lot more 10-100 material than was expected. Orgaworld is selling this 10-100 material to some farmers as mulch.

At the start of operations the amount of SSO received was, on average, approximately 82 tonnes per operating day. The City of Ottawa decided to collect the City's leaf and yard waste co-mingled with the SSO waste. This greatly increased the volume and tonnage of material received. As an example, the site received, on average, approximately 292 tonnes per operating day in June, 2010.

On my site visit of September 20th, 2010, compost was being removed for the compost Curing Hall and loaded onto a truck. The compost will be brought to Orgaworlds compost storage site located in back of 3200 Rideau Rd, Ottawa. It should be noted that, as of November 29th, 2010 there is approximately 7,600 tonnes of compost at the storage site. Orgaworld is leasing this site from Tomlinson to store finished compost until buyers are found and ready to accept the compost.

At the time of inspection, the bay doors to the Processing Building were closed with the exception of one door from the compost curing hall because compost was being removed from the hall.

There were three piles of 10-100 material located outside the facility, these piles were side by side on the eastern side of the building. The piles were outside as a result of three separate fires that occurred inside the building. There has also been a fourth fire but the material was never brought outside. The company has been instructed to remove the material once it is deemed safe. Since then the material has been removed

from the site and sold as mulch.

Observations regarding some conditions in the CofA:

Condition 2. Service area, approved waste types, rates & storage.
- It should be noted that the company has appealed Conditions 2(i) and 2(ii) of the certificate of approval to the ERT. The Tribunal has not yet made a decision.
- Tonnage records were reviewed, no non compliances were noted.
- There have been some issues with outside storage of waste on site. The company has stored material outside as a result of 4 fires that occurred during the summer. This material has since been removed and the company has submitted a detailing the events and measures taken to prevent reoccurrence.

Condition 3. Signs
- Orgaworld has posted a sign at their front gate that complies with the condition.

Condition 5 Site Operations
- According to company officials no waste has been rejected.

Condition 6 Equipment and site inspections & maintenance
- Daily site inspections are conducted and a record is produced.
- The company has not yet created and implemented a preventative maintenance program for all on -Site equipment. See Air Inspection report for further action to be undertaken.

Condition 7 Quality criteria, testing & monitoring
- Every quarter there is an audit done of incoming SSO waste with the City of Ottawa. The company also does their own sampling of incoming waste.
- Finished compost sample results were reviewed, no non compliance issues were noted.
- Monitoring of the composting material is done electronically through a SCADA system.
- The odour monitoring program was received on October 30th, 2009. Since the start up of the operation the Ministry has received 3 odour complaints for the company. While it was not possible to conclusively determine the source of the odours, it is believed that the source is the pile of finished compost being stored at the compost storage site on Rideau.

Condition 8 Nuisance impact control & housekeeping
- A pressure washer is available inside the Truck hall in the event the trucks need to get cleaned.
- The company calls in a sweeping company to clean off the asphalt parking area if and when it gets dirty.
- the company has an agreement with an extermination company to handle vermin and vector.

Condition 9 Operations manual & staff training
- The Operations manual was received October 30th, 2009.

Condition 10 Emergency response and contingency plan
- The contingency plan was received on October 30th, 2009
- The plan in kept at the front office in a cabinet and is accessible to all employees.

Condition 12 Records keeping
- The company keeps an active excel sheet detailing the movement of waste through the process.
- The first annual report is due March 31, 2011

2.2 FINANCIAL ASSURANCE:

Financial assurance has been received by the company.
According to Condition 1(20) the company is required to have Financial Assurance of $727, 700. Should the

company increase their Maximum Approved Waste Processing Capacity to 150, 000 tonnes they will need to increase their financial assurance to $1,018,000.

2.3 SITE SERVICE AREA:

In accordance with Condition 2(1) the site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

Site observations:

The facility is currently only accepting organic waste and leaf and yard waste from the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Tonnage records have been reviewed from January 28th, 2010 to September 18th, 2010. No exceedences were noted.

Weight of the waste received is measured by a scale located on site. The data is inputted in two computerized databases, one for Orgaworld and the other for the City of Ottawa.

The Site has never had to reject a load of waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

This is the first time this facility is inspected by the Ministry.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry 's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

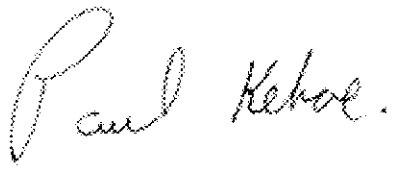
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:

Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Non-Hazardous WasteTransfer Processing Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:			
Inspection Start Date:	2010/09/20	**Inspection Finish Date:**	2010/12/21
Region:	Eastern		

1.0 INTRODUCTION

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste, as defined in their waste certificate of approval, for the production of compost. The Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. Once the material remains in the tunnels long enough for the temperature to reach 55 degrees Celsius for 3 consecutive days it is cooled down, removed from the tunnels and placed into a screener which separates the material in size fractions. The screener separates the material into 100+ (which includes large pieces of material that have not composted -branches, large pieces of incidental plastic), 10-100 material (which is medium sized material), incidental waste, and compost. The 100+ material might get sent to landfill or sent back to the shredder and enter the compost stream at the front of the line. The 10-100 material is used as inoculate and mixed in with fresh material in the Mixing Hall. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the certificate of approval and then removed from the site as finished compost.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa is currently collecting the leaf and yard waste co-mingled with the SSO waste. It should be noted that the City of Ottawa started co-mingling their leaf and yard waste with the SSO organics and sending it to Orgaworld in April 2010.

The purpose of the inspection is to assess the sites compliance with their Waste Certificate of Approval (CofA) and applicable environmental legislation such as the Environmental Protection Act (EPA) and Reg 347 under that same act. The inspection consisted of a District file review, site visit and discussions with Greg Mariotti, site operations manager.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. Although the time of inspection is listed as September 20th, 2010, the information in this report is also based on site visits done at the facility throughout the year.

An air facility inspection and an industrial sewage inspection were also carried out at the site. See respective reports for details.

2.0 INSPECTION OBSERVATIONS

Certificate of Approval Number(s): ● Yes ○ No
C of A Number(s): 2766-7HEPSZ, issued September 16th, 2009

2.1 SITE OPERATION:

Throughout this inspection report, the names allocated to the different areas within the processing building are as described in Figure 5.1 from the document titled: "Application for a Provisional Certificate of Approval for a Waste Disposal Site" dated June 2008.

General site observations from Sept 20th, 2010 :

10-100 material was piled in the Truck Hall, there was also some "fresh" waste that had recently been dropped off. The fresh material appeared to consist mostly of leaf and yard waste, the odd plastic bag was noted. Fresh material was also seen piled in the Receiving and Sorting Hall, a small amount of 10-100 material was seen in the eastern corner of the Receiving Hall. The Mixing Hall was approximately 3/4 full of 10-100 material. Tunnel #4 was being emptied, the front end loader was taking material from tunnel 4 to the screener.

Orgaworld is currently operating 6 compost tunnels. At the time of inspection tunnel #4 was being emptied. Tunnels #7 and 8 are shells, one is being used to store 10-100 material the other is being used to store curing compost.

There are two operating biofilters at the site and a third shell of a biofilter tunnel. Orgaworld has installed doors on the biofilter tunnel shell and has connected duct work to create a negative pressure in the tunnel and plans on using this as storage for 10-100 material or curing compost. This biofilter shell is not currently being monitored by the SCADA system.

According to staff, the increase in leaf and yard waste co-mingled with SSO has caused some operational challenges for Orgaworld as the material does not break down as easily. As a result Orgaworld has been accumulating a lot more 10-100 material than was expected. Orgaworld is selling this 10-100 material to some farmers as mulch.

At the start of operations the amount of SSO received was, on average, approximately 82 tonnes per operating day. The City of Ottawa decided to collect the City's leaf and yard waste co-mingled with the SSO waste. This greatly increased the volume and tonnage of material received. As an example, the site received, on average, approximately 292 tonnes per operating day in June, 2010.

On my site visit of September 20th, 2010, compost was being removed for the compost Curing Hall and loaded onto a truck. The compost will be brought to Orgaworlds compost storage site located in back of 3200 Rideau Rd, Ottawa. It should be noted that, as of November 29th, 2010 there is approximately 7,600 tonnes of compost at the storage site. Orgaworld is leasing this site from Tomlinson to store finished compost until buyers are found and ready to accept the compost.

At the time of inspection, the bay doors to the Processing Building were closed with the exception of one door from the compost curing hall because compost was being removed from the hall.

There were three piles of 10-100 material located outside the facility, these piles were side by side on the eastern side of the building. The piles were outside as a result of three separate fires that occurred inside the building. There has also been a fourth fire but the material was never brought outside. The company has been instructed to remove the material once it is deemed safe. Since then the material has been removed

from the site and sold as mulch.

Observations regarding some conditions in the CofA:

Condition 2. Service area, approved waste types, rates & storage.
- It should be noted that the company has appealed Conditions 2(i) and 2(ii) of the certificate of approval to the ERT. The Tribunal has not yet made a decision.
- Tonnage records were reviewed, no non compliances were noted.
- There have been some issues with outside storage of waste on site. The company has stored material outside as a result of 4 fires that occurred during the summer. This material has since been removed and the company has submitted a detailing the events and measures taken to prevent reoccurrence.

Condition 3. Signs
- Orgaworld has posted a sign at their front gate that complies with the condition.

Condition 5 Site Operations
- According to company officials no waste has been rejected.

Condition 6 Equipment and site inspections & maintenance
- Daily site inspections are conducted and a record is produced.
- The company has not yet created and implemented a preventative maintenance program for all on -Site equipment. See Air Inspection report for further action to be undertaken.

Condition 7 Quality criteria, testing & monitoring
- Every quarter there is an audit done of incoming SSO waste with the City of Ottawa. The company also does their own sampling of incoming waste.
- Finished compost sample results were reviewed, no non compliance issues were noted.
- Monitoring of the composting material is done electronically through a SCADA system.
- The odour monitoring program was received on October 30th, 2009. Since the start up of the operation the Ministry has received 3 odour complaints for the company. While it was not possible to conclusively determine the source of the odours, it is believed that the source is the pile of finished compost being stored at the compost storage site on Rideau.

Condition 8 Nuisance impact control & housekeeping
- A pressure washer is available inside the Truck hall in the event the trucks need to get cleaned.
- The company calls in a sweeping company to clean off the asphalt parking area if and when it gets dirty.
- the company has an agreement with an extermination company to handle vermin and vector.

Condition 9 Operations manual & staff training
- The Operations manual was received October 30th, 2009.

Condition 10 Emergency response and contingency plan
- The contingency plan was received on October 30th, 2009
- The plan in kept at the front office in a cabinet and is accessible to all employees.

Condition 12 Records keeping
- The company keeps an active excel sheet detailing the movement of waste through the process.
- The first annual report is due March 31, 2011

2.2 FINANCIAL ASSURANCE:

Financial assurance has been received by the company.
According to Condition 1(20) the company is required to have Financial Assurance of $727, 700. Should the

company increase their Maximum Approved Waste Processing Capacity to 150, 000 tonnes they will need to increase their financial assurance to $1,018,000.

2.3 SITE SERVICE AREA:

In accordance with Condition 2(1) the site may only accept solid non-hazardous domestic, commercial, institutional or industrial Organic Waste for the Province of Ontario and Quebec limited to the Organic Waste listed in Condition 2 of the Approval.

Site observations:

The facility is currently only accepting organic waste and leaf and yard waste from the City of Ottawa waste collection program.

2.4 APPROVED SITE CAPACITY:

Tonnage records have been reviewed from January 28th, 2010 to September 18th, 2010. No exceedences were noted.

Weight of the waste received is measured by a scale located on site. The data is inputted in two computerized databases, one for Orgaworld and the other for the City of Ottawa.

The Site has never had to reject a load of waste.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

This is the first time this facility is inspected by the Ministry.

4.0 SUMMARY OF INSPECTION FINDINGS (HEALTH/ENVIRONMENTAL IMPACT)

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry 's mandate ?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material ?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment ?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material ?

No

Specifics:

Was there any indication of minor administrative non-compliance?

No

Specifics:

5.0 ACTION(S) REQUIRED

6.0 OTHER INSPECTION FINDINGS

7.0 INCIDENT REPORT

Not Applicable

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

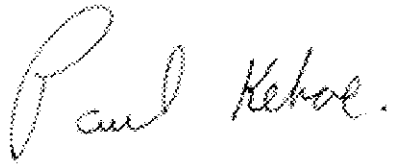
Name: Tracy Hart
District Office: Ottawa District Office
Date: 2010/12/21
Signature



REVIEWED BY:
District Supervisor:

Name: Paul Kehoe
District Office: Ottawa District Office
Date: 2010/12/22

Signature:



File Storage Number: SI OC

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ontario

Ministry of the Environment
Ministère de l'Environnement

Industrial Sewage Inspection Report

Client:	Orgaworld Canada Ltd. Mailing Address: 651 Colby Dr, Waterloo, Ontario, Canada, N2J 4A4 Physical Address: 651 Colby Rd, Waterloo, City, Regional Municipality of Waterloo, Ontario, Canada, N2J 4A4 Telephone: (519)568-5610, FAX: (519)568-5612 Client #: 8883-7FKSLA, Client Type: Corporation, NAICS: 562210		
Inspection Site Address:	5123 Hawthorne Road South Address: Lot: Part of West Half of 27, Concession: 6, Ottawa, City, K1G 3Y3 District Office: Ottawa GeoReference: ,		
Contact Name:	Greg Mariotti	**Title:**	Site operations manager
Contact Telephone:	(613)219-9311 **ext**	**Contact Fax:**	
Last Inspection Date:	2010/11/25		
Inspection Start Date:	2011/09/19	**Inspection Finish Date:**	2011/09/30
Region:	Eastern		

1.0 INTRODUCTION

For Clarity within this report it should be noted that the Ministry of the Environment has restructured their approvals process. As of October 31st, 2011, all Certificates of Approval will be referred to as Environmental Compliance Approvals (ECA).

The facility is an aerobic composting facility that is approved to accept solid non-hazardous organic waste as defined in their waste ECA for the production of compost. Organic waste is brought to the facility, shredded, mixed and placed inside composting tunnels. Conditions within the tunnels are monitored and changed to ensure optimum conditions that promote aerobic composting. The compost size material gets placed in the compost curing area where it is required to cure for 21 days, tested to ensure it meets all requirements under the waste certificate of approval and then removed from the site as finished compost. All process air and air from the receiving hall is directed through pollution control equipment. Leachate generated as a result of the composting process gets recirculated, any excess is kept in on-site storage tanks.

Orgaworld Canada Ltd. first started accepting organic material at their site on January 28th, 2010. The Site is currently only receiving waste from the City of Ottawa source separated organics (SSO) collection program and leaf and yard waste program. The City of Ottawa has been collecting the leaf and yard waste commingled with the SSO waste.

The facility is approved to operate at a production limit of up to 150,000 tonnes per year of organic waste.

The following inspection report relies on information found in the district file, site observations and information gathered from conversations with Orgaworld staff. The site visit for the inspection was

conducted on September 19th and a follow visit was conducted on September 30th to review paperwork requirements.

The purpose of this inspection is to assess the sites compliance with their Industrial Sewage Works ECA and applicable environmental legislation such as the Ontario Water Resources Act (OWRA). The inspection consisted of a district file review, site visit and discussions with Greg Mariotti, site operations manager.

An air facility inspection and non -hazardous waste transfer processing inspection were also carried out at the site. See respective reports for details

2.0 INSPECTION OBSERVATION

Facility MEWS (Works) Number:
N/A

Sector Type:
Other

Specify Other:
Composting facility

Effluent Type:
Storm Water

Receiver Type:
Surface Water

Name of Receiver:
Findlay Creek

Is there a sensitive receptor on/in the receiver?
Yes

Select the most important type of sensitive receptor.
Receiving Water

Certificate of Approval Number(s):
Yes
C of A Number(s): 7251-8GKRPD issued May 30th, 2011

The current certificate was issued to include alterations to the outdoor stormwater drainage including the addition of a submersible pump, storage tanks and aerators on the pond.

Previous ECA's:

1- # 9465-7NVRWT issued September 16th, 2009
2- # 7032-88XPRA issued September 7th, 2010 - was issued to reflect changes in the on site monitoring wells.

2.1 WASTEWATER TREATMENT PROCESS DESCRIPTION

Stormwater is collected in an on-site open ditch system leading to a stormwater management pond that discharges off site to the Hawthorne Industrial Park ditch system which eventually leads to Findlay Creek.

Process water generated inside the building gets stored in leachate holding tanks buried on the East side of the building. Should the facility need to use water in their process (wetting the

composting material) they use the leachate from the storage tanks and/or water from the stormwater pond. Should the leachate tanks need to be emptied the company has been contacting Lacombe to pick up and dispose of the leachate. The HWIN generator number for the site is ON3338779, and indicates that the leachate is classified as waste class 270L. According to company officials the facility operates in a water negative environment in the summer but has found that they collect excess leachate in the winter.

2.2 EFFLUENT SUMMARY REPORT

What are the facility's effluent limits based on?
Certificate of Approval/Permit, None

Does the facility comply with its limits?
Yes

The ECA does not refer to any exceedance limits but refers to trigger parameters. Should the stormwater exceed any of the trigger parameters it would be considered leachate contaminated stormwater and would not be allowed to be discharged from the stormwater management pond.The stormwater management pond can only be discharged when sampling shows that the water does not exceed trigger levels listed in Table 2 of the Certificate.

Table 2
Trigger Parameters

Parameter	Trigger Level (mg/L if not specified)
Ammonia (unionized)	0.05
Nitrate-N (NO3-N)	2.93
CBOD5	15
Total Phosphorus	0.4
Total Suspended Solids	15
E-Coli	100 count/100 mL
pH	6.5 to 8.5
Temperature (maximum)	23°C

Condition 5(1) of the ECA requires the company to sample the effluent on a monthly basis for the parameters listed in Table 1. Results from sampling done from March to September 2011 were submitted. The following issues were noted:

- April sampling: exceedence of Total Suspended Solids
  no pH reading
- May sampling: not tested for ammonia
  not tested for nitrates
  no pH reading
- June sampling: no pH reading
- July sampling: exceedence of Ecoli

- September sampling: exceedence of Total Suspended Solids

According to file review the pond was discharged in March and April of 2011. The Ministry was contacted prior to discharge in April as the TSS trigger parameters was exceeded by 1mg/L. At the time of inspection, Greg also indicated that he plans on discharging this fall in order to ensure adequate storage space during the following spring snow melt.
See Section 5.0 Action Items

The ECA was amended on May 30th, 2011 to include the installation of aerators in the pond. These aerators were not installed at the time of inspection.

2.3 SEWAGE TREATMENT WORKS CAPACITY ASSESSMENT

Flow (m^3/day)	Year 1	Year 2	Year 3
Average daily flow	0.00	0.00	0.00
Maximum daily flow	0.00	0.00	0.00
Capacity Design	0.00	0.00	0.00
% of capacity (based on average daily flow)	0.00	0.00	0.00

The ECA does not require flow measurement nor list any design capacity. In accordance to condition 6(12) The Owner shall inspect the Works at least once a year and, if necessary, clean and maintain the Works to prevent the excessive build-up of sediments and/or vegetation. The owner is also required to maintain a log book to record the results of these inspections.

Daily site inspection records were reviewed at the time of inspection and were found to include pond site inspection findings.

2.4 SAMPLING REQUIREMENTS

What are the facility's sampling requirements based on?
Certificate of Approval/Permit

Does the facility meet sampling requirements?
Yes

Table 1 - Effluent Monitoring SWM Pond		
General Parameters	**Inorganic**	**Field Parameters**
BOD5	Arsenic	Conductivity
COD	Boron	Dissolved Oxygen
DOC	Cadmium	pH
Total Ammonia Nitrogen	Chromium	Temperature

Total Kjeldahl Nitrogen	Cobalt	
Nitrate-N	Copper	
Nitrite-N	Lead	
Total Phenols	Mercury	
Total Phosphorus	Nickel	
Total Suspended Solids (TSS)	Zinc	
E-Coli		
Oil & Grease		
pH		

2.5 REPORTING REQUIREMENTS

What are the facility's reporting requirements based on?
Certificate of Approval/Permit

Does the facility meet reporting requirements?
Yes

As per condition 10(3) of the ECA the facility submitted a performance report for 2010.

2.6 FLOW MEASUREMENT

Flow measurements are not required in the ECA.

2.7 MINISTRY SAMPLE RESULTS

Were Ministry samples collected during the inspection?
No

Reason:
Facility was not discharging at the time of inspection

2.8 FINANCIAL ASSURANCE

The facility holds financial assurance in accordance with Waste ECA #2766-7HEPSZ.

2.9 SPILL PREVENTION AND CONTINGENCY PLANS

Is the facility required to have a Spill Prevention and Contingency Plan (SPCP) as required by Ontario Regulation 224/07?
No

Has the facility had any spills since the last inspection?
No

Were all the spills reported to the ministry?
N/A

Does the facility's operations or spill history suggest that a SPCP be developed?
No

Comments:
The facility has spill kits on site and has submitted a contingency plan for odours, spills, fires, power failures and labour disruptions.

3.0 REVIEW OF PREVIOUS NON-COMPLIANCE ISSUES

The company has received an amendment to their ECA reflecting the alterations seen during the previous inspections. The Company has also disconnected their sump pump therefore no longer potentially requiring a permit to take water.

4.0 SUMMARY OF INSPECTION FINDINGS

Was there any indication of a known or anticipated human health impact during the inspection and/or review of relevant material, related to this Ministry's mandate?

No

Specifics:

Was there any indication of a known or anticipated environmental impact during the inspection and/or review of relevant material?

No

Specifics:

Was there any indication of a known or suspected violation of a legal requirement during the inspection and/or review of relevant material which could cause a human health impact or environmental impairment?

No

Specifics:

Was there any indication of a potential for environmental impairment during the inspection and/or the review of relevant material?

No

Specifics:

Was there any indication of minor administrative non-compliance?

Yes

Specifics:

Insufficient stormwater effluent monitoring.

5.0 ACTION(S) REQUIRED

1. Submit a report on the effluent monitoring explaining why the parameters noted in Section 2.2 of this report were not sampled for.

Submit all information required above to

Tracy Hart
Ministry of the Environment
2430 Don Reid Dr.
Ottawa, K1H 1E1
tracy.hart@ontario.ca
fax: 613 521-5437

DUE: January 16th, 2012

6.0 OTHER INSPECTION FINDINGS

No other inspection findings at this time.

7.0 INCIDENT REPORT

Applicable
2228-8PCTN7

8.0 ATTACHMENTS

PREPARED BY:
Environmental Officer:

Name:	**Tracy Hart**
District Office:	**Ottawa District Office**
Date:	**2011/12/20**
Signature	

REVIEWED BY:
District Supervisor:

Name:	**Tara MacDonald**
District Office:	**Ottawa District Office**
Date:	**2011/12/20**
Signature:	

File Storage Number: SI OC OT HAW 230

Note:
"This inspection report does not in any way suggest that there is or has been compliance with applicable legislation and regulations as they may apply to this facility. It is, and remains, the responsibility of the owner and/or the operating authority to ensure compliance with all applicable legislative and regulatory requirements"

Ministry of the Environment and Climate Change

P.O. Box 22032
Kingston, Ontario
K7M 8S5
613/549-4000 or 1-800/267-0974
Fax: 613/548-6908

Ministère de l'Environnement et de l'Action en matière de changement climatique

C.P. 22032
Kingston (Ontario)
K7M 8S5
613/549-4000 ou 1-800/267-0974
Fax: 613/548-6908

Ontario

M E M O R A N D U M

September 17, 2014

TO: Kyle Straberger
Senior Environmental Officer
Peterborough District Office
Eastern Region

FROM: Bob Holland
Hydrogeologist
Water Resources Unit
Technical Support Section
Eastern Region

RE: Orgaworld Organics Facility
Groundwater Assessment and Work Plan
5123 Hawthorne Road
City of Ottawa
Hydrogeologic Assessment

I have reviewed the Conestoga Rovers & Associates memorandum of July 16, 2014 concerning the assessment of groundwater impacts and proposed work program at the Orgaworld Organics Facility in Ottawa.

This memorandum identifies contaminants of concern to be ammonia, iron, manganese, dissolved organic carbon, sulfate, and total dissolved solids. Groundwater sampling and mapping isopleth mapping of ammonia, DOC, iron and manganese confirm that a plume extend north eastward originating in and around the northeast corner of the Organic Composting Facility. Shallow groundwater has been found to have very high levels of ammonia that poses a potential threat to surface water due to unionized ammonia toxicity.

In order to further assess this threat one additional shallow groundwater monitoring well called MW106 is to be constructed along the north site boundary west of MW5-09, as shown on Figure 1, to further delineate the western edge of the plume. Four staff gauges are to be installed in the ditch that runs along the north site boundary. Hydraulic testing of well is to be conducted to better determine the hydraulic characteristics of the shallow overburden and bedrocks aquifers. A topographic survey is to be completed to assist in determining potential groundwater surface water interactions. I agree with this work program, however, **ditch water sampling should begin immediately** to begin to assess the level of impact in the ditch given the high strength of ammonia found in groundwater. The Surface Water Unit should be consulted on this matter.

I agree with the groundwater remediation program. This program proposes to collect up to 15,000 litres of groundwater by installing an extraction well next to the ammonia scrubber where groundwater has been most heavily impacted. I assume that problems with the ammonia scrubber have been fixed. More extraction wells may be needed. Recirculation of extracted groundwater into the facility is an abatement matter.

Original signed by

Robert W. Holland, P.Geo.
RWH/gl

c: Frank Crossley/File GW OT OT HA 01 02
Bob Holland

Proposed New Extraction Well EW108-19
Existing Extraction Well EW107-15
N

004579

Welcome
9 OF 150 REPORTS VIEWED

SEARCH BY: ADDRESS | ADDRESS RANGE | NAME | INSTRUMENT/PLAN | LOT&CONCESSION

FEEDBACK
HELP CENTRE

Property Search | Neighbourhood Sales | Demographics | Plan List By PIN

N/A
OTTAWA | K0A
Search By Block | Enhanced Report | GeoWarehouse Store

ACTIVE | PIN [redacted]

Land Registry Information - PIN: 145539032

Print Parcel Register

Address:	N/A				
Municipality:	OTTAWA	LRO:	04	Area:	467.340 sq
Land Registry Status:	ACTIVE	Registration Type:	LT	Perimeter:	3251 m
Description:	PT LT 27 CON 8 CUMBERLAND; PT LT 28 CON 8 CUMBERLAND AS IN RB85543; CUMBERLAND				
Party To:	WELSHART FARMS [INC.]				

Sales History Information

DATE:	TYPE:	AMOUNT:
04/12/2019	T	$950,000
PARTY TO:	WELSHART FARMS [INC.]	
06/15/2006	T	$[illegible],000
PARTY TO:	CAMPHALG, RUTH	
07/08/1999	T	$[illegible],000
PARTY TO:	PETERSON, CLARICE WILHELMINA; CAMPHALG, RUTH;	
03/02/1977	T	$[illegible],500
PARTY TO:	PETERSON, CLARICE W.; CAMPHALG, RUTH; MCMANUS, SHERRY ANNE;	

Con 8 Lot 27 Cumberland

MAP VIEW | STREET VIEW

Satellite

Layers

Google

Ownership | Parcel | Zoning | Subject Property | Subject Property | Subject APN | Neighborhood Trim

004580

Pages 4581 to / à 4584

are withheld pursuant to section

sont retenues en vertu de l'article

22

of the Freedom of Information and Protection of Privacy Act

de la Freedom of Information and Protection of Privacy Act

SI OT GL HA 610.

Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa Ontario
K1H 1E1
613-521-3450 or 1-800-860-2195
Fax: 613-521-5437

Ministère de l'Environnement et de l'Action en matière de changement climatique
Bureau du district d'Ottawa
2430, promenade Don Reid, Unité 103
Ottawa (Ontario)
K1H 1E1
613-521-3450 ou 1-800-860-2195
Téléc. : 613-521-5437

Ontario

March 18, 2015

Michael Rooke
Orgaworld Canada Ltd.
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

Dear Sir:

RE: Implementation of Ontario Compost Quality Standards – Maturity & Foreign Matter
Orgaworld Ottawa Facility, 5123 Hawthorne Road, Ottawa
Environmental Compliance Approval No. 2766-7HEPSZ

On July 25, 2012 the Ministry of the Environment and Climate Change (MOECC) released revised standards for aerobic composting of organic waste materials in the province of Ontario entitled *Ontario Compost Quality Standards* ("Standards"). The Standards update and replace the *Interim Guideline for the Production and Use of Aerobic Compost in Ontario*, first released in November 1991, and last updated in 2004.

The Standards outline new categories of compost (AA, A, and B) with specific requirements for metals, quality of feedstock, pathogens, foreign matter and maturity. The MOECC implemented Phase I (metals, quality of feedstock and pathogens) of the Standards on January 1, 2013 with Phase II (maturity and foreign matter) to be implemented on July 1, 2015.

In preparation of the upcoming implementation date, the MOECC would like to engage Orgaworld Canada Ltd. in how the requirements of the Standards will be met.

By **May 1, 2015**, please submit an action plan outlining how the Orgaworld Ottawa Facility will comply with the implementation of Phase II of the Standards on July 1, 2015. The action plan should include, but not necessarily be limited to, the following:

1. Process and/or operational changes to the current operations at the Orgaworld Ottawa Facility that may be necessary;
2. Environmental Compliance Approval amendments required to reflect any required process changes or modifications;
3. Options to manage processed organic waste not meeting the *Ontario Compost Quality Standards*; and
4. Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with the Phase II *Ontario Compost Quality Standards*.

Please contact me if you have any questions or concerns with the above request and the implementation of Phase II of the Standards. A meeting can be arranged in the event Orgaworld Canada Ltd. would like to discuss this subject in further detail.

Sincerely,

Kyle Straberger

Kyle Straberger
Environmental Officer

KS:jdv

File Code: SI OT GL HA 610

Soil Management in Ontario

Internal Questions and Answers

July 18, 2014

Key Messages:

- Creating opportunities to build or renew infrastructure and redevelop brownfields sites benefits Ontario's economy. Effective, sustainable soil management practices are important to maintaining a healthy economy and environment.
- The Ministry of the Environment and Climate Change encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.
- The ministry has finalized a best practices guide for how to manage excess soil on large-scale projects to help provide clarity to site owners, developers and contractors and promote a consistent approach.
- While municipalities and Conservation Authorities are the main permitting agencies for soil management activities, the ministry is helping by releasing a guidance document that outlines best management practices for managing excess soil.
- The ministry consulted extensively with the public and stakeholders and carefully considered the feedback received through the Environmental Bills of Rights Registry prior to finalizing the guide.
- The Best Management Practices provides essential guidance on many aspects of excess soil management. Going forward, we will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected.

Questions and Answers for the District/Area Offices:

Enforcement

1. How will ministry staff enforce the Management of Excess Soil – A Guide for Best Management Practices?

Currently all soil management activities brought to the ministry's attention are assessed on a. case-by-case basis, using site specific information. The applicability of the guide will also be assessed on a case-by-case basis.

If the ministry determines there is a potential environmental concern, the ministry will examine each situation to understand how the guidance was applied or how it can be applied to the specific site.

District Engineers or Regional Technical Support staff may need to be consulted to assist in determining and/or verifying (based on the information that is provided by the Qualified

Person) if there is a potential for, or a confirmed adverse effect, associated with the excess soil management activity.

If there is a confirmed or potential for an adverse effect, ministry staff will ensure the site owners take appropriate actions to mitigate the impacts using the ministry's Compliance Policy – Applying Abatement and Enforcement Tools (May 2007).

2. **What tools are available to enforce the Management of Excess Soil – A Guide for Best Management Practices?**

All current abatement tools, such as both voluntary and mandatory abatement, following the ministry's Compliance Policy and Informed Judgement Matrix are available to Environmental Officers to address non-compliance situations.

If voluntary or mandatory abatement tools, such as letters or Orders are used to follow up on, or address issues or concerns regarding excess soil management activities, Environmental Officers are encouraged to incorporate language from the guide, as appropriate.

This will ensure a consistent approach is being utilized by District/Area offices across the province.

3. **Can an Environmental Officer order someone to follow the Management of Excess Soil – A Guide for Best Management Practices, or reference the document in an Order?**

Management of Excess Soil – A Guide for Best Management Practices is a guidance document that highlights the ministry's expectations of stakeholders when they are engaging in excess soil management activities from large-scale projects. While these expectations were created to help ensure compliance with ministry legislation, the document itself is not legally enforceable.

The authority to issue an Order is still dependent upon identifying legislative contraventions based on site specific information, or the need for preventative measures. The language and concepts found in the guide can be incorporated into an Order, but only in instances where the site specific information establishes the context for incorporating the guidance into that Order.

Generally there are three legislative areas that can address concerns regarding excess soil management activities:

- Contraventions of the general prohibition clauses for the discharge or presence of contaminants in the natural environment that cause or may cause an adverse effect under the Environmental Protection Act and Ontario Water Resources Act;
- Preventative measures to ensure there is no future adverse effect (under the Environmental Protection Act); and
- Contraventions of the general waste management provisions found in O. Reg. 347, General Waste Management Regulation and the Environmental Protection Act.

District/Area Offices can consult the Central Region Program Services Unit or their

Regional Counsel for advice when taking compliance actions or referencing the guide within an Order.

4. Can the ministry order a landowner to get a Record of Site Condition if they have received soil at the site?

Records of Site Condition are only required when a property is changing to a more sensitive property use. The ministry does not order landowners to obtain a Record of Site Condition unless it is legally required under the *Environmental Protection Act*.

Managing Soil as a Waste

5. When should excess soil be managed as a waste?

The determination of whether excess soil should be managed as a waste can only be made on a case-by-case basis.

For excess soil that is being transported from a ministry-approved waste management site (such as a transfer / processing site or soil remediation facility), the Environmental Officer should refer to the site's Environmental Compliance Approval for conditions related to where the excess soil can go when it leaves the site.

If soil is found to be inappropriate for re-use at a site or the excess soil has no beneficial re-use and is destined for final disposal, the soil should be managed as a waste.

The Management of Excess Soil – A Guide for Best Management Practices provides stakeholders with the best management practices the ministry considers reasonable for managing excess soil as a resource.

If it is unclear whether a proponent is managing excess soil in accordance with the guide, your District/Area Office management team and the Central Region Program Services Unit can assist in determining if the soil from a site is being managed in an appropriate manner.

Temporary Soil Storage and Receiving Sites

6. What procedures should the District/Area Office follow related to a proponent establishing a Temporary Soil Storage Site?

Before a District/Area Office offers guidance to a proponent planning to establish a Temporary Soil Storage Site, the proponent should confirm that they have already contacted the appropriate permitting body, such as the municipality or conservation authority.

The permitting authority will advise the proponent whether the proposed site is appropriate for use as a Temporary Storage Site, and may also suggest or provide the proponent with site-specific conditions.

If the permitting authority is satisfied with the establishment of the site, the ministry should direct the proponent to follow the Management of Excess Soil – A Guide for Best

Management Practices for the operation of the site.

If appropriate, ministry staff can issue a preventative measures Order under Section 18 or 157.1 of the Environmental Protection Act to establish the conditions of the site so that they can be legally enforced. Prior to using an Order, ministry staff should consult with Regional Counsel.

7. How can the ministry establish financial assurance for Temporary Soil Storage Sites and Receiving Sites?

If the ministry determines that financial assurance is required, the District or Regional Office can issue an Order under *the Environmental Protection Act*. The Order should take into account the specific characteristics of the site to determine the amount of financial assurance required.

Risk Assessments

8. Is a risk assessment required for a proponent to assess the quality of soil being received at a site?

No, a risk assessment is not required for all sites receiving soil.

A Qualified Person is hired to make decisions for excess soil management and should be someone who can exercise professional judgment based on their experience. This is so that they can advise on appropriate reuse options for the excavated or excess soil, based on the appropriate soil analysis and characterization.

If the risk assessment is to be conducted and a Record of Site Condition is filed, the guide does not apply, and the soil management requirements highlighted under Part XII of Ontario Regulation 153/04 take precedent.

District/Area Office Training

9. Will there be any additional support and training for ministry staff related to the Excess Soil Management – A Guide for Best Management Practices?

Please contact Jonathan Fernandes, Central Region Program Services Unit at 416-326-5686 or jonathan.fernandes@ontario.ca for further assistance, clarification and interpretation of the document.

Central Region's Program Services Unit staff offer training sessions coordinated through the District/Area Office management teams. Contact your local District/Area Office for more information.

District/Area Office

1. What is included in the Excess Soil Management – A Guide for Best Management Practices?

While municipalities and Conservation Authorities are the main permitting agencies for soil

management activities, the ministry has developed a guide that highlights best practices for excess soil management activities.

The document provides guidance on how to handle excess soil generated from large-scale projects that is transported to sites where it can be reused for a beneficial purpose.

Excess soil management options in the guide include:

- direct reuse at the site where the soil was excavated
- on or offsite treatment of soil for reuse
- reusing excess soil at a construction or development site where imported soil is required for purposes such as site alteration, filing in depressions/excavations or re-grading
- managing excess soil at a ministry-approved soil recycling, processing or treatment facility
- reusing excess soil at a commercial fill site; or
- use as daily cover at a ministry-approved waste disposal site.

2. Why did the government develop the new guidance?

The guide was developed in response to concerns from stakeholders such as municipalities, conservation authorities, the construction industry, environmental consulting firms, and environmental non-governmental organizations.

While municipalities and Conservation Authorities are the main permitting agencies for soil management activities, the ministry has developed a guide that highlights best practices for excess soil management activities.

The guide will assist in establishing a consistent approach to managing excess soil for beneficial uses as well as avoid unnecessary disposal of soil in landfills.

3. What will change from what's currently being done?

The ministry provides guidance on excess soil management activities on a case-by-case basis.

The Best Management Practices guide details the ministry's expectations for those who manage excess soil to help ensure a consistent approach across the ministry.

The guide also encourages reuse for beneficial purposes to prevent excess soil from being unnecessarily disposed of in landfills.

4. Who will be affected by the proposed new soil management guidance?

Anyone engaging in excess soil management activities is responsible for ensuring excess soil is managed in an environmentally sound manner and according to all regulatory requirements. This includes municipalities, developers and owners of source and receiving sites.

5. How will the Best Management Practices help industry involved in the redevelopment of a site?

The Best Management Practices guide details the ministry's expectations for those who manage excess soil to help ensure a consistent approach across the ministry. The document can be used by site owners, developers and contractors as well as municipalities, government ministries and agencies.

The guidance document may help industry reduce trucking and disposal costs in the longer term by encouraging beneficial reuse of excess soil rather than disposal in landfill sites.

Municipalities and Conservation Authorities are encouraged to incorporate these best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

6. Why does the Excess Soil Management – A Guide for Best Management Practices focus on large-scale projects when the majority of soil management in Ontario is related to small-scale projects?

The proposed best management practices are not intended to apply to:

- small-scale construction projects, such as small parking lots, recreational paths, and playgrounds.
- maintenance and construction activities at single-dwelling residential properties such as building a swimming pool or landscaping activities; or
- activities associated with small-scale municipal road work or sewer and water main construction such as minor or localized repairs of underground utilities.

Anyone can use the Best Management Practices concepts for construction projects that generate excess soil. Homeowners are not expected to incur the cost of retaining a Qualified Person for small-scale projects. That is why the focus is on large-scale projects.

7. Why isn't the government developing a full policy to address all soil management activities in Ontario?

The Best Management Practices guide is intended to advise municipalities and others on the types of requirements to be considered when developing provisions for managing excess soil.

This guidance can be used to inform municipal by-laws, municipal site alteration permits and contracts involving the movement of excess soil.

The ministry also will review the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

Municipalities and Conservation Authorities have the authority to develop by-laws and issue permits for soil management activities.

8. How will the ministry encourage use of the best management practices?

While drafting the best management practices, the ministry consulted a broad range of stakeholder groups including municipalities, roads associations, waste associations, the engineering community and developers.

The ministry will encourage the use of these best practices by posting of our guide on our ministry website and outreach activities with anyone who is involved in soil management. We will also coordinate an implementation plan that includes compliance information and additional guidance and support.

The ministry will provide support to stakeholders to ensure the best management practices guide along with any relevant ministry legislation is being interpreted and applied appropriately. This includes the potential for ministry staff to conduct site visits at construction sites where excess soil is being generated.

9. When will a broader policy framework for soil management be developed?

We will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected.

In the meantime, the ministry encourages the use of the Best Management Practices guide for anyone involved in managing excess soil.

Any future policy development will build on the best management practices, what we heard when we consulted on it, and ongoing engagement with the public, stakeholders and other ministries.

10. Who enforces soil management?

In most cases, municipalities and conservation authorities oversee soil management by issuing permits and approvals to assist those managing excess soil in a manner consistent with the rules of the jurisdiction.

They also enforce compliance with the permits and approvals they issue.

11. How will the new Best Management Practices for soil management be enforced?

The Best Management Practices document sets out the ministry's expectations for managing excess soil generated from large-scale projects.

Where environmental concerns are identified at a site, the ministry may assess all soil management activities. This includes those occurring at the excavation site, during transportation or at sites where the soil is received. The ministry may take action as required.

Anyone handling excess soil must meet all current provincial laws as they apply, as well as any applicable bylaws and permitting requirements established by local municipalities and/or conservation authorities.

These best practices are intended to complement existing approvals under

provincial legislation and municipal bylaws.

Municipalities and Conservation Authorities are encouraged to consider the concepts set out in the guide when issuing permits or licenses, or establishing soil management by-laws or policies, and to make use of them as appropriate. Municipalities and Conservation Authorities may also initiate their own compliance activities based on their jurisdictional authority.

12. Who is responsible during the planning stage of a project?

Municipalities have the authority to determine where soil can be used in their jurisdictions.

Soil conservation and management should be integrated into all aspects of the planning and development process, from the initial concept through permitting, construction, transportation and reuse of excess soil.

The ministry encourages municipalities, conservation authorities and other regulatory bodies to address soil management activities from a planning perspective to complement these best management practices.

13. Why has the ministry accepted to undertake a review of the need for additional policy related to the management of compromised soil?

The ministry has developed the Best Management Practices guide to encourage a consistent approach to the management of excess soil. The ministry will be reviewing the need for further policy for managing soil in ways that ensure public health and the environment are protected. This review will build on the Best Practices, assessing the need for additional policy to support implementation of soil management in a manner consistent with the recommendations set out in the Best Practices guide.

14. Will additional guidance be available?

The ministry is coordinating an outreach and implementation plan that will include additional support and guidance for anyone involved in or responsible for managing excess soil.

The ministry is also supporting industry as they lead the development of complementary industry codes of practice for their sector.

The ministry will also be seeking opportunities to work with stakeholders to develop and promote the best management practices.

15. Does the Best Management Practices Guide consider invasive species?

The guide highlights that considerations should be given to controlling the introduction and spread of invasive species during all excess soil management activities. Please refer to the Ontario Invasive Species Strategy Plan 2012 and the Ontario Invading Species Awareness Program developed by the Ministry of Natural Resources and Forestry for more information.

16. Does the Best Management Practices Guide include compost?

Compost does not meet the definition of soil as described in the guide and is not intended to be addressed by these best management practices. The ministry has developed Compost Quality Standards and a Guideline for the Production of Compost in Ontario that includes best management practices.

17. When will the ministry address other soil management issues, including road building, pits and quarries?

These specific issues require longer-term consultation and policy development involving other ministries and jurisdictions.

For example, the Ministry of Natural Resources regulates quarries and gravel pits in Ontario. The ministry provides input to the Ministry of Natural Resources on how these materials can be managed on a case-by-case basis. Soil management activities at road construction projects may involve both the municipalities and the Ministry of Transportation. These activities will also be reviewed by the ministry on a case-by-case basis.

18. Why isn't Ontario adopting a soil mapping and soil reuse strategy to promote soil banking like the Netherlands?

The Netherlands has a regulatory framework for soil management which provides clear rules for where excess soil can be placed. The country is divided or mapped out into "soil zones" that allow soil to be moved within its zone so that the same types of soil remain within their specified zones. The Netherlands is not comparable to Ontario with respect to size or geography or the history which lead to their comprehensive soil policy.

The ministry wants to see excess soil put to beneficial uses where possible and not end up in landfill sites. That is why we are providing the Best Management Practices guide to stakeholders.

Soil banking is considered an option for soil management. Considerations for soil mapping may be discussed as part of a broader policy review related to soil management.

19. Does the proposed Best Management Practices document provide standards for receiving soil?

The Best Management Practices provide guidance for Qualified Persons to determine whether the excess soil is suitable for reuse or disposal. This is based on a site-specific evaluation of the receiving site by the Qualified Person to determine what concentration of contaminants is appropriate.

20. How will the Best Management Practices help landowners receiving excess soil such as municipalities?

The Best Management Practices guide requires a Qualified Person to oversee excess soil management activities at the source site. This will help ensure that soil going to receiving sites is of acceptable quality and will not cause an adverse effect in the local community.

Municipalities can use the Best Management Practices for their procurement activities. This includes road building and issuing approvals or permits.

21. How is "soil" defined in this guidance? Does this apply to asphalt and concrete or other aggregate products?

Soil is defined as naturally-occurring mineral particles and material resulting from the natural breakdown of rock or organic matter. The soil particles are smaller than two millimeters, or pass the U.S. Number 10 sieve.

The guide is not intended to apply to other materials such as engineered fill products, asphalt, concrete and reused or recycled aggregate products.

22. Why doesn't the ministry just refer to the existing standards? What is the difference?

Generic brownfield standards were developed using technical assumptions in order to meet specific objectives, for the filing of a Record of Site Condition.

Ontario's brownfield standards are not intended to address overall soil management activities in Ontario. They were created using scientific models and a policy framework designed for the clean-up of brownfields. There are several factors used in the development of these standards that do not apply to the management of excess soil. These standards may not be appropriate for overall soil management and would require a site specific evaluation to determine their appropriateness.

The best practices provide guidance to Qualified Persons on the considerations that must be taken into account when applying these brownfields standards to overall soil management activities, such as assessing the acceptability of the use of the standards at sites receiving excess soil.

23. How much time/effort is needed to develop soil management standards?

Developing new standards requires clear policy objectives and principles, in addition to the time required to undertake a sound scientific process. The development of standards also requires time to consult extensively with stakeholders.

The ministry will examine options for the development of standards as part of the review for the need for further policy for managing soil in ways that ensure public health and the environment are protected.

In the meantime, the ministry has developed the best practices guide for managing excess soil on large-scale projects to promote a consistent approach by site owners, developers and contractors.

24. Why doesn't the Best Management Practices make specific reference to the

assessment of soil types at receiving sites to see if they are appropriate for reuse?

The Best Management Practices guide advises that all assessment work should be conducted by a Qualified Person.

Qualified Persons have the expertise to determine when soil brought to the property is appropriate for reuse and does cause an adverse effect. The Qualified Person's assessment would also examine the compatibility of soil types as part of their standard assessment work.

The Qualified Person may need to consult with other experts to decide on the intended beneficial reuse of soil, such as an agrologist if soil is to be used for an agricultural purpose.

25. Why doesn't the guidance in the best practices reflect Ontario's brownfields regulation?

Ontario's brownfields legislation applies to sites that are being redeveloped to a more sensitive property use, such as a former industrial site being redeveloped for a new residential subdivision.

The regulatory framework and standards under the brownfields legislation were developed to ensure the site is appropriate for the intended new property use, and was not intended to apply to overall soil management activities.

Sites that are accepting excess soil and are planning to submit a Record of Site Condition for filing under the brownfields legislation must follow the soil management provisions within that legislation.

The best management practices are not legal requirements and do not apply to anything related to the filing of a Record of Site Condition.

26. Are there areas in the ministry where placing soil should be banned (e.g. Oak Ridges Moraine)?

The ministry encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.

Placing large amounts of excess soil should be done knowing where the soil came from, the quality of that soil and whether that quality of soil is appropriate for the location at which it is being placed. There should be no adverse effect on the site where the soil is placed.

The ministry will continue to work with stakeholders to advise on managing excess soil, including near environmentally sensitive areas. Decisions on where excess soil can be reused will be made on a case-by-case basis.

27. Why doesn't the ministry stipulate where soil can go?

The placement of excess soil may be subject to a number of restrictions imposed by the

ministry, a municipality, conservation authority or as a result of contractual arrangements.

Depending on the circumstances, the province's waste management provisions or regulations for the redevelopment of brownfield sites will apply.

Municipal by-laws may further restrict where and what quality of soil is placed at a property, and Conservation Authorities further regulate site alteration within their regulated areas. It is also appropriate for the receiving property owner to understand the quality of soil received and to ensure that no adverse effect results.

The ministry encourages the reuse of excess soil in a sustainable manner. The ministry has developed a Best Management Practices guide to help those who generate or receive soil decide on how best to manage that excess soil.

28. Will the government allow there to be a certain level of contamination on clean properties as part of a soil management policy?

The Best Management Practices guide advises that assessment work should be conducted for each receiving site by a Qualified Person.

Qualified Persons have the expertise to determine that the excess soil brought to the property is appropriate for reuse and will not cause an adverse effect to the property.

The Qualified Person's assessment would include soil quality and compatibility of soil type as part of their standard assessment work.

In general, those managing excess soil should seek out sites that are of compatible land-use types. Where possible, those managing excess soil should avoid the introduction of new contaminants at the receiving site and take measures to avoid increasing the concentration of an existing contaminant at a receiving site.

29. Provinces like Quebec mandate soil treatment prior to reuse. Why doesn't Ontario do the same?

The ministry encourages soil treatment if necessary to enable excess soil to be reused. The ministry will continue to promote innovative approaches to soil treatment.

30. Why doesn't the ministry ensure that municipalities use a consistent approach?

While the ministry is not developing a model by-law, the best practices are intended to complement municipal by-laws, such as site alteration, noise and traffic by-laws.

Municipalities are encouraged to consider the concepts set out in the best practices when issuing permits or licenses, or establishing by-laws or policies for soil management, and to make use of them as appropriate.

31. What's wrong with sending soil to landfill? Can't it be used as cover?

Yes – some excess soil can be used by landfill sites as cover material. The ministry is encouraging the reuse of excess soil to keep soil that can be reused from taking up space in landfill sites.

The ministry encourages the reuse of excess soil for beneficial uses as long as it can be done in a way that protects human health and the environment.

32. What's wrong with accepting a small amount of soil on my farm property if it does not cause an adverse effect?

The ministry encourages the reuse of excess soil provided that its reuse does not cause an adverse effect or impair water quality. Placing a small amount of soil on farm property is acceptable as long as the quality is appropriate and it does not cause an adverse effect.

Property owners accepting soil should consult their local municipality to determine if a permit is required.

Property owners may also consult qualified professionals to help determine the soil quality is appropriate for their property.

33. What are the next steps?

The Best Management Practices guide is available through the ministry's website. The ministry will support the guide with an implementation plan, and will work with municipalities, developers, industry associations and Qualified Persons to provide additional guidance and oversight.

In addition, the ministry will be reviewing the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

Qualified Persons

34.What is a "Qualified Person"?

Qualified Persons are defined under the ministry's brownfields legislation and are generally professional engineers and geoscientists. They are licensed under the *Professional Engineers Act*, or are members of the Association of Professional Geoscientists of Ontario.

A Qualified Person who is hired to make decisions for excess soil management should be someone who can exercise professional judgment based on their experience. This is so that they can advise on appropriate reuse options for the excavated or excess soil, based on the appropriate soil analysis and characterization.

35. What criteria are Qualified Persons using?

Qualified Persons use their professional expertise and judgment to determine the most appropriate criteria for a site on a case-by-case basis.

36. Can a Qualified Person assess a property they own or are engaged in?

Qualified Persons should not assess properties that they or their employers have a direct or indirect interest in, as this would be a conflict of interest.

37. Will the cost of ensuring that soil is tested and Qualified Persons are involved deter proponents of development projects from building in Ontario and cost Ontario jobs?

The initial short-term costs for work done at the source site may be balanced against the longer term reduced costs for trucking and shipping excess soil to landfill, especially if the excess soil can be temporarily stored or reused for beneficial purposes.

By following the best practices guide, the development community will also avoid the risk of incurring costs to address improper soil management activities.

38. What types of soil does the Best Management Practices guide address? Who determines that?

It is the responsibility of all parties who excavate, transport, receive or store excess soil to ensure that the excess soil is being managed in an environmentally sound manner in accordance with all regulatory requirements.

The guidance sets out the ministry's expectations for all those managing excess soil to support safe and sustainable soil management and reuse while promoting consistency across the province.

Fill Sites in Ontario

39. Doesn't this guidance actually encourage contamination of commercial fill sites receiving excess soil?

Commercial fill sites are permitted through local municipalities or conservation authorities.

It is the responsibility of all parties who excavate, transport, receive or store excess soil to ensure that the excess soil is being managed in an environmentally sound manner in accordance with all regulatory requirements.

The guidance sets out the ministry's expectations for all those managing excess soil to support safe and sustainable soil management and reuse while promoting consistency across the province. This includes best practices that can be applied to a commercial fill site.

Municipalities and Conservation Authorities are encouraged to incorporate the best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

40. Why isn't the ministry taking stronger action in regulating fill sites?

Many municipalities and conservation authorities have permitting requirements for fill

sites. Municipalities and Conservation Authorities are encouraged to incorporate the best practices when issuing permits and approvals to assist those managing excess soil in a consistent manner.

If environmental concerns are identified at a site, the ministry may assess all activities related to excess soil management, including those occurring at a fill site and may take appropriate actions when necessary under the ministry's legislative mandate. This may include issuing orders.

41. Some municipalities are including the ministry's soil standards in their fill permits, such as Table 1 and Table 2, but it's not consistent. Why doesn't the ministry just tell municipalities what standards to use?

Some municipalities refer to Table 1 and Table 2 from the ministry's brownfields standards in their fill permits. However, the brownfields standards are not intended to address overall soil management activities in Ontario.

Rather than focus solely on standards, the ministry has developed a Best Management Practices Guide. The guide details the ministry's expectations for municipalities and others who manage excess soil. This will help ensure a consistent approach to managing large-scale construction projects. It will also encourage reuse of excess soil for beneficial purposes while providing flexibility at the local level.

The ministry will also be reviewing the need for further policy for managing excess soil in ways that ensure public health and the environment are protected.

42. The Ministry of Natural Resources requires only Table 1 soils to be used to rehabilitate former pits and quarries. Why doesn't the Ministry of the Environment and Climate Change use Table 1 standards in the Best Management Practices?

Table 1 is part of the Ministry of the Environment and Climate Change's brownfields legislation. It represents the background concentrations of metals and other substances in typical Ontario soil not affected by industry or other sources of contamination. It is intended to be applied to brownfields sites planned for redevelopment.

The Ministry of Natural Resources applies this standard as part of its legislation and policies used to rehabilitate former pits and quarries. It would be best to contact the Ministry of Natural Resources for further information on their specific legislation and policies.

The ministry supports the beneficial reuse of excess soil to help prevent the unnecessary disposal of excess soil in landfills. The use of only Table 1 for all soil management activities may limit the amount of excess soil that can be reused in an environmentally sustainable way. Discussions like this will be part of the broader review of soil management policy options.

43. Will the ministry place a moratorium on fill sites while consulting on the proposed guidance?

No. We have developed the Best Management Practices to clarify the rules and

requirements related to key excess soil management activities in Ontario.

When the ministry receives information about a site that may be causing an environmental impact, the ministry will follow up to make sure the environment is protected.

44. How can residents living near fill sites be sure their drinking water is safe?

When the ministry receives information about a site that may be causing an environmental impact, it will follow up to make sure the environment is protected. If you have concerns, contact your local ministry office.

45. What is being done to ensure soil coming into a commercial fill site is free of contaminants?

The agency that grants the permit to the site operator (such as the municipality or conservation authority) can hire a Qualified Person to determine what soil is suitable for the site.

The ministry will take action as required to make sure fill operations do not have the potential to cause an adverse effect.

46. What happens to soil that exceeds the brownfields standards?

The brownfield standards are not intended to address overall soil management activities. For example, the brownfield standards are based on assumed contaminant volumes and loadings and do not account for wide variance in soil volume and contaminant loadings which may occur with general soil management.

When considering the applicability of the brownfields standards for use at a particular site, it is important to note that elevated concentrations of contaminants when compared to the standards do not necessary imply that:

- there is a risk to human health or the environment;
- remediation is required; or
- excess soil should be considered a waste.

An elevated concentration when compared to the standards may suggest that additional site-specific studies, evaluations or assessments are warranted. These additional site-specific studies, evaluations or assessments should, at a minimum, be done in accordance with the best practices.

47. What powers do municipalities have to address soil management?

Municipalities are accountable and responsible governments and have the authority to regulate fill based on local needs.

The *Municipal Act*, 2001 provides municipalities with authority to prohibit or regulate the

placing or dumping of fill, removal of topsoil, alteration of the grade of the land and to establish fees and charges for its services and activities. Municipalities are using this authority to require studies, permits and conditions.

The *Planning Act* provides the legislative framework for municipalities to regulate the uses of land, buildings and structures. The *Planning Act* also provides municipalities with the authority to require that soil management reports be included, in certain circumstances, as part of the information and material to support an application when planning approvals are sought in respect to a development proposal.

48. What is an adverse effect?

As defined in the *Environmental Protection Act,* adverse effect refers to:

- Impairment of the quality of the natural environment for any use that can be made of it;
- injury or damage to property or to plant or animal life;
- harm or material discomfort to any person;
- an adverse effect on the health of any person;
- impairment of the safety of any person;
- rendering any property or plant or animal life unfit for human use;
- loss of enjoyment of normal use of property, and
- interference with the normal conduct of business.

49. Who will provide oversight for temporary soil storage sites?

In most cases, municipalities and Conservation Authorities would oversee Temporary Soil Storage Sites by issuing permits and approvals to assist those managing excess soil in a manner consistent with the rules of the jurisdiction.

They also enforce compliance with the permits and approvals they issue.

50. Is the government considering the development of a model by-law?

While a model by-law is not being considered at this time, municipalities are encouraged to consider the concepts set out in the guide when establishing soil management by-laws where appropriate. The ministry will also provide support to any municipality seeking to develop a by-law based on the concepts found in the guide.

51. How will the ministry ensure that anyone who establishes Temporary Soil Storage Sites won't abandon these sites and leave potentially contaminated soil piles behind?

Temporary soil storage sites must have the appropriate approvals issued by the municipality or the conservation authority. This includes ensuring the site is appropriately zoned for this use.

If environmental concerns are identified at a site, the ministry may assess all activities related to soil management, including those occurring at a commercial fill site. The ministry may take appropriate action as necessary, including issuing orders.

Inspection Follow-up Email - Information Request

Straberger, Kyle (MOECC) <Kyle.Straberger@ontario.ca>

Fri 2018-03-16 2:30 PM

To: David Veinot <dveinot@orgaworld.ca>; Brian Begg <bbegg@orgaworld.ca>; Andre Boucher <aboucher@orgaworld.ca>;

Hi Andre, David and Brian,

Thank you for your time and cooperation during the ministry's inspection of the Orgaworld Ottawa Facility. As discussed during the inspection, please provide the following information as part of the inspection:

1 - Training Protocol for employees including re-training
2 - 2017 Mass Balance
3 - Sample results for the 2017 operating year including off-site discharge
4 - Operation and Maintenance Manual records:
  - 4a Copy of the Operation and Maintenance procedures for the bioscrubber and biofilters
  - 4b Inspection, repair and maintenance records for each for the following dates (date includes daily, weekly, monthly, quarterly)
    - January 18th, 2017, March 15th, May 1st, July 3rd, September 29th, November 30th
  - 4c Process data for bioscubber and biofilters for the dates outlined above
5 - Confirm copy of original ESDM report that accompanied ECA No. 1631-A2ELCQ
6 - Confirm copy of original Acoustic Assessment report that accompanied ECA No. 1631-A2ELCQ
7 - Complaint protocol for receiving and responding to complaints from the public (ECA No. 1631-A2ELCQ)
- Sampling results for the 2017 operating year, including off-site discharge, from the industrial sewage works

Let me know you if you have any questions.

Thanks,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

Please consider the environment before printing this email.

8.0 COMPLAINT RESPONSE PROTOCOL

If complaints are received in relation to the Site or Site operations, information pertaining to the complaint will be recorded and a response protocol will be initiated in three steps as per the C of A (Air) as follows:

Step 1: Record of Complaint

The information collected regarding the complaint will be:

- Contact information of the complainant
- Time, date, and location of the complaint
- Complainant's identification of the characteristics of the odour and any information indicating relative strength compared to other events
- Operational activities during the time of the complaint
- Wind direction, weather conditions, and temperature

To gather additional information regarding the characteristics of the odour source, the Site Manager will ask for permission of the complainant to send Site personnel to the location of the complaint to provide additional characterization of the odour source. This is a component of the Complaints Response Protocol developed for two reasons: to validate the odour as originating from the Facility and, if this validation is provided, to assess the likely source of the odour from the Facility. This will facilitate identification of Facility components that are potentially responsible for the odour emission. Complainants will also be invited to visit the Site to allow them to see and smell the Facility's operations and more accurately provide feedback.

When the odour issue is resolved, the Site Manager will fully investigate the situation and determine procedures to be enacted to prevent reoccurrence. All newly implemented procedures will be fully communicated to Site employees.

Step 2: Investigation and Handling of Complaint

The following outlines the procedure for notifying the MOE of odour and noise-related issues. All events in relation to odour and noise that are beyond the normal operating conditions are recorded. These records are available to the MOE upon request. The MOE District Manager will be immediately notified in case of a situation that could potentially lead to significant increases in odour and noise generated.

In case of process discrepancies, the following procedures are adhered to:

Extent of Process Aberration	*Notifying Procedure*
Aberrations which are: not influencing processing ability; and do not cause significant increase of odour and noise generated.	Event and responsive actions recorded in Site logbook or electronic file Immediately informed are: Facility Site Manager
Aberrations which may: potentially lead to significant increase of odour and noise generation	Event and responsive actions recorded in Site logbook or electronic file Immediately informed are: Facility Site Manager Senior Operations Manager MOE District Manager

Each complaint will be recorded using a computerized tracking system and will include the following information:

- Name, address, and telephone number
- Time and date of complaint
- Waste management activities undertaken at time of complaint
- Details of complaint
- Actions taken to remediate the cause of complaint
- Proposed actions to be taken to prevent reoccurrence in future

A record of all activities taken to mitigate the odour source will be recorded. All procedures developed to prevent reoccurrence will also be recorded.

The MOE Ottawa Regional Office will be notified of a complaint made by a member of the public. All appropriate steps will be taken to eliminate the cause of the complaint and to prevent reoccurrence.

As per C of A (Waste Disposal Site) requirements, a designated representative will be available to receive complaints 24 hours per day, 7 days per week. Information regarding this hotline will be displayed on signage at the entrance to the Facility. The MOE's Spill Action Centre will be notified immediately of all complaints received at the Site. Upon successful resolution of the complaint OCL will within 3 business days provide, a written

report to the District Manager identifying the source of complaint and details of what action was taken to rectify problem and prevent recurrence.

Step 3: Suspension of Operation

OCL acting on orders from the District Manager will suspend the receipt of organic wastes and/or suspend operations of the Facility in conjunction with the Emergency Response and Contingency Plan should the District Manager deem this action to be required to satisfy an occurrence of valid and substantiated odour complaints.

Part 11 Barrel 8

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date Wednesday Jan 18 2017

Maintenance Rep. Darryl

TASKS:

- Picked up roller That Fell off Screening Line and rebuild it went to RS for bearings
- Rip apart 3 brushes from screening Line
- Boosted 522oF with Brad & Dan
- Cleaned up work area open / close Door #3 X2

Regular Hours	Overtime Hours	Daily Total
10 — 6:30pm		Weekly Total

004608

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date March 15 2017

Maintenance Rep. Darryl

TASKS:

- had Morning Meeting
- check T3 prokp #1
- switch Ducting pump with Process pump

Regular Hours	Overtime Hours	Daily Total
		Weekly Total

10am 6:45pm

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date MARCH 15 2017

Maintenance Rep. WILLIE MCLACHLAN

TASKS:

PLOW SNOW
CLEAN PROCESS FILTER TWICE
SHOVEL DOORS
RESEAL DRAIN PLUG ON PUMP ON BIOSCRUBBER PUMP.

Regular Hours	Overtime Hours	Daily Total
6:00AM - 2:30PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date MAY 1 2017

Maintenance Rep. WILLIE MCLACHLAN

TASKS:

- DAILY INSPECTION SHEET
- WORK ON SCREENING

Regular Hours	Overtime Hours	Daily Total
6:00AM TO 18:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date May 1rst 2017

Maintenance Rep. Darryl

TASKS:

- Worked on peterson with Tim From capital controle and Denis to set up Peterson

Regular Hours	Overtime Hours	Daily Total
		Weekly Total

10 am 6:30pm

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date July 3 2017

Maintenance Rep. Willie

TASKS:

- Daily inspection sheet
- Fix 220 wiper
- work with mechanic on 644 loader
- Trouble shoot 744 loader
- Receiving

Regular Hours	Overtime Hours	Daily Total
6:00AM-6:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date SEPT 29 2017

Maintenance Rep. WILLIE

TASKS:

- DAILY INSPECTION SHEET
- HELP WALK DOPPSTADT FOR CLEANING
- SAFETY MEETING
- FUEL DOPPSTADT AND REFUEL JOCKEY TANK
- WORK WITH BRIAN & MECHANIC ON 220 LOADER 972 LOADER AND 966K RENTAL LOADER.

Regular Hours	Overtime Hours	Daily Total
6:00AM - 5:00PM		
		Weekly Total

Orgaworld
Part of Shanks Group

Maintenance Daily Sheet

Date NOV 30 2017

Maintenance Rep. WILLIE

TASKS:

- WORKED IN TECH HALL
- FIX PROBE IN TUNNEL #1
- WORK IN RECEIVING
- SAFETY MEETING

Regular Hours	Overtime Hours	Daily Total
8:30AM - 4:30PM		
		Weekly Total

Part 4 Bottle 2

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Jan 18 / 17 TIME : 730 AM

NAME : BBegg SIGNED : [signature]

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: _____ Ducks _____ Geese	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : March 15/17 TIME : 1030 AM

NAME : Jessica SIGNED : [signature]

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 **Ducks** 0 **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : May 1 / 17 TIME : 845 AM

NAME : Jessica SIGNED : Jessica Hall

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 2 **Ducks** 1 **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : July 3/17 TIME : 630 AM

NAME : Jessica SIGNED : Jessica Black

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 Ducks 0 Geese	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Sept 30 TIME : 7:45

NAME : BB SIGNED : BBegg

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 4 **Ducks** _____ **Geese**	✓	

List below actions taken to correct any deficiencies.
(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Orgaworld
Part of Shanks Group

DAILY SITE INSPECTION RECORD

DATE : Nov. 30/17 TIME : 7:30 AM

NAME : Jessica SIGNED : Jessica Black

INSPECTION ITEM	OK	Not OK
1. Parking lot area for evidence of run-off from the facility.	✓	
2. Loading/unloading area of the leaf & yard waste storage pad.	✓	
3. Air pollution control equipment in operation.	✓	
4. Building secure with all doors closed where required.	✓	
5. Security fence and property line secure.	✓	
6. Odour detected at property line.	✓	
7. Presence of leaks and drips from waste delivery trucks outside building.	✓	
8. Presence of excessive fugitive dust emissions from the on-site roads or compost.	✓	
9. On and off-site litter.	✓	
10. Presence of vector and vermin.	✓	
11. Pond.	✓	
12. Pond drain/culvert (flow).	✓	
13. Presence of birds on-site and near/at the storm water pond. Approximate number: 0 Ducks 0 Geese	✓	

List below actions taken to correct any deficiencies.

(NOTE – an item assigned a "Not OK" check-mark above shall be entered below with an action:

ITEM #	CORRECTIVE ACTION TAKEN	DATE	TIME

Continue on other side of inspection sheet if necessary.

Pond 4 Build 8

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Jan. 17 / 17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	456.3	✓	No
Sulphuric Acid	291.4	✓	No
Recirculation	Full	✓	No
Bleeder	80 Gal	✓	No

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	No
Sigma Acid	✓	✓	No

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	✓		No
Scrubber Body	✓		No
Floor Drip Trays	✓		No
Support Structure	✓		No

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	No
Level Sensors	✓	✓	No
Pressure Transmitter	✓	✓	No

VALVES & PIPE

	Function	Condition	Leaks
Ducting Dischage	✓	✓	No
Bleeder Down Tube	✓	✓	No
Strainer & Pump	✓	✓	No
Acid Lines	✓	✓	No

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	59803	m3/h
Static Pressure	9.1	mb
Negative Pressure	-37.5	Pa
Pressure Drop	N/A	
Fan Speed	70	%
Incoming Air Temp	31.8	°C
Bio Mass Temp	33.9	°C
Average Temp	33.2	°C
Air Inlet Humidity	99.6	%
Water Pressure	0	bar
Spraying Frequency	5 min	16 hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	Loud
Fan Bearing Temp	32.3 /	26.7°C
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	40396	m3/h
Static Pressure	8.6	mb
Negative Pressure	-26.2	Pa
Pressure Drop	N/A	
Fan Speed	72	%
Incoming Air Temp	31.8	°C
Bio Mass Temp	35.2	°C
Average Temp	34.8	°C
Air Inlet Humidity	97.1	%
Water Pressure	0	bar
Spraying Frequency	5 min	16 hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	24.4 /	29.4 °C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	No	General Condition	✓

004622

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	clear
Water Odour	Slight odour

	Value	Normal
Water Level	67.1cm	✓
Water PH	N/A	✓
Air Flow	100 828 m³/h	✓
Inlet Air Temp	28.1°C	✓
Inlet Air Humidity	100.1.	✓
Scrubber Pressure	1.6 bar	✓
Scrubber O2	20.7.1.	✓
Manifold Pressure	1.6 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	Needs Replacement

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	✓ Belt Squeak
Fan Bearing Temp	44.7 / 56.0°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	32.0°C
Test Ports Operational	✓

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	44.4 / 51.9°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	32.0°C
Test Ports Operational	✓

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: March 14 / 17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	199.7cm	✓	No
Sulphuric Acid	292 4cm	✓	"
Recirculation	4 14	✓	Yes
Bleeder	80 gal	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	No
Sigma Acid	✓	✓	No

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓	=	No
Bio Filter Plenum	X	=	Yes
Scrubber Body	X ✓	=	Yes
Floor Drip Trays	✓	=	No
Support Structure	✓	=	No

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	No
Level Sensors	✓	✓	No
Pressure Transmitter	✓	✓	No

VALVES & PIPE

	Function	Condition	Leaks
Ducting Dischage	✓	✓	No
Bleeder Down Tube	✓	✓	No
Strainer & Pump	✓	✓	No
Acid Lines	✓	✓	No

Comments: Air leaking from connection between ductwork and ammonia scrubber (bio filter side); Water leaking from inspection door of scrubber body

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	74870	m3/h
Static Pressure	18.5	mb
Negative Pressure	-31.7	Pa
Pressure Drop	N/A	
Fan Speed	98%	
Incoming Air Temp	25.0°C	
Bio Mass Temp	27.1°C	
Average Temp	26.4°C	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5min 16hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	LOUD MOTOR
Fan Bearing Temp	25.1°C	132.6°C
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	54294	m3/h
Static Pressure	19.1 mb	
Negative Pressure	2.1	Pa
Pressure Drop	N/A	
Fan Speed	98%	
Incoming Air Temp	25.1°C	
Bio Mass Temp	26.8°C	
Average Temp	26.6°C	
Air Inlet Humidity	~~100%~~	98.2%
Water Pressure	0 bar	
Spraying Frequency	5min 16hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	21.0°C	136.5°C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	No	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	49.0 cm	✓
Water PH	N/A	✓
Air Flow	126 174 m³/h	✓
Inlet Air Temp	21.9°C	✓
Inlet Air Humidity	100%	✓
Scrubber Pressure	1.9 bar	✓
Scrubber O2	21.1%	✓
Manifold Pressure	1.9 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	Needs replacement.

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	Okay, belt squeak
Fan Bearing Temp	45.3°C / 36.4°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	24.2°C
Test Ports Operational	✓

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	36.1°C / 62.5°C
Stack Condition	✓
Stack Base Condition	✓
Stack Temp.	24.2°C
Test Ports Operational	

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: MAY 4 / 17 Maintenance Person: JESSICA

AMMONIA SCRUBBER

Scrubber Status:	ON ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	217.4	✓	No
Sulphuric Acid	295.6	✓	"
Recirculation	Full	✓	"
Bleeder	60 Gal	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	No
Sigma Acid	✓	✓	No

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	OK		YES
Scrubber Body	✓		No
Floor Drip Trays	✓		No
Support Structure	✓		No

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	No
Level Sensors	✓	✓	No
Pressure Transmitter	✓	✓	No

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	No
Bleeder Down Tube	✓	✓	No
Strainer & Pump	✓	✓	No
Acid Lines	✓	✓	No

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	66235	m³/h
Static Pressure	11.9	mb
Negative Pressure	-23	Pa
Pressure Drop	N/A	
Fan Speed	64	-1-
Incoming Air Temp	32.9	°C
Bio Mass Temp	34.1	°C
Average Temp	32.0	°C
Air Inlet Humidity	95.100	-1-
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 6hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.7	/ 39.1 °C
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	36665	m³/h
Static Pressure	10.7	mb
Negative Pressure	-11	Pa
Pressure Drop	N/A	
Fan Speed	65	-1-
Incoming Air Temp	36.2	°C
Bio Mass Temp	34.9	°C
Average Temp	32.2	°C
Air Inlet Humidity	98.1	-1-
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 6hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	29.1°C	/ 34.2°C
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	43.9 cm	✓
Water PH	N/A	✓
Air Flow	123364 m³/h	✓
Inlet Air Temp	32.3°C	✓
Inlet Air Humidity	100.1.	✓
Scrubber Pressure	1.5 bar	✓
Scrubber O2	19.6%	✓
Manifold Pressure	1.5 bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	GOOD
Filter 4.3	"
Check Valve 4.2	"
Check Valve 4.3	"
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	GOOD
Pump # 3 (4.3)	"
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	34.3/27.3°C
Stack Condition	GOOD
Stack Base Condition	GOOD
Stack Temp.	33.8°C
Test Ports Operational	YES x2

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	27.4/33.7°C

COMMENTS

first leaking to Bio filter May 9

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: July 3/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	OK ✓	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	330-60cm	✓	No
Sulphuric Acid	195cm	✓	"
Recirculation	213	✓	"
Bleeder	120 GAL	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	✓
Arbo Strainer	✓	✓	✓
Sigma Acid	✓	✓	✓

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	OK		YES
Scrubber Body	OK		NO
Floor Drip Trays	✓		NO
Support Structure	✓		NO

Comments:

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	✓
Flow Switch	✓	✓	✓
Level Sensors	✓	✓	✓
Pressure Transmitter	✓	✓	✓

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	✓
Bleeder Down Tube	✓	✓	✓
Strainer & Pump	✓	✓	✓
Acid Lines	✓	✓	✓

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	42 150	
Static Pressure	13 mb	
Negative Pressure	-21	
Pressure Drop	N/A	
Fan Speed	80	
Incoming Air Temp	39	
Bio Mass Temp	42	
Average Temp	419	
Air Inlet Humidity	98-1.	
Water Pressure	0 bar	
Spraying Frequency	5min/1hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.1 / 37.2	
Humidity Tube Level	✓	
Belimo Valves		

BIO FILTER #2

	Value	Condition / Comment
Air Flow	51290	
Static Pressure	14 mb	
Negative Pressure	-12	
Pressure Drop	N/A	
Fan Speed	80	
Incoming Air Temp	39	
Bio Mass Temp	41	
Average Temp	42.2	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5min/1hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition		
Fan Bearing Temp	✓	
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	37.2	✓
Water PH	N/A	✓
Air Flow	9420	✓
Inlet Air Temp	41	✓
Inlet Air Humidity	100	✓
Scrubber Pressure	1.16 Bar	LOW
Scrubber O2	19.1	✓
Manifold Pressure	1.16 Bar	LOW

MECHANICAL

	Valve Setting
Sprayer # 1	CLOSED
Sprayer # 2	1/2
Sprayer # 3	1/2
Sprayer # 4	1/2

	Condition
Filter 4.2	✓
Filter 4.3	✓
Check Valve 4.2	✓
Check Valve 4.3	✓
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	✓
Pump # 3 (4.3)	✓
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	41.4 / 86.2

Stack Temp.	40
Test Ports Operational	YES

STACK #2

	Condition / Value / Comment
Fan Condition	✓
Fan Bearing Temp	39.4 / 39.2

Stack Condition	✓
Stack Base Condition	✓

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Sept. 29/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	ON	OFF

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	328.6	✓	No
Sulphuric Acid	104.9	✓	"
Recirculation	4/4	✓	"
Bleeder	Empty	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	✓
Arbo Strainer	✓	✓	✓
Sigma Acid	✓	✓	✓

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		✓ No
Bio Filter Plenum	✓		✓ "
Scrubber Body	✓		✓ "
Floor Drip Trays	✓		"
Support Structure	✓		"

Comments:

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	✓
Flow Switch	✓	✓	✓
Level Sensors	✓	✓	✓
Pressure Transmitter	✓	✓	✓

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	✓
Bleeder Down Tube	✓	✓	✓
Strainer & Pump	✓	✓	✓
Acid Lines	✓	✓	✓

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	65177	
Static Pressure	-7.3	
Negative Pressure	-28.3	
Pressure Drop	N/A	
Fan Speed	75.1.	
Incoming Air Temp	37.0°C	
Bio Mass Temp	36.0°C	
Average Temp	36.1°C	
Air Inlet Humidity	100.1.	
Water Pressure	0 bar	
Spraying Frequency	5 min/6hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	42.5/41.0°C	
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	43520	
Static Pressure	9.7	
Negative Pressure	-27.8	
Pressure Drop	N/A	
Fan Speed	75.1.	
Incoming Air Temp	33.9°C	
Bio Mass Temp	36.6°C	
Average Temp	34.9°C	
Air Inlet Humidity	98.41.	
Water Pressure	4.8 bar	
Spraying Frequency	5 min/6hrs	
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	32.4/33.0°C	
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	Clear
Water Odour	Slight odour

	Value	Normal
Water Level	50.0	✓
Water PH	N/A	✓
Air Flow	108/166 m³/h	✓
Inlet Air Temp	30.4°C	✓
Inlet Air Humidity	100%	✓
Scrubber Pressure	1.1 bar	low
Scrubber O2	19.9 %	✓
Manifold Pressure	1.1 bar	LOW

MECHANICAL

	Valve Setting
Sprayer # 1	1/8
Sprayer # 2	1/8
Sprayer # 3	1/8
Sprayer # 4	1/8

	Condition
Filter 4.2	GOOD
Filter 4.3	GOOD
Check Valve 4.2	GOOD
Check Valve 4.3	GOOD
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	IN SERVICE
Pump # 3 (4.3)	OK
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	34.9/32.0°C

Stack Temp.	32.8°C
Test Ports Operational	YES - INSIDE CLOSED

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	29.1/35.2

Stack Condition	GOOD
Stack Base Condition	GOOD

COMMENTS

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

Date: Nov. 30/17 Maintenance Person: Jessica

AMMONIA SCRUBBER

Scrubber Status:	✓	Off

TANKS

	Level	Condition	Leaks
Ammonia Sulfate	327.4	✓	No
Sulphuric Acid	106.0	✓	"
Recirculation	Low	✓	"
Bleeder	EMPTY	✓	"

PUMPS

	Function	Condition	Leaks
Arbo Chemical	✓	✓	No
Arbo Strainer	✓	✓	"
Sigma Acid	✓	✓	"

DUCTWORK & METALWORK

	Condition		Leaks
Tunnel Plenum	✓		No
Bio Filter Plenum	✓		"
Scrubber Body	✓		"
Floor Drip Trays	✓		"
Support Structure	✓		"

SENSORS

	Function	Condition	Leaks
PH Controller	✓	✓	No
Flow Switch	✓	✓	"
Level Sensors	✓	✓	"
Pressure Transmitter	✓	✓	"

VALVES & PIPE

	Function	Condition	Leaks
Ducting Discharge	✓	✓	No
Bleeder Down Tube	✓	✓	"
Strainer & Pump	✓	✓	"
Acid Lines	✓	✓	"

Comments:

BIO FILTERS

BIO FILTER #1

	Value	Condition / Comment
Air Flow	77250	
Static Pressure	12.5	
Negative Pressure	-18	
Pressure Drop	N/A	
Fan Speed	90%	
Incoming Air Temp	21.1	
Bio Mass Temp	23.4	
Average Temp	24.1	
Air Inlet Humidity	100%	
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 4hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	31.7	/ 42.1 ✓
Humidity Tube Level	✓	
Belimo Valves	✓	

BIO FILTER #2

	Value	Condition / Comment
Air Flow	59450	
Static Pressure	15	
Negative Pressure	-10	
Pressure Drop	N/A	
Fan Speed	90%	
Incoming Air Temp	20.8	
Bio Mass Temp	23.2	
Average Temp	23.8	
Air Inlet Humidity	98%	
Water Pressure	0 bar	
Spraying Frequency	5 min	/ 4hrs
Main Door Closed	✓	
Inspection Hatch	✓	
Fan Condition	✓	
Fan Bearing Temp	✓	32.1/41.9
Humidity Tube Level	✓	
Belimo Valves	✓	

MAIN BIO FILTER PUMP

Flow	✓	Down Pipe	✓
Leaks	✓	General Condition	✓

Orgaworld
Part of Shanks Group

ODOUR ABATEMENT WEEKLY INSPECTION

BIO SCRUBBER

WATER & AIR

	Condition
Water Clarity	CLEAR
Water Odour	SLIGHT ODOUR

	Value	Normal
Water Level	50	✓
Water PH	N/A	✓
Air Flow	132150	✓
Inlet Air Temp	21.1	✓
Inlet Air Humidity	100.1	✓
Scrubber Pressure	2.0bar	✓
Scrubber O2	20.6	✓
Manifold Pressure	2.0bar	✓

MECHANICAL

	Valve Setting
Sprayer # 1	100
Sprayer # 2	100
Sprayer # 3	100
Sprayer # 4	CLOSED

	Condition
Filter 4.2	GOOD
Filter 4.3	GOOD
Check Valve 4.2	GOOD
Check Valve 4.3	GOOD
Pump # 1 (4.1)	IN SERVICE
Pump # 2 (4.2)	GOOD
Pump # 3 (4.3)	GOOD
Man Door Seals	NEEDS ATTENTION

STACK & FANS

STACK #1

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	64.9/25.5

Stack Temp.	22.4
Test Ports Operational	YES

STACK #2

	Condition / Value / Comment
Fan Condition	GOOD
Fan Bearing Temp	26.7/35.1

Stack Condition	GOOD
Stack Base Condition	GOOD

COMMENTS

Squeaking belt on Stack fan #1 fixed November 27/17

Orgaworld Canada (Ottawa)

Part of the Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET - ODOUR ABATEMENT SYSTEM

Month: JANUARY 2017

DAY	AIR FLOW m3/hr	Fan Speed %	Pressure Drop mb	Humidity In %	Humidity Out %	Air Temp In (Degrees C)	Avg Temp (Degrees C)	Rate of Irrigation
1	35800	63	6.7	100	100	35.2	34.6	5MINUTES 6 HOURS
2	31715	60	6.3	97.7	100	36.5	37.4	5MIN 6HRS
3	41792	73	9.8	98.2	100	39.6	40.1	5M 6H
4	41544	71	8.2	97.6	100	33.2	33.4	5M 6H
5	35514	65	7.6	97.3	100	26.5	28.3	5M 6H
6	37325	67	7.6	97.4	100	29.1	28.7	5M 6H
7	40373	46	4.3	96.8	100	32	34.6	5M 6H
8	33264	52	4.2	96.5	100	28.2	31.8	5M 6H
9	35902	62	6.5	98	100	21.8	26.1	5M 6H
10	40743	60	6	97.4	98.7	39.2	38.2	5M 6H
11	35794	58	5.2	98	100	33.6	35.8	5M 6H
12	33759	59	5.8	98.5	100	37.9	37.1	5M 6H
13	36764	64	7.1	97.1	100	30.8	32.6	5M 6H
14	32565	59	5.4	98	100	31.3	31.4	5M 6H
15	44811	76	10.4	97.8	100	36.9	38	5M 6H
16	34775	62	7	98.2	100	42.6	40.6	5M 6H
17	47281	80	10.8	97.3	100	36.6	35.5	5M 6H
18	39548	68	8.1	96.4	100	34	35.6	5M 6H
19	36448	63	6.8	97.2	100	34.3	33.8	5M 6H
20	42258	70	8.9	98.2	100	41.2	39.1	5M 6H
21	35063	55	5	96.7	100	32.6	34.2	5M 6H
22	34444	58	5.8	97.6	100	32.9	34.3	5M 6H
23	37537	64	7.5	97.2	100	32.8	35.2	5M 6H
24	33060	54	5	97.6	100	33.9	33.7	5M 6H
25	36273	58	5.8	97.8	100	39.9	38.1	5M 6H
26	32214	55	4.5	98.1	99.6	37	38.5	5M 6H
27	37417	62	6.2	98.2	100	41.2	42	5M 6H
28	43086	65	7.4	98.6	100	38.6	39.1	5M 6H
29	27097	44	3.4	100	100	41.8	41.9	5M 6H
30	39560	67	7.9	97.5	100	40.6	42.2	5M 6H
31	37252	62	8.1	97.3	100	36.1	34.5	5M 6H

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MARCH 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	58927	99	17	98.9	100	35.9	38.5	5MIN/6HRS
2	60010	100	18	97.2	100	34.1	35.3	5M/6HR
3	26833	58	5.8	97.3	100	25.8	27.2	5M6H
4	33871	60	7.4	96.2	100	24.5	26.2	5M6H
5	38251	61	7.7	97.1	100	36.7	24.9	5M6H
6	35809	66	9.7	97.4	100	29.3	29.2	5M6H
7	36074	61	6.8	98.1	100	35.9	30.8	5M6H
8	36232	64	8.6	97.5	100	39.6	37.7	5M6H
9	47726	73	12	98.1	100	38.7	37.5	5M6H
10	44775	71	9.6	98.2	100	37.9	36.9	5M6H
11	41651	65	8.1	97.2	100	34.4	30.2	5M6H
12	39971	73	10	97.1	100	32.5	31.6	5M6H
13	47321	94	14.2	98.2	100	29	31.6	5M6H
14	53781	99	19.1	97.2	100	25.2	26.6	5M6H
15	35061	65	7.8	96.8	100	19	22.6	5M6H
16	27540	51	4.4	97	100	14.9	19.2	5M6H
17	39870	65	7.7	97.7	100	25.1	21.2	5M6H
18	36472	63	8.4	96.9	100	29.6	27.5	5M6H
19	33616	65	8.9	97.6	100	22.9	24.2	5M6H
20	34016	65	8.6	96.4	100	20.1	20.5	5M6H
21	40912	76	12	97.1	100	24.5	25.1	5M6H
22	32472	59	7.3	96.7	100	17.7	21.3	5M6H
23	29674	53	5.5	96.1	100	17.8	17.4	5M6H
24	43827	80	13.6	97.6	100	33.1	26.2	5M6H
25	49715	55	10	97.1	100	31.3	30.5	5M6H
26	27604	57	19.6	96.6	100	46.7	39.7	5M6H
27	49738	89	17.2	97.7	100	35.6	36.6	5M6H
28	48988	88	15.7	98.5	100	36.7	36.6	5M6H
29	39878	75	10.4	96.9	100	34.5	34.8	5M6H
30	39723	73	10.9	97.3	100	34.9	34.3	5M6H
31	43097	76	12	98.2	100	38.4	38.7	5M6H

004635

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MAY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	36982	63	6.1	97.5	100	31.6	32.4	5MIN LARS
2	50561	85	11.9	98.8	100	32.5	33.1	5M/6MRS
3	38740	67	6.8	97.4	100	30.6	31	5M6H
4	37495	65	7.3	98.4	100	31.2	31.9	5M6H
5	43387	73	8.7	98	100	33.3	34.6	5M6H
6	45617	77	9.5	98.7	100	34	33.4	5M6H
7	42307	69	8.9	97.9	100	18.3	32.3	5M6H
8	46276	76	9.6	98.4	100	33.4	30.5	5M6H
9	49978	83	11.7	96.7	100	31.5	31.5	5M6H
10	37204	64	7	98.4	100	33.6	32.2	5M6H
11	35647	63	7.5	98.5	100	35	35.7	5M6H
12	39511	70	8.5	98.5	100	37	37	5M6H
13	34132	60	6.1	97.7	100	39.6	39	5M6H
14	28729	48	4.7	98.6	100	42.4	41.4	5M6H
15	54461	88	14	98.9	100	44.2	42.2	5M6H
16	36173	61	6.2	98.1	100	35.3	37.7	5M6H
17	48654	79	10.4	93	100	42.2	41.8	5M6H
18	33763	58	5.4	98.9	100	40.8	40.7	5M6H
19	33147	55	4.7	98.2	100	39.3	39.9	5M6H
20	43966	76	10.1	98.5	100	39.7	43.1	5M6H
21	39560	66	7	98.5	100	34.5	38.4	5M6H
22	44614	75	10	99.6	100	38.9	40.4	5M6H
23	45417	74	8.8	98.5	100	39.3	39.2	5M6H
24	45722	76	9.2	98.5	100	39.7	39.8	5M6H
25	44548	73	8.8	98.6	100	42.3	41.5	5M6H
26	37700	63	6.2	98.8	100	35.6	36.9	5M6H
27	42109	69	7.7	98.1	100	39.9	39.6	5M6H
28	35426	76	9.6	97.5	100	40.7	41.3	5M6H
29	39130	66	7	98.2	100	41.9	42.9	5M6H
30	49978	84	12.3	99	100	41.6	42.9	5M6H
31	47397	78	10.6	98.9	100	39.1	39.4	5M6H

0004636

Orgaworld
Part of Stanley Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: JULY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	36249	63	6.6	97.9	100	40.9	41.8	5MIN 6HRS
2	36349	62	7.8	98.9	100	43.3	42.5	5MIN 6HRS
3	42972	73	9.4	98.6	100	42.9	43.2	5M 6H
4	40222	71	8.8	98.9	100	40	39.7	5M 6H
5	30864	54	5	99.3	100	41.1	39.4	5M 6H
6	55259	93	16.2	90	100	39.9	39	5M 6H
7	51623	85	11.8	96.8	100	40.6	40.7	5M 6H
8	51339	84	10.5	100	100	39.3	36.8	5M 6H
9	47280	76	8.5	97.5	100	40.5	41.2	5M 6H
10	54874	68	11.7	98.6	100	43.3	40.8	5M 6H
11	45700	73	7.9	98.9	100	42.3	41.7	5M 6H
12	62652	85	10.9	97.8	100	40.2	41	5M 6H
13	48998	79	9.6	98.6	100	40.2	40.5	5M 6H
14	37505	61	6	99.3	100	40	39.8	5M 6H
15	35637	58	4.7	98.2	100	42.7	41.4	5M 6H
16	42883	67	7.4	98.3	100	46.4	44.9	5M 6H
17	53337	87	12.6	99	100	45.6	45.6	5M 6H
18	49325	83	11.7	98.6	100	45.2	44.9	5M 6H
19	44787	73	7.8	99.3	100	44.9	44.8	5M 6H
20	56657	91	14	99.3	100	46.3	47.2	5M 6H
21	53056	86	43.9	99.4	100	43.9	44.6	5M 6H
22	47084	78	9.4	98	100	45.6	45.8	5M 6H
23	48204	83	11.2	99.3	100	41.6	42.6	5M 6H
24	51747	87	13.1	98.5	100	40.8	40.9	5M 6H
25	47705	84	12.7	98.6	100	39.6	40.6	5M 6H
26	54050	93	16.1	98.9	100	43.2	43.9	5M 6H
27	48277	82	12.2	97.9	100	43.6	43.5	5M 6H
28	37558	66	7.1	98.5	100	40.9	40.9	5M 6H
29	36102	64	15.5	99.6	100	39.3	41.4	5M 6H
30	59599	90	12.2	91.9	100	48.6	49.2	5M 6H
31	61725	100	16.6	98.4	99.7	44.1	48.9	5M 6H

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: SEPTEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	37787	68	8.2	98.1	100	39.9	38	5MIN6HRS
2	49815	85	12.8	98.6	100	42.9	42.8	5M6H
3	53315	90	15.8	98.2	100	40.3	40.7	5M6H
4	48389	83	13.3	97.7	100	36.5	37.5	5M6H
5	54082	87	13.7	98.6	100	41	41	5M6H
6	51747	88	14.3	99.6	100	40	40.3	5M6H
7	45128	75	10.1	98.9	100	40.2	39.5	5M6H
8	36297	66	7	98.2	100	39	38.3	5M6H
9	39152	67	7.6	97.4	100	37.3	37.5	5M6H
10	54040	89	15.7	98.2	100	44	41.9	5M6H
11	52440	92	15.3	99.3	100	43.2	42.5	5M6H
12	51124	84	13	98.2	100	42.3	42.1	5M6H
13	53476	87	13.6	99	100	44.3	44.1	5M6H
14	48277	82	11.9	98.6	100	43.3	42.6	5M6H
15	52772	91	15.7	98.2	100	41.3	41.5	5M6H
16	38199	68	8.5	97.1	100	45.3	43.7	5M6H
17	51199	86	14.3	94.1	100	45.5	44.6	5M6H
18	41792	73	10.1	99	100	43	41.8	5M6H
19	51790	88	13.9	98.6	100	42.5	42	5M6H
20	50886	88	14.1	99.3	100	39.7	40.7	5M6H
21	36687	69	8.6	99.3	100	39.6	39.9	5M6H
22	47945	82	11.8	98.1	100	38.8	39	5M6H
23	45534	65	9.6	98.6	100	43.1	42.4	5M6H
24	44360	73	8.8	98.7	100	47.2	44.8	5M6H
25	54602	91	15.5	98.6	100	42.8	43.2	5M6H
26	48867	82	45.4	96.9	98.6	45.4	44.4	5M6H
27	50947	87	14.2	99.3	100	40	41.5	5M6H
28	47567	81	11.1	98.8	100	36.6	37	5M6H
29	43557	76	10.3	98.9	100	36.3	35.7	5M6H
30	54520	91	12.8	99.6	100	45.6	38.3	
31								

Orgaworld
Part of Shanks Group

BIOFILTER #2

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: NOVEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	37921	65	7	97.8	100	28.7	28.4	5MIN6HRS
2	38961	66	7.8	98.8	100	32.2	31.9	5M6H
3	39965	66	8	98.4	100	32.5	33.2	5M6H
4	36493	61	5.6	97.5	100	29.1	31.1	5M6H
5	35170	58	5.7	97	100	25.2	25.7	5M6H
6	37514	62	7.1	98.4	100	31.6	31.3	5M6H
7	37797	62	7.2	97.7	100	36.3	32.4	5M6H
8	35274	59	5.7	97.8	100	28.7	28.9	5M6H
9	42900	71	9.1	97.8	100	28.3	29.6	5M6H
10	41822	72	9.4	96.9	100	27	25	5M6H
11	44629	79	11.6	96.9	100	24.3	25.4	5M6H
12	40865	71	9.2	97.6	100	34.2	31.5	5M6H
13	38694	67	8.2	99.1	100	29.5	29.3	5M6H
14	40217	70	8.9	97.9	100	30.8	31.9	5M6H
15	50169	87	13.8	97.4	100	29.3	30.7	5M6H
16	47743	78	9.6	98.5	100	23.9	25	5M6H
17	56456	93	14.5	98.5	100	24.5	26.4	5M6H
18	47696	80	11	97.5	100	21.2	23.4	5M6H
19	41006	71	8.5	97	100	23.1	23.3	5M6H
20	44171	79	10.2	98	100	22.9	23.9	5M6H
21	37705	67	7.8	95.7	100	23.8	25.2	5M6H
22	49217	88	14.1	98.7	100	28.3	30	5M6H
23	48644	86	12.8	97.6	100	24.9	24.3	5M6H
24	47758	82	11.7	97.9	100	29	28.5	5M6H
25	49239	96	7.4	97.6	100	23.5	24.8	5M6H
26	50424	80	13	97.4	100	20.5	22.3	5M6H
27	52363	73	15.3	98	100	22.4	23.7	5M6H
28	53652	93	16.8	97.5	100	31.8	20.6	5M6H
29	36074	61	6.7	98.5	100	22.6	24.2	5M6H
30	29776	61	7	97.4	100	19.4	21.2	5M6H
31								

Orgaworld Canada (Ottawa)

Part of the Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET - ODOUR ABATEMENT SYSTEM

Month: JANUARY 2017

DAY	AIR FLOW m3/hr	Fan Speed %	Pressure Drop mb	Humidity In %	Humidity Out %	Air Temp In (Degrees C)	Avg Temp (Degrees C)	Rate of Irrigation
1	55325	63	8	98.8	100	37.5	32.5	5MINUTES 6HOURS
2	56591	60	6.3	99.6	100	36.7	35.2	5MIN 6HRS
3	62728	73	9.8	100	100	39.8	38.2	5M 6H
4	61283	71	8.4	99.2	100	33.3	32.4	5M 6H
5	51729	65	8	99.2	100	26.9	27.3	5M 6H
6	55717	67	8.5	100	100	29.2	27.4	5M 6H
7	43735	46	3.9	100	100	33.3	30	5M 6H
8	42508	52	4.8	99.1	100	28.5	29.6	5M 6H
9	50261	62	7.2	100	100	22.1	25.1	5M 6H
10	51317	60	6.6	98.9	98.7	39.7	35.2	5M 6H
11	53357	58	4.9	100	100	33.9	34.1	5M 6H
12	48867	59	6.2	100	100	38.2	35.9	5M 6H
13	50327	64	7	100	100	31	31.4	5M 6H
14	45953	59	6.8	100	100	32.1	29.6	5M 6H
15	61475	76	11.2	99.6	100	38	36.7	5M 6H
16	50094	62	7.1	98.9	100	42.8	38.3	5M 6H
17	66882	80	11.9	99.6	100	36.7	34.3	5M 6H
18	58327	68	8.4	99.2	100	33.9	34.3	5M 6H
19	50662	63	6.9	98.9	100	34.4	32.7	5M 6H
20	57676	70	9.7	100	100	41.4	36.9	5M 6H
21	33584	55	5.2	100	100	32.3	32.9	5M 6H
22	37393	58	6.6	100	100	34.3	30.9	5M 6H
23	40173	64	7.4	98.8	100	33	32.1	5M 6H
24	41701	54	4.8	100	100	33.8	30.2	5M 6H
25	47978	58	5.7	100	100	39.9	35.2	5M 6H
26	47893	55	4.9	98.9	99.6	37.3	36.1	5M 6H
27	56587	67	6	99.3	100	41.4	39.9	5M 6H
28	56262	65	6.8	98.6	100	39.1	37.2	5M 6H
29	51883	49	3.8	100	100	41.8	38.3	5M 6H
30	59797	67	7.9	98.9	100	40.2	40.3	5M 6H
31	63677	67	7.4	98.9	100	36.3	33.6	5M 6H

004640

Orgaworld
of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET -- ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MARCH 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	78376	99	16.4	100	100	35.2	37.9	5MIN/6HRS
2	78713	100	18.2	100	100	33	35.1	5M/6H
3	47786	58	5.5	99	100	24	26.4	5M6H
4	46469	60	6.8	100	100	22.4	25.2	5M6H
5	47170	61	7.1	100	100	20.4	23.9	5M6H
6	52571	66	8.6	100	100	27.6	28.2	5M6H
7	49077	61	6.7	100	100	34.5	29.5	5M6H
8	52444	64	8.4	99.2	100	38.6	36.2	5M6H
9	59543	73	11.3	100	100	37.5	37.4	5M6H
10	62377	71	9.2	100	100	36.7	35.3	5M6H
11	61291	65	8	100	100	35.4	30.1	5M6H
12	68683	73	10.2	99.6	100	33	31.3	5M6H
13	75543	84	13.6	99.1	100	29.1	31.4	5M6H
14	75276	99	20	99	100	25.1	26.3	5M6H
15	50090	65	7.7	99.4	100	19	22.1	5M6H
16	39976	51	4.4	100	100	14.4	18.7	5M6H
17	51339	65	8.2	100	100	24.2	20.9	5M6H
18	48396	63	7.9	100	100	29	26.1	5M6H
19	49394	65	9.4	100	100	22.7	23.7	5M6H
20	49877	65	8.6	100	100	19.4	19.5	5M6H
21	59246	76	11.5	100	100	24	24.3	5M6H
22	45744	59	7.4	100	100	16.8	20.7	5M6H
23	39483	53	5.8	100	100	17.2	16.4	5M6H
24	61613	80	13.4	100	100	32.6	25.5	5M6H
25	52348	55	12.9	100	100	29.7	28.8	5M6H
26	74591	57	19.1	100	100	47.2	39.8	5M6H
27	67458	88	14.6	100	100	35.9	36	5M6H
28	67617	88	15.5	99.6	100	36.6	36.6	5M6H
29	58027	75	10.8	100	100	33.9	34.2	5M6H
30	57496	73	11.3	100	100	34.3	33	5M6H
31	59878	76	12.1	100	100	38.2	36.4	5M6H

004641

Orgaworld
A Division of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: MAY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	58872	63	6.5	99.6	100	31.8	31.5	5MIN 6HRS
2	73276	95	12.5	100	100	32.6	32.9	5M 6H
3	57810	67	7.9	99.6	100	30.8	30.2	5M 6H
4	57344	65	7.1	100	100	31.4	30.8	5M 6H
5	64768	73	9.4	100	100	33.3	33.6	5M 6H
6	68448	77	9.8	100	100	31.3	32.5	5M 6H
7	58241	69	8.5	100	100	19.4	31.1	5M 6H
8	63706	76	9.2	100	100	33.6	29.6	5M 6H
9	70764	83	12.1	99.2	100	31.6	30.7	5M 6H
10	57229	64	7.2	98.8	100	33.9	31.1	5M 6H
11	54715	63	7.3	99.2	100	35	34.6	5M 6H
12	62251	70	9	100	100	37.7	35.9	5M 6H
13	55279	60	6.2	100	100	39.1	37.8	5M 6H
14	52778	48	4.2	100	100	42.9	38.7	5M 6H
15	70664	88	13.4	99.6	100	44.4	42	5M 6H
16	52475	61	6.4	100	100	35.4	36.5	5M 6H
17	71094	79	10.3	100	100	41.6	41	5M 6H
18	50470	58	5.6	100	100	40.6	38.7	5M 6H
19	40963	55	5.2	100	100	39.5	37	5M 6H
20	66258	76	10.9	100	100	39.9	41	5M 6H
21	61016	66	6.6	100	100	34.7	36.6	5M 6H
22	66307	75	9.4	100	100	38.9	38.5	5M 6H
23	67001	74	9.3	99.3	100	39.4	37.7	5M 6H
24	68047	76	9.4	99.6	100	39.3	39	5M 6H
25	65307	73	8.4	99.3	100	42.4	40.4	5M 6H
26	57001	63	6.6	99.3	100	35.9	35.8	5M 6H
27	64028	69	8	99.6	100	39.9	38.3	5M 6H
28	66515	76	10.7	100	100	40.7	39.9	5M 6H
29	59577	66	7.2	100	100	41.9	41.7	5M 6H
30	70370	84	12.8	100	100	41.6	42.1	5M 6H
31	69778	78	11.3	100	100	39.2	38.2	5M 6H

Orgaworld
of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: JULY 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	54006	63	6.9	100	100	41.3	41.8	5MIN6HRS
2	54207	62	7.1	100	100	42.7	41.4	5MIN6HRS
3	61072	73	8.9	100	100	42.9	43	5M6HR
4	60379	71	8.8	99.6	100	40	39.5	5M6H
5	48705	54	4.8	100	100	41	38.9	5M6H
6	81723	93	15.5	90.7	100	40	39.2	5M6H
7	73979	85	10.9	100	100	40.2	40.7	5M6H
8	72296	84	9.7	100	100	40.6	39.9	5M6H
9	68415	76	8.3	100	100	39.9	39.1	5M6H
10	75435	88	10.9	100	100	43.2	40.7	5M6H
11	67783	73	7.4	100	100	42.2	41.4	5M6H
12	74371	85	10.5	98.9	100	40.2	41.4	5M6H
13	67759	79	9	100	100	40.3	40.4	5M6H
14	56449	61	5.2	100	100	39.8	39.6	5M6H
15	61328	58	4.9	100	100	42.2	41	5M6H
16	61592	67	6.9	100	100	45.2	44.2	5M6H
17	72903	87	12.1	100	100	45.7	45.6	5M6H
18	71371	83	11.4	100	100	45.1	45	5M6H
19	63280	73	8.8	100	100	44.8	44.9	5M6H
20	76755	91	13.8	100	100	46.3	47.2	5M6H
21	75173	86	12.4	100	100	43.8	44.5	5M6H
22	68573	78	9.6	100	100	44.9	45.2	5M6H
23	70558	83	11.7	100	100	41.9	42.9	5M6H
24	70732	87	11.8	100	100	40.7	40.9	5M6H
25	70107	84	12.8	100	100	39.5	40.4	5M6H
26	79267	93	15.8	100	100	43.2	43.7	5M6H
27	74652	82	11.6	100	100	43.5	42.8	5M6H
28	57735	66	7.1	100	100	41	40.4	5M6H
29	75007	64	9	100	100	43.2	41.3	5M6H
30	70907	90	13.6	100	100	48.5	47.6	5M6H
31	86061	100	15	100	99.7	49	48.4	5M6H

004643

Orgaworld
A part of Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: SEPTEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	61678	68	7.5	100	100	39.9	38.1	5MIN6HRS
2	73361	85	12.7	100	100	43.1	43	5M6H
3	74960	90	13.6	100	100	40.3	40.8	5M6H
4	69654	83	12.5	100	100	37	38.1	5M6H
5	74099	87	12.4	100	100	41	41.7	5M6H
6	74491	88	12.9	100	100	39.6	40.4	5M6H
7	65565	75	9.5	100	100	40	40.2	5M6H
8	59376	66	7.3	100	100	38.5	38.6	5M6H
9	58666	67	7.9	100	100	37.7	37.9	5M6H
10	74974	89	14.2	100	100	42.5	41.8	5M6H
11	79117	92	13.8	100	100	43.2	42.9	5M6H
12	72597	84	11.5	100	100	42.3	42.4	5M6H
13	73925	87	12.2	99.4	100	44.3	44.7	5M6H
14	73707	92	11	100	100	43.3	42.7	5M6H
15	79007	91	13.9	100	100	41.3	41.6	5M6H
16	64217	68	8.2	100	100	45.2	44.1	5M6H
17	74329	86	12.8	100	100	45.5	45	5M6H
18	64768	73	8.9	99.6	100	43.2	42.4	5M6H
19	76701	88	12.9	100	100	42.3	42.2	5M6H
20	75787	88	12.8	100	100	39.6	40.7	5M6H
21	65577	69	7.7	100	100	39.6	39.9	5M6H
22	71079	80	8.1	100	100	38.8	39.7	5M6H
23	70521	76	7.4	100	100	43.8	44.3	5M6H
24	72282	76	7.6	100	100	46.3	47	5M6H
25	79674	93	12.6	100	100	42.8	43.7	5M6H
26	76766	84	8.7	100	98.6	44.9	45.6	5M6H
27	76748	87	9.7	100	100	39.9	41.5	5M6H
28	69705	81	9	100	100	36.7	37.3	5M6H
29	71322	76	7.3	100	100	36.4	37.1	5M6H
30	50058	91	8.3	100	100	45.9	40.4	5M6H
31								

Orgaworld
A Shanks Group

BIOFILTER #1

OPERATIONAL CONTROL SHEET – ODOUR ABATEMENT SYSTEM

ORGAWORLD CANADA LTD (Ottawa Office) Month: NOVEMBER 2017

DAY	FLOW m3/hr	FAN SPEED %	PRESSURE DROP mb	HUMIDITY IN %	HUMIDITY OUT %	AIR TEMP – IN Degree C	AVG TEMP Degree C	Rate of Irrigation min/hr
1	57441	65	5.6	99.6	100	29.1	28.3	5MIN 6HRS
2	61774	66	5.8	100	100	32.4	32.2	5M 6H
3	57813	66	6.1	100	100	32.5	33.2	5M 6H
4	54037	61	5.2	100	100	30.3	30.8	5M 6H
5	60260	58	5.3	100	100	23.3	25.2	5M 6H
6	53729	62	5.4	100	100	31.7	31.6	5M 6H
7	57037	62	5.8	99.6	100	36.4	33	5M 6H
8	55932	59	4.7	100	100	28.8	28.5	5M 6H
9	64475	71	7.9	100	100	28.4	29.9	5M 6H
10	59761	72	7.2	100	100	27.2	24.4	5M 6H
11	66291	79	8	100	100	25.4	25.6	5M 6H
12	61292	71	7.3	100	100	34.2	33.1	5M 6H
13	60195	67	6.1	100	100	29.8	29.8	5M 6H
14	61792	70	6.2	100	100	30.9	31.7	5M 6H
15	76966	87	9.7	100	100	29.3	30.1	5M 6H
16	71117	78	7.5	100	100	23.9	24.2	5M 6H
17	79749	93	11.5	100	100	24.5	26.2	5M 6H
18	68152	80	9.6	100	100	21.8	22.8	5M 6H
19	58338	71	7	100	100	21.4	23.2	5M 6H
20	65373	79	9.1	100	100	22.9	23.6	5M 6H
21	56291	67	5.6	98	100	23.9	25.1	5M 6H
22	74171	88	11.1	100	100	28.3	29.8	5M 6H
23	57996	86	10.2	100	100	23.8	23.5	5M 6H
24	71479	83	9.3	100	100	29	28.8	5M 6H
25	73264	96	12.4	100	100	28.8	27.7	5M 6H
26	67639	80	9.1	100	100	30.2	29.1	5M 6H
27	68530	73	8.3	100	100	20.6	21.8	5M 6H
28	81270	93	12.8	100	100	31.8	30.8	5M 6H
29	54732	61	5.1	100	100	22.6	23.5	5M 6H
30	52794	61	5.2	100	100	19.6	20.5	5M 6H
31								

004645

Point 4 Bunch 3

Log Off | Tunnels Overview | Ammonia Scrubber | Biofilters Overview | Water Overview | Batch Trendlogs | 9:45 | Orgaworld Port of Shanks Group

004646

ABATEMENT OVERVIEW

A

18 JAN 17

Tunnels

35.0 °C

-151.3 Pa

20.7 %

Water

auto 0.675 kPa 68 %

auto 1.491 kPa 68 %

enabled 8.4 mb 33.9 °C

enabled 8.1 mb 34.0 °C

13.5 °C

Fan biofilter1	
68 %	40.8 Hz
23.0 KW	52.9 A

Fan biofilter 2	
68 %	40.8 Hz
22.1 KW	45.5 A

Biofilter 1	Biofilter 2	Biofilter 3
58327 m³/h	39548 m³/h	8.1 °C
34.9 °C	35.8 °C	9.8 °C
35.2 °C	35.5 °C	
32.8 °C	35.7 °C	
-47.7 Pa	-38.9 Pa	0.0 Pa

Average temperature biofilter 1	34.3 °C
Actual humidity biofilter 1	99.2 %

Average temperature biofilter 2	35.6 °C
Actual humidity biofilter 2	96.4 %

auto 54 % auto 55 %

auto 54 % auto 50 %

-414.4 Pa

20.7 % -405.1 Pa

99 % 100 %

100.0 % 29.5 °C

-1 %

Stack fan 1	
65 %	39.0 Hz
19.1 KW	40.3 A

Stack fan 2	
64 %	38.4 Hz
14.3 KW	32.9 A

auto

auto

32.8 °C

N 20 % W E 97.8 mph S

Settings B1 | gs B2 | Settings Scrubber | Events

004647

ABATEMENT OVERVIEW

A

15MAR17

Tunnels

20.4 °C

-153.1 Pa

20.4 %

Water

auto 0.882 kPa 65 %

auto 1.464 kPa 65 %

enabled 7.7 mb 19.0 °C

enabled 7.8 mb 19.0 °C

6.6 °C

Fan biofilter1	
65 %	39.0 Hz
19.7 KW	48.1 A

Fan biofilter 2	
65 %	39.0 Hz
22.8 KW	43.9 A

Average temperature biofilter 1	22.1 °C
Actual humidity biofilter 1	99.4 %

Average temperature biofilter 2	22.6 °C
Actual humidity biofilter 2	96.8 %

Biofilter 1

50090 m³/h

22.1 °C

22.5 °C

21.8 °C

-41.0 Pa

Biofilter 2

35061 m³/h

22.5 °C

23.0 °C

22.3 °C

-48.8 Pa

Biofilter 3

4.4 °C

4.3 °C

0.0 Pa

Stack fan 1	
62 %	37.2 Hz
16.7 KW	37.0 A

Stack fan 2	
62 %	37.2 Hz
14.2 KW	34.3 A

auto 46 % auto 46 %

auto 53 % auto 53 %

-447.3 Pa

20.4 % -405.1 Pa

100.0 % 17.5 °C

99 %

100 %

-0 %

auto

auto

20.6 °C

84 %

97.8 mph

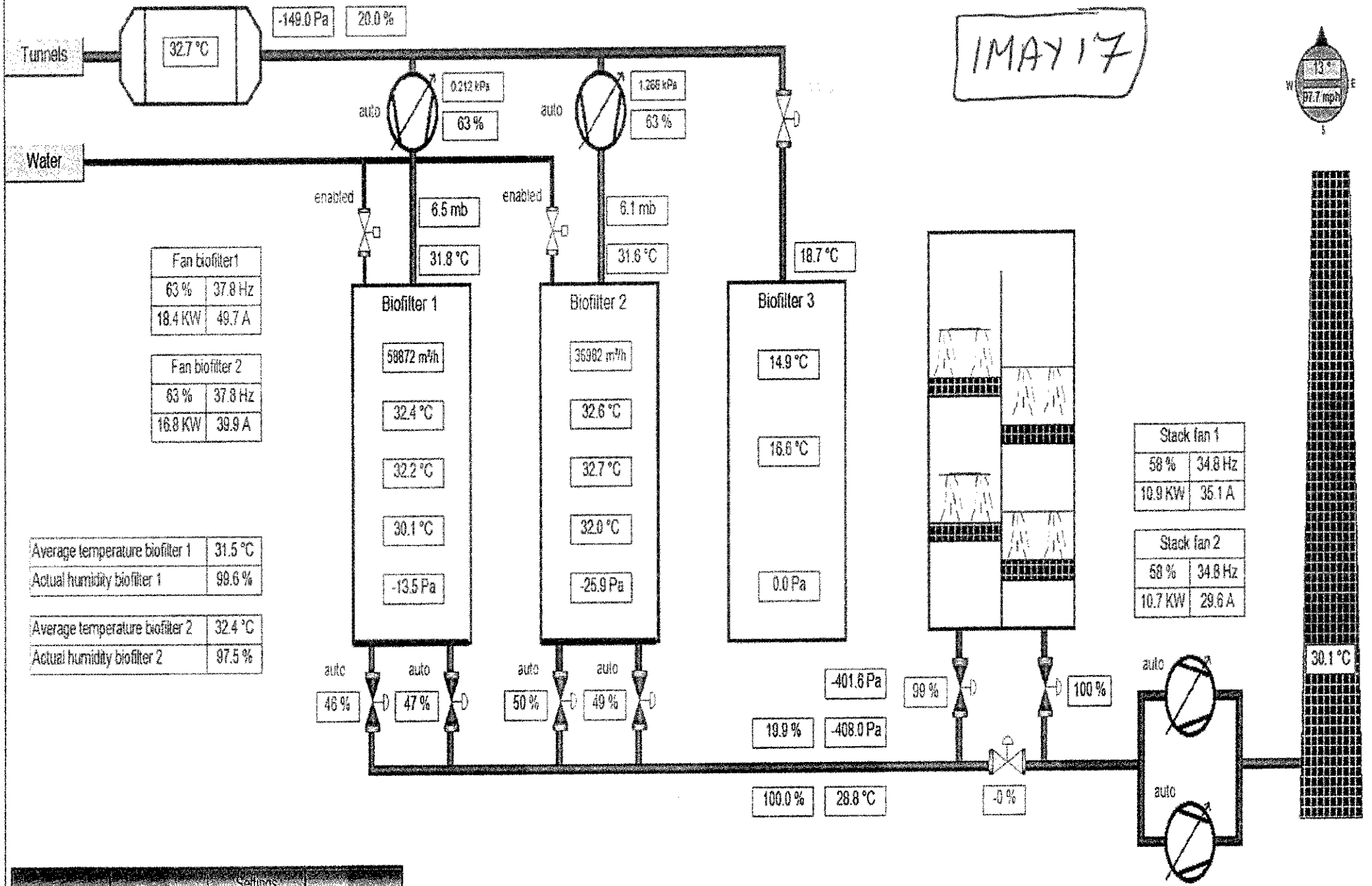
N W S

004648

ABATEMENT OVERVIEW

A

1 MAY 17

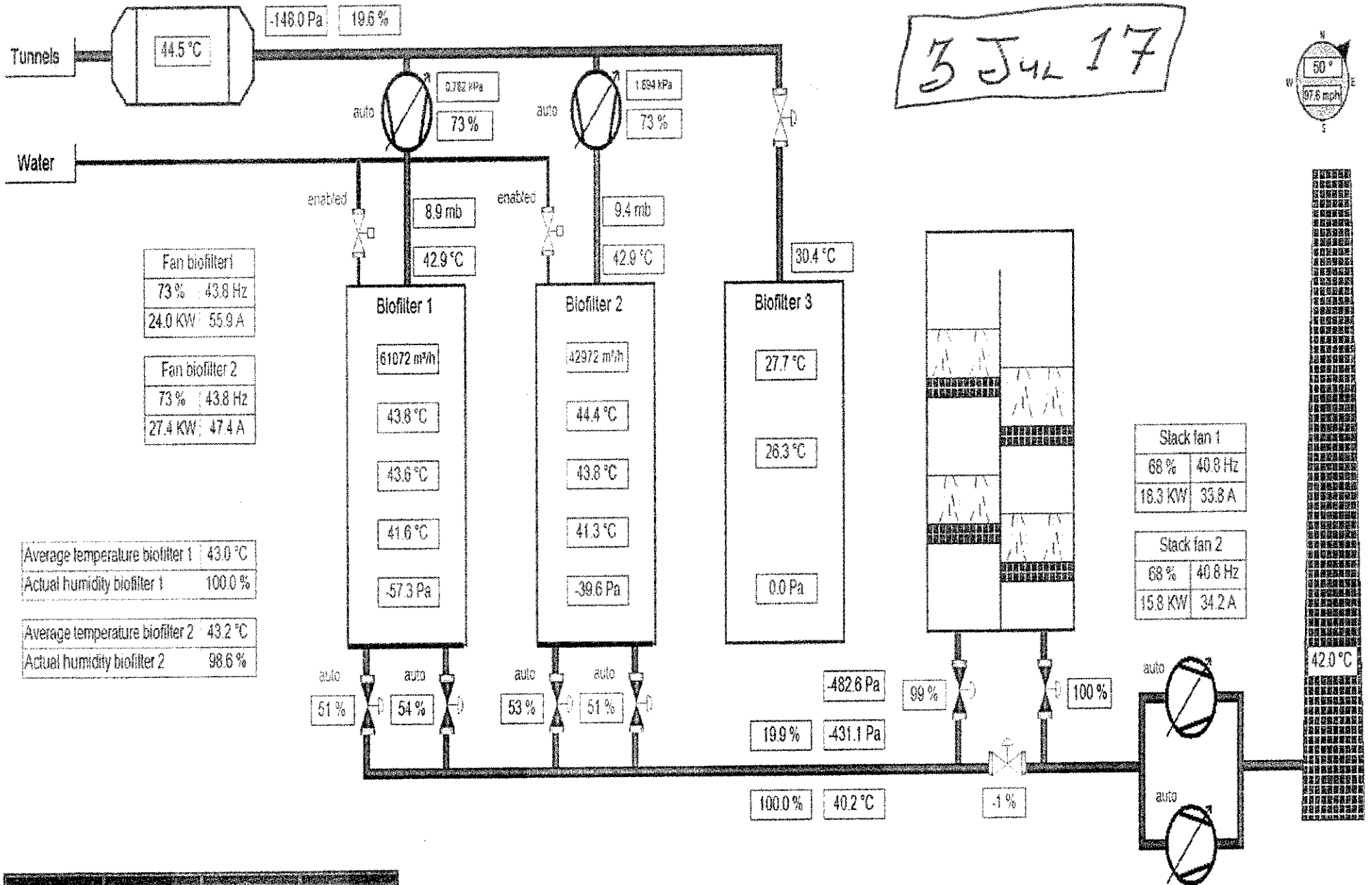


004649

ABATEMENT OVERVIEW

A

3 JUL 17



004650

ABATEMENT OVERVIEW

A

29 SEP 17

Tunnels

37.5 °C

-151.0 Pa

20.0 %

Water

auto 0.265 kPa 76 %

auto 1.892 kPa 76 %

enabled 7.3 mb 36.4 °C

enabled 10.3 mb 36.3 °C

33.3 °C

Fan biofilter1	
76 %	45.6 Hz
29.8 KW	53.2 A

Fan biofilter 2	
76 %	45.6 Hz
31.8 KW	52.1 A

Average temperature biofilter 1	37.1 °C
Actual humidity biofilter 1	100.0 %

Average temperature biofilter 2	35.7 °C
Actual humidity biofilter 2	98.9 %

Biofilter 1

71372 m³/h

37.3 °C

37.0 °C

37.0 °C

-30.6 Pa

Biofilter 2

43557 m³/h

38.2 °C

35.1 °C

33.8 °C

-34.9 Pa

Biofilter 3

26.7 °C

30.2 °C

0.0 Pa

auto 54 % auto 56 %

auto 63 % auto 63 %

-456.9 Pa

19.9 %

-393.5 Pa

100.0 %

32.7 °C

99 %

100 %

-0 %

Stack fan 1	
77 %	46.2 Hz
29.0 KW	39.2 A

Stack fan 2	
76 %	45.6 Hz
21.9 KW	38.9 A

auto

auto

34.9 °C

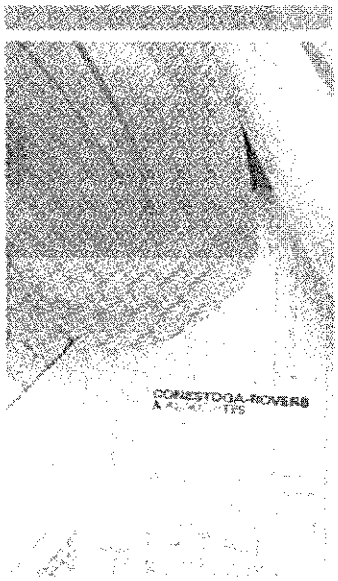
N 39 ° W 97.6 mph E S

Logic
Overview
Inputs
Outputs
Variables
Timers
Counters
Alarms
Settings
Diagnostics
Help
Logic

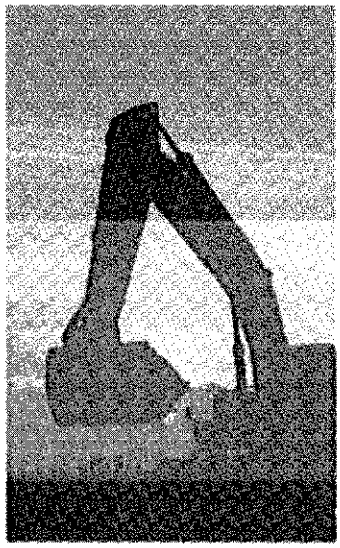
Point 5

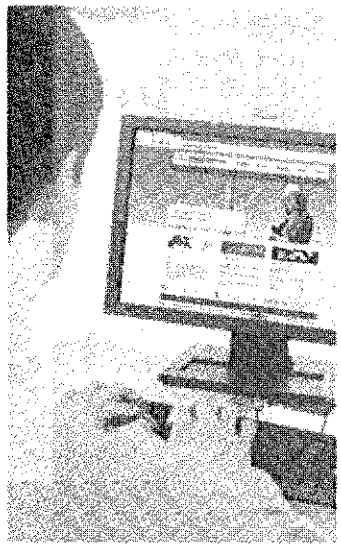
CONESTOGA-ROVERS
& ASSOCIATES

www.CRAworld.com









Acoustic Assessment Report

Orgaworld Canada Ltd.
Ottawa, Ontario

ORIGINAL 2014 ACOUSTIC ASSESSMENT
ON FILE AT FACILITY

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

May 2014 • 045804 • Report No. 52

Partners in Sustainability

Table of Contents

		Page
Section 1.0	**Introduction**	1
Section 2.0	**Noise Source Summary**	2
Section 3.0	**Point of Reception Summary**	3
Section 4.0	**Assessment Criteria**	4
Section 5.0	**Impact Assessment – Steady-State Noise Sources**	5
Section 6.0	**Conclusions and Recommendations**	6

List of Figures
(Following Text)

Figure 1	Noise Source Summay Plan
Figure 2	Point-of-Reception Locations

List of Tables
(Following Text)

Table 1	Noise Source Summary
Table 2	Point-of-Reception Noise Impact - Unattenuated Sound Levels
Table 3	Acoustic Assessment Summary – Day-Time Steady-State Sound Levels

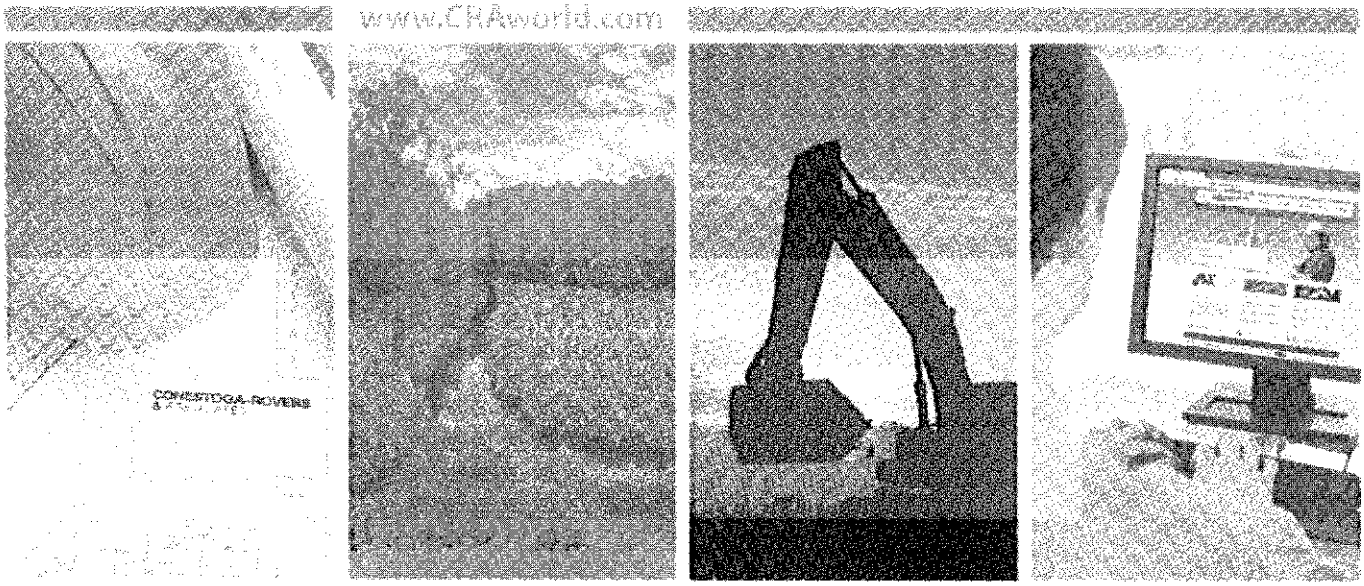
List of Appendices

Appendix A	Zoning Map and Definitions
Appendix B	Manufacturers Specifications
Appendix C	Cadna A Noise Model Outputs

Part 6

CONESTOGA-ROVERS
& ASSOCIATES

www.CRAworld.com



Emission Summary and Dispersion Modelling Report

Orgaworld Canada Ltd
Ottawa, Ontario

ORIGINAL 2014 ECDM
ON FILE AT FACILITY

Conestoga-Rovers & Associates
651 Colby Drive
Waterloo, Ontario N2V 1C2

May 2014 • 045804 • Report No. 51

Partners in Sustainability

Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report was prepared to support an Application for Renewal of Environmental Compliance Approval (ECA) (Air). The Facility is currently operating under ECA (Air) No. 7021-7HQNDE. The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05 to support the ECA (Air) Application. Guidance in the Ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 (ESDM Procedure Document) was followed as appropriate.

Orgaworld Canada Ltd. (OCL) operates a facility (Facility) at Lot 27, Concession 6, Gloucester in Ottawa, Ontario. The Facility will be located in an area zoned for industrial use. OCL is an aerobic composting operation that will process source separated organics (SSO), such as kitchen waste, and leaf and yard wastes into an unrestricted end product suitable for application on agricultural lands.

The Facility is subject to s.20 of O.Reg. 419/05, therefore the modelled impact of contaminant emissions can be assessed using the AERMOD dispersion model for each contaminant and applicable averaging period.

Odour-based dispersion modelling was performed at each of the sensitive receptors previously identified by the Ontario Ministry of the Environment (MOE), and for the 99.85th percentile as per the MOE proposed position paper "Proposed Approach for the Implementation of Odour-Based Standard and Guidelines" (June 2006).

The Facility is expected to emit Odour, Particulate, Ammonia, and Products of Diesel Combustion. Some of the sources and contaminants were considered negligible in accordance with s.8 of O. Reg. 419/05.

The maximum POI concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O. Reg. 419/05 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Facility was calculated based on the calculated emission rates and the output from the approved dispersion model; the results are presented in the Emission Summary Table in accordance with s.26 of O. Reg. 419/05.

The POI concentrations listed in the Emission Summary Tables were compared against criteria listed in the Ministry publication "Summary of Standards and Guidelines to Support Ontario Regulation 419: Air Pollution – Local Air Quality" dated April 2012.

Tab 1

004657

ORGAWORLD CANADA EH&S TRAINING MATRIX

REQUIREMENT	OPERATORS	MAINTENANCE STAFF	COMPOST TECH.	WEIGH SCALE
new starters orientation (incl. Right to refuse)	x	x	x	x
Operations manual / procedures	x	x	x	
Environmental Compliance Approval training	x	x	x	x
Health and Safety Policy	x	x	x	x
contingency plans / emergency response	x	x	x	x
first aid / CPR *	x	x	x	
Pedestrian Safety	x	x	x	x
WHMIS	x	x	x	x
Lockout / Tagout	x	x	x	
Respirator usage / bioaerosols	x	x	x	
Respirator fit test	x	x	x	
Hearing Protection	x	x	x	
Heat Stress	x	x	x	
Cold Stress	x	x	x	
PPE requirements	x	x	x	
Loader operation*	x	x		
Propane Handling*	x	x		
Manual Material Handling and Back Care	x	x	x	
Laboratory Safety			x	
Workplace Violence and Harassment	x	x	x	x
Accident / Incident reporting requirements	x	x	x	x
Confined Space training*	x	x		
Eyewash / Safety Shower Procedure	x	x	x	
due diligence training	x	x	x	x
Hot Work Permits		x		
proper fueling procedure for loaders	x	x		
fall protection	x	x	x	
transportation of dangerous goods			x	x
ladder safety	x	x	x	
Waste acceptance / shipment protocols	x	x	x	x
Critical injury and WSIB requirements			x	

Accident / Incident investigations	x
Work Refusal Responsibilities	x
Hazard Recognition / Inspection protocols	x
Proper incoming waste and outgoing compost sampling procedures	x
SCADA operation training	x
Pond Water Sampling	

* = if considered necessary for that employee

SUPERVISORS	REFRESHER REQUIREMENTS
x	
x	on-going
x	on-going
x	as amended
x	as amended
x	3 yrs
x	
x	annual or if chemical usage changes
x	
x	
x	
x	
x	
x	
x	as amended
x	3 years
x	3 years
x	
x	
x	
x	
x	facility dependent
x	
x	
x	
x	
x	3 years
x	
x	
x	

Page 8

004660

Orgaworld Canada: Ottawa 2017 Mass Balance

Intake: (Tonnes)

		January	February	March	April	May	June	July	August	September	October	November
SSO	CITY OF OTTAWA - SOURCE SEPERATED ORGANICS (SSO)	3,564	2,409	2,677	6,909	9,355	9,073	7,795	7,643	6,624	8,759	9,166
	CITY OF OTTAWA - COMMERCIAL ORGANICS				10	7						5
ICI	Kevron Recycling (19070526)	143	87									
	Progressive (19070496)	48	54	62	45	60	60	52	62	61	60	56
	Waste Management (19070547)	109	136	155	120	144	140	106	115	148	140	166
	Metro (19070648)	383	296	331	317	104						
	Tomlinson Environmental (19070570)	106	97	37		11	52	31				
	Malex (19070379)	74	68	81	72	90	92	79	79	93	94	73
	Total Intake	**4,428**	**3,146**	**3,344**	**7,472**	**9,771**	**9,417**	**8,064**	**7,900**	**6,926**	**9,061**	**9,466**
	City of Ottawa	3,564	2,409	2,677	6,919	9,362	9,073	7,795	7,643	6,624	8,759	9,170
	ICI	863	737	667	554	409	345	269	257	303	302	296

December	Total
3,510	77,494
	21
	230
58	678
103	1,592
29	1,461
	335
73	968
3,773	**82,769**
3,510	77,505
263	5,264

S1 OT GL HA 610

Straberger, Kyle (MOECC)

From: McComb, Dale (OMAFRA)
Sent: May 22, 2015 4:28 PM
To: Straberger, Kyle (MOECC)
Subject: RE: NASM Sites

Follow Up Flag: Follow up
Flag Status: Completed

Got it done. See below.

Dale McComb
OMAFRA
519-826-3293

From: Straberger, Kyle (MOECC)
Sent: Friday, May 22, 2015 3:46 PM
To: McComb, Dale (OMAFRA)
Subject: NASM Sites

Hi Dale – As discussed, I have provided the list of sites in which Orgaworld will be potentially sending processed organic waste not meeting the new Phase II Ontario Compost Quality Standards for moisture. I would like to determine whether these sites already have a NASM Plan in place. Thanks again and if you have any questions please let me know.

Martin Sieve
CLAY ALL OVER FARMS
2409 Ritchance Road
Alfred, Ont
K0B 1A0
No NASM plan or Nutrient Management Strategy

GFL Environmental Inc.
125 Villarboit Cres., Suite B
Vaughan, Ontario
Canada L4K 4K2
City address North of Toronto– not a farm

Jacob Buhler
1271 rue St. Andre
Embrun, ON
K0A 1W0
No NASM plan or Nutrient Management Strategy

Thomas Wahler
Wahler Farms
3651 Labelle Road
Bourget, ON
K0A 1E0
No NASM plan or Nutrient Management Strategy

Kyle Straberger

Schedule "A" – Disposal Locations & Quantities of Processed Organic Waste

Martin Sieve
Clay All Over Farm
2409 Ritchance Road
Alfred, ON
K0B 1A0

NO NASM

Quantity of Processed Organic Waste:
6,500 tonnes

GFL Environmental Inc.
125 Villarboit Crescent, Suite B
Vaughn, ON
L4K 4K2

NOT A FARM

Quantity of Processed Organic Waste:
900 tonnes

Jacob Buhler
1271 St. Andre Road
Embrun, ON
K0A 1W0

NO NASM

Quantity of Processed Organic Waste:
3,000 tonnes

Kyle O'Donahue
14455 County Road #9
Berwick, ON
K0C 1G0

NASM PLAN # 21380

Quantity of Processed Organic Waste:
1,000 tonnes

Thomas Wahler
Wahler Farms
3651 Labelle Road
Bourget, ON
K0A 1E0

NO NASM

Quantity of Processed Organic Waste:
2,000 tonnes

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: April 28, 2015 1:58 PM
To: Straberger, Kyle (MOECC)
Subject: Implementation of Ontario Compost Quality Standards
Attachments: Response to MOECC Ottawa District.docx

Hello Kyle:

Please find attached the Orgaworld Ottawa response to your letter dated March 18, 2015. If you have further question or concern, please let me know.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0630
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Orgaworld
Part of Shanks Group

April 28, 2015

Kyle Straberger
Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa, Ontario
K1H 1E1

Re: Response to MOECC Ottawa District
IMPLEMENTATION OF ONTARIO COMPOST QUALITY STANDARDS – MATURITY AND FOREIGN MATTER

Action plan required for the following:

1. *Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary;*
2. *Environmental Compliance Approval amendments required to reflect any required process changes or modifications;*
3. *Options to manage processed organic waste not meeting the Ontario Compost Quality Standards; and*
4. *Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with Phase II Ontario Compost Quality Standards.*

Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary

1. In order to meet the moisture requirement stated in the new compost regulations, the Ottawa facility will need to look at either installing winterized water tankage, water lines and pumps, or utilizing a water truck to spray the compost. Operational changes will include using this water truck and developing procedures in order to ensure that the spraying of the compost meets the 40% moisture target throughout the entire compost pile.
2. Additional future changes may mean the addition of increased compost storage space, since once the compost piles are sprayed with water, they must be turned, or transferred to an empty storage bunker.
3. Sharps. There has yet to be a definitive definition on what is a sharp or not. The phrase "Shall contain no material of a size or shape that can reasonably cause animal or human injury" is extremely vague. Historical analytical results have demonstrated that with the current incoming wastestream into Ottawa, there should be little difficulty for the Ottawa facility to meet the foreign matter or sharp requirements.

Environmental Compliance Approval amendments required

1) The Ottawa facility will look at utilizing the water taken from the groundwater remediation well and potentially utilize it in order to bring the finished curing compost up to the specified 40% moisture level. Orgaworld has just submitted an amendment request to the MOECC for our Stormwater ECA. It is unclear at this time if we would have to submit another amendment in order to be able to utilize this water from the remediation well.
2) If this water spray equipment was added, it is presumed that this equipment would also require an amendment to the waste ECA since it would be considered a "change or alteration" to the existing facility and the existing process.
3) If deemed that additional compost storage space is required, this will also require an amendment to the existing Waste ECA.

Options to Manage Processed Organic Waste NOT meeting the Ontario Compost Quality Standards

Orgaworld Ottawa will manage the processed organic waste that does not meet the new regulations by utilizing NASM plans which would still allow the compost to go to farmers fields and be utilized in a beneficial manner. Orgaworld has already arranged transport with haulers that are licensed to transport organic waste, and have completed NASM plan agreements with farmers who wish to take our NASM product.

Timelines associated with actions necessary for compliance

It must be noted that for over a year, Orgaworld Canada and the MOECC were in continuous negotiations regarding the new compost regulations. Until recently, Orgaworld and several other compost producers were under the impression that the MOECC was seriously considering other alternatives than the complete adoption of the entire new compost regulation package. This did not occur and the decision to fully adopt the new compost regulations was made, but not communicated to Orgaworld until very recently. With this in mind, Orgaworld Canada would like to request that we would be allowed to honour all of our compost delivery contracts through the end of the 2015 season. This would allow time to discuss with all of our current compost customers:

i) the potential for accepting the NASM product
ii) The restrictions and usage requirements set out in the plan
iii) Take the necessary soil sampling and creation of the plans

If Amendments are required for the water spraying equipment, then the timeframe to submit the application to the MOECC could be at least six months. The MOECC has mentioned that they would be willing to "fast-track" the approvals process, but it is unclear exactly how long that may take. If more compost storage space is required (a multi-million dollar investment), this process, including engineering, financing, MOECC approval and construction could take at least one to two years.

If you have further questions or concerns, please do not hesitate to contact me at your convenience.

Michael Rooke
Compliance Officer

Ontario

Ministry of the Environment and Climate Change

Ministry of the Environment
5/6/2015
10 a.m. to 12 p.m.

Meeting called by: Straberger, Kyle

Attendees:

Kyle Straberger, Senior Environmental Officer, MOECC; Jena Leavoy, District Supervisor, MOECC; Steve Burns, District Manager, MOECC; Michael Rooke, Compliance Officer, Orgaworld; ~~Dale Harley, General Manager, Orgaworld~~

Location: Ottawa District Office, 2430 Don Reid Drive, Ottawa, Ontario, K1H 1E1

Ottawa Boardroom (teleconferencing is available if requested)

Purpose: The purpose of the meeting is to discuss the upcoming implementation of the Phase II Ontario Compost Quality Standards and the impacts the standards will have on the operations at Orgaworld Ottawa Facility located at 5123 Hawthorne Road in Ottawa.

Introduction (Kyle)

1. Round table introductions
2. Review agenda items

Phase II Ontario Compost Quality Standards – MOECC Letter, March 18, 2015 – Request for Action Plan (Kyle)

Maturity & Foreign Matter:

1. Process and/or operational changes
2. Environmental Compliance Approval amendments
3. Options to managed processed organic waste not meeting the Ontario Compost Quality Standards
4. Timelines associated with actions necessary to become compliant with Phase II Ontario Compost Quality Standards

Phase II Ontario Compost Quality Standards – Orgaworld Letter, April 28, 2015 – Response to MOECC Letter (Kyle)

1. Installation of water application equipment, development of procedures and potential increase of capacity. No changes to address 'sharps'
2. Amendments to Industrial Sewage Works and Waste ECAs

3. NASM Plan for non-compliant processed organic waste
4. Request for extension to operate under previous regulatory standards until end of 2015. Environmental Compliance Approvals amendments estimated at 1 to two years

Path forward

1. Revisions to the Action Plan (Kyle)

Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa Ontario
K1H 1E1
613-521-3450 or 1-800-860-2195
Fax: 613-521-5437

Ministère de l'Environnement et de l'Action en matière de changement climatique
Bureau du district d'Ottawa
2430, promenade Don Reid, Unité 103
Ottawa (Ontario)
K1H 1E1
613-521-3450 ou 1-800-860-2195
Téléc : 613-521-5437

Ontario

March 18, 2015

Michael Rooke
Orgaworld Canada Ltd.
5123 Hawthorne Road
Ottawa, ON K1G 3Y3

Dear Sir:

RE: Implementation of Ontario Compost Quality Standards – Maturity & Foreign Matter
Orgaworld Ottawa Facility, 5123 Hawthorne Road, Ottawa
Environmental Compliance Approval No. 2766-7HEPSZ

On July 25, 2012 the Ministry of the Environment and Climate Change (MOECC) released revised standards for aerobic composting of organic waste materials in the province of Ontario entitled *Ontario Compost Quality Standards* ("Standards"). The Standards update and replace the *Interim Guideline for the Production and Use of Aerobic Compost in Ontario*, first released in November 1991, and last updated in 2004.

The Standards outline new categories of compost (AA, A, and B) with specific requirements for metals, quality of feedstock, pathogens, foreign matter and maturity. The MOECC implemented Phase I (metals, quality of feedstock and pathogens) of the Standards on January 1, 2013 with Phase II (maturity and foreign matter) to be implemented on July 1, 2015.

In preparation of the upcoming implementation date, the MOECC would like to engage Orgaworld Canada Ltd. in how the requirements of the Standards will be met.

By **May 1, 2015**, please submit an action plan outlining how the Orgaworld Ottawa Facility will comply with the implementation of Phase II of the Standards on July 1, 2015. The action plan should include, but not necessarily be limited to, the following:

1. Process and/or operational changes to the current operations at the Orgaworld Ottawa Facility that may be necessary;
2. Environmental Compliance Approval amendments required to reflect any required process changes or modifications;
3. Options to manage processed organic waste not meeting the *Ontario Compost Quality Standards*; and
4. Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with the Phase II *Ontario Compost Quality Standards*.

Please contact me if you have any questions or concerns with the above request and the implementation of Phase II of the Standards. A meeting can be arranged in the event Orgaworld Canada Ltd. would like to discuss this subject in further detail.

Sincerely,

Kyle Straberger
Environmental Officer

KS:jdv

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: April 28, 2015 1:58 PM
To: Straberger, Kyle (MOECC)
Subject: Implementation of Ontario Compost Quality Standards
Attachments: Response to MOECC Ottawa District.docx

Hello Kyle:

Please find attached the Orgaworld Ottawa response to your letter dated March 18, 2015. If you have further question or concern, please let me know.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 150 Kent St, London, ON N6A 1L3 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Orgaworld
Part of Shanks Group

April 28, 2015

Kyle Straberger
Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Suite 103
Ottawa, Ontario
K1H 1E1

Re: Response to MOECC Ottawa District
IMPLEMENTATION OF ONTARIO COMPOST QUALITY STANDARDS – MATURITY AND FOREIGN MATTER

Action plan required for the following:

1. *Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary;*
2. *Environmental Compliance Approval amendments required to reflect any required process changes or modifications;*
3. *Options to manage processed organic waste not meeting the Ontario Compost Quality Standards; and*
4. *Timelines associated with the actions necessary for the Orgaworld Ottawa Facility to be compliant with Phase II Ontario Compost Quality Standards.*

Process and/or operational changes to the current operations at the Orgaworld Ottawa facility that may be necessary

1. In order to meet the moisture requirement stated in the new compost regulations, the Ottawa facility will need to look at either installing winterized water tankage, water lines and pumps, or utilizing a water truck to spray the compost. Operational changes will include using this water truck and developing procedures in order to ensure that the spraying of the compost meets the 40% moisture target throughout the entire compost pile.
2. Additional future changes may mean the addition of increased compost storage space, since once the compost piles are sprayed with water, they must be turned, or transferred to an empty storage bunker.
3. Sharps. There has yet to be a definitive definition on what is a sharp or not. The phrase "shall contain no material of a size or shape that can reasonably cause animal or human injury" is extremely vague. Historical analytical results have demonstrated that with the current incoming wastestream into Ottawa, there should be little difficulty for the Ottawa facility to meet the foreign matter or sharp requirements.

Environmental Compliance Approval amendments required

1) The Ottawa facility will look at utilizing the water taken from the groundwater remediation well and potentially utilize it in order to bring the finished curing compost up to the specified 40% moisture level. Orgaworld has just submitted an amendment request to the MOECC for our Stormwater ECA. It is unclear at this time if we would have to submit another amendment in order to be able to utilize this water from the remediation well.
2) If this water spray equipment was added, it is presumed that this equipment would also require an amendment to the waste ECA since it would be considered a "change or alteration" to the existing facility and the existing process.
3) If deemed that additional compost storage space is required, this will also require an amendment to the existing Waste ECA.

Options to Manage Processed Organic Waste NOT meeting the Ontario Compost Quality Standards

Orgaworld Ottawa will manage the processed organic waste that does not meet the new regulations by utilizing NASM plans which would still allow the compost to go to farmers fields and be utilized in a beneficial manner. Orgaworld has already arranged transport with haulers that are licensed to transport organic waste, and have completed NASM plan agreements with farmers who wish to take our NASM product.

Timelines associated with actions necessary for compliance

It must be noted that for over a year, Orgaworld Canada and the MOECC were in continuous negotiations regarding the new compost regulations. Until recently, Orgaworld and several other compost producers were under the impression that the MOECC was seriously considering other alternatives than the complete adoption of the entire new compost regulation package. This did not occur and the decision to fully adopt the new compost regulations was made, but not communicated to Orgaworld until very recently. With this in mind, Orgaworld Canada would like to request that we would be allowed to honour all of our compost delivery contracts through the end of the 2015 season. This would allow time to discuss with all of our current compost customers:

i) the potential for accepting the NASM product
ii) The restrictions and usage requirements set out in the plan
iii) Take the necessary soil sampling and creation of the plans

If Amendments are required for the water spraying equipment, then the timeframe to submit the application to the MOECC could be at least six months. The MOECC has mentioned that they would be willing to "fast-track" the approvals process, but it is unclear exactly how long that may take. If more compost storage space is required (a multi-million dollar investment), this process, including engineering, financing, MOECC approval and construction could take at least one to two years.

If you have further questions or concerns, please do not hesitate to contact me at your convenience.

Michael Rooke
Compliance Officer

Process and/or operational
- installing water tanks,
new pumps or water treatment
→ what are the processes
for testing water (monitoring,
testing timing, frequency) and
records
- additional capacity (hours)
→ will you be able to
manage capacity for a
period of time after Tank 1?

Straberger, Kyle (MOECC)

From: Michael Rooke <mrooke@orgaworld.ca>
Sent: May 11, 2015 4:59 PM
To: Straberger, Kyle (MOECC)
Subject: Fw: Addresses

Follow Up Flag: Follow up
Flag Status: Flagged

Hello Kyle:

As per our email traffic last week, please see forwarded the addresses of the farms mentioned last week. Please let me know if you require anything else.

Kind regards,

Mike Rooke
Compliance Officer

Orgaworld
Part of Shanks Group

mrooke@orgaworld.ca
C: (519) 630 6324 | P: (519) 663 4446 ext. 104 | F: (519) 663 0830
Orgaworld Canada Ltd. PO box 21070, London, ON N6K 0C7
* 2940 Dingman Drive, London ON N6N 1G4 (head office)
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

-----Forwarded by Michael Rooke/ORG/WMN on 05/11/2015 04:57PM -----
To: Michael Rooke/ORG/WMN@WMN
From: Michele Myre/ORG/WMN
Date: 05/11/2015 03:54PM
Subject: Addresses

Martin Sieve
CLAY ALL OVER FARMS
2409 Ritchance Road
Alfred, Ont
K0B 1A0

GFL Environmental Inc.
125 Villarboit Cres., Suite B
Vaughan, Ontario
Canada L4K 4K2

Jacob Buhler
1271 rue St. Andre
Embrun, ON
K0A 1W0

Kyle O'Donahue
14455 County Road #9
Berwick, ON

K0C 1G0

Thomas Wahler
Wahler Farms
3651 Labelle Road
Bourget, ON
K0A 1E0

Kind regards,

Michele Myre
Scale Operater

Orgaworld
Part of Shanks Group

mmyre@orgaworld.ca
P: (613) 822 2056 ext. 142 | F: (613) 822 2058
Orgaworld Canada Ltd, PO box 21070, London, ON N6K 0C7
* 4675 Wellington Road South, London, ON N6E 3W7
* 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
www.orgaworld.ca

Consider the environment. Please don't print this e-mail unless you really need to.

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: February 4, 2015 4:26 PM
To: mrooke@orgaworld.ca
Cc: tminarik@orgaworld.ca
Subject: 2013/2014 Operating Year Inspection - Orgaworld Ottawa - Information Request

Hi Mike,

As stated during the inspection on Thursday January 29, 2015, please find the information I requested for each inspection type completed. If you have any questions please let me know.

Industrial Sewage Works – ECA# 7251-8GKRPD

- Analytical results of the 2014 surface water monitoring program outlined in Condition 5 – Surface Water Monitoring and Recording for the month of February, May, August and November
- Analytical results of the 2014 groundwater monitoring program outlined in Condition 9 – Groundwater Monitoring for the month of February, May, August and November
- **Analytical results of Table 2 Trigger Parameters for discharge events in 2013 as per Condition 6 (5) (check annual report)**
- Copy of the Operation & Maintenance Manual (Part II & Part III)
- Logbook records for routine maintenance activities, inspection findings, and repairs completed in 2014

Air – ECA# 7021-7HQNDE

- Complaints Recording Procedure – Provide copies of the complaint records for the two complaints received in December of 2014. I understand the complaints in the Cornwall area are not related to the Orgaworld site in Ottawa however it will verify compliance that the recording procedure is being complied with.
- The last date of revision of the Emission Summary and Dispersion Modelling Report and Acoustic Assessment Report (last time modifications were made to the facility requiring modelling to ensure compliance with air & noise standards outlined in Ontario Regulation 419/05)
- Records of maintenance completed of the bio filter (media replacement)
- Screen shot of SCADA illustrating the process monitoring of the pollution control equipment

Waste Disposal Site – ECA# 2766-7HEPSZ

- Analytical results of the 2014 incoming and outgoing (including 10-100) as per Condition 7(3), Condition 7(4) and Condition 7(6)
- In 2014 has Orgaworld received results of non-compliance with Quality Compost Standards?
- Screen shot of SCADA illustrating the process monitoring of the composting operations to ensure compliance with Condition 7(8)
- Temperature monitoring records for the curing stockpiles for the following dates: January 15, 2014, February 19, 2014, March 26, 2014, April 30, 2014, May 28, 2014, June 25, 2014, July 30, 2014, August 27, 2014, September 24, 2014, October 29, 2014, November 26, 2014, December 17, 2014

I am currently working on the inspections therefore I may send another email if I require additional information.

Thanks,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca



Please consider the environment before printing this email.

SLOTGLHA 211

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: April 17, 2018 8:51 AM
To: David Veinot (dveinot@orgaworld.ca)
Cc: Brian Begg (bbegg@orgaworld.ca); Andre Boucher
Subject: MOECC Inspection Reports - Orgaworld Canada Inc., 5123 Hawthorne Road, Ottawa, On
Attachments: Air Facility Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Industrial Sewage Works Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Non-Hazardous Waste Transfer Processing Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Subject Waste Generator Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf

Hello David,

Please find attached copies of the inspection reports completed at Orgaworld Ottawa, dated March 15, 2018, located at 5123 Hawthorne Road, Ottawa, On. If you have any questions after the review of the reports please contact me to discuss.

Attachments:

- Air Facility Inspection Report
- Industrial Sewage Works Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report
- Subject Waste Generator Inspection Report

The Subject Waste Generator Inspection Report outlines an action item for the confirmation of Copy 6 of Waste Manifest No. RS77263. In your email, dated March 23, 2018, the copy was provided to me therefore the action item has been addressed. The report was already completed and sent for sign-off when you provided the information therefore I couldn't make any changes at that time.

Thank you,

Kyle Straberger
Environmental Officer
Ministry of the Environment and Climate Change
Ottawa District Office
2430 Don Reid Drive, Ottawa
K1H 1E1

(613) 521-3450 ext. 232
(613) 521-5437 fax
1-800-860-2195
Kyle.Straberger@ontario.ca

ORGAWORLD
SLOTGL HA 211 ✓
5123 Hawthorne
#1631-A2ELCQ

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: November 2, 2016 8:36 AM
To: Nick Pora (npora@orgaworld.ca)
Cc: mrooke@orgaworld.ca
Subject: Ministry of the Environment and Climate Change Inspection Reports - September 29, 2016
Attachments: Ministry of the Environment and Climate Change - Air Facility Inspection Report (September 29, 2016).pdf; Ministry of the Environment and Climate Change - Industrial Sewage Works Inspection Report (September 29, 2016).pdf; Ministry of the Environment and Climate Change - Non-Hazardous Waste Transfer Processing Inspection Report (September 29, 2016).pdf

Good morning Nick,

As a result of the Ministry of the Environment and Climate Change's inspections at Orgaworld Ottawa on September 29, 2016, please find attached the following inspection reports:

- Air Facility Inspection Report
- Industrial Sewage Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report

Please review and contact me if you have any questions. I want to also thank yourself, Chris and Brian for your time and cooperation during the inspection process.

Regards,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

Please consider the environment before printing this email.

Hart, Tracy (ENE)

From: Wojcik, Margaret (ENE)
Sent: September 8, 2011 4:00 PM
To: Placko, Joanne (ENE); Mills, Jeff (ENE); Hart, Tracy (ENE); Armour, Lynnette (ENE)
Cc: Shah, Bijal (ENE); Benvenuti, Lisa (ENE)
Subject: FW: Negative pressure at SSO composting sites

Good Afternoon, I am writing to you all to follow up on my previous email regarding negative pressure in SSO processing buildings. Do any of you have any monitoring data that would help us at the EAAB defend the negative pressure condition?
Lisa has sent me some information on operations at Universal in Welland and it appears that Universal maintains the negative pressure at all times, even when the doors open to let trucks in and out.
Anybody else?
Thanks, Margaret (and Bijal)

From: Wojcik, Margaret (ENE)
Sent: August 31, 2011 11:52 AM
To: Placko, Joanne (ENE); Mills, Jeff (ENE); Hart, Tracy (ENE); Benvenuti, Lisa (ENE); Armour, Lynnette (ENE)
Cc: Shah, Bijal (ENE)
Subject: Negative pressure at SSO composting sites

Good morning to All,

The issue of negative pressure in the SSO receiving buildings continues to generate challenges for the EAAB reviewers dealing with the SSO composting sites. We are getting contradicting information from proponents with respect to their ability to maintain negative pressure in the SSO containing buildings especially when the doors are open. We acknowledge the fact that some of the negative pressure is lost when the doors are open, but we were under the impression that it is possible to keep the pressure on the negative side, even if it's only slightly negative.

Also, there are discrepancies regarding the maximum level of negative pressure that is physically possible to achieve. In their application, Orgaworld proposed -250 Pa to be maintained in the receiving area and the main hall. The City of Guelph said that it's physically impossible to maintain this level of negative pressure in the building without damage to the building and the doors, and instead proposed -5 to -10 Pa. That is quite a difference.

So to solve this mystery once for all, I would like to ask for the actual negative pressure monitoring data for the composting sites you are looking after. I checked the cofas and hope that the data is available:

City of Hamilton, WDS CofA #A130213, Issue Date: January 28, 2005

68. The Owner and Operator shall maintain a negative air pressure atmosphere in the unloading area at all times. In the event that negative air pressure can not be maintained, the Owner and Operator shall cease accepting additional waste and shall keep the loading bay doors closed until such time as negative pressure is re-established.

But Joanne indicated before that they do measure the magnitude.

Orgaworld Canada Ltd. (London) WDS CofA #5250-6V4HX2, Issue Date: December 20, 2006

46. The Owner shall maintain a negative air pressure atmosphere within the processing building, incompassing the receiving and traffic hall, pump room, and screening area, at all times. In the event that adequate negative air pressure can not be maintained, the Owner shall cease accepting additional waste and shall keep the loading bay doors closed until such

time that negative pressure is re-established.

Jeff, are they measuring the negative pressure?

Orgaworld Canada Ltd. (Ottawa) WDS cofa #2766-7HEPSZ, Issue Date: September 16, 2009

5.(7) Odour Control:

(a) The Owner shall maintain and monitor a negative air pressure atmosphere within the Processing Building at all times in accordance with the documents in Schedule "A". In the event that adequate negative air pressure cannot be maintained within the Processing Building, the Owner shall cease accepting additional Organic Waste and shall keep the loading bay doors and the air intake louvers closed until such time that negative pressure is re-established.

City of Guelph, WDS Cofa #A170128, Notice No. 3, Issue Date: August 11, 2010

36.(6) Odour Control:

(a) The Owner shall maintain a negative air pressure atmosphere within the Processing Building, as compared to the ambient atmospheric pressure, at all times.

Cofa AIR #1721-82YRUS, Issue Date: August 11, 2010

3. The Company shall monitor and record the following physical parameters of the Biofilter and the building, through a combination of sensors, meters and physical probes, at frequencies either as recommended by the Equipment suppliers or as determined by operational needs:

(2) Building:

(a) negative pressure

Universal Resource Recovery Inc., WDS Cofa #9855-73BJGK, Issue Date: December 9, 2010

7.(13) Processing Building Atmosphere:

(a) The Owner shall monitor the following physical parameters of the atmosphere within the Processing Building, through a combination of appropriate sensors, meters and physical probes as follows:

(i) negative pressure within the confines of the Processing Building, continuously; and

---

Thanks a lot everybody. Hope to hear from you soon.

Margaret

Witnessed July 6, 2011

Hart, Tracy (ENE)

From: Hannington, Neil (ENE)
Sent: July 19, 2011 1:51 PM
To: Hart, Tracy (ENE)
Cc: Azocar, Guillermo (ENE); Wan, Rudolf (ENE); Fani, Jason (ENE)
Subject: Orgaworld witnessing report
Attachments: 20110718-5070106-Orgaworld_Witnessing_Report.pdf

Tracy,

It was a pleasure meeting you earlier this month. As per usual I am attaching a witnessing report which outlines the portion of the testing that I witnessed. This report also documents the production information recorded during the test period.

As mentioned on-site, if this round of testing once again results in measured TRS concentrations below the method detection limit, it may be reasonable to consider relaxing the sampling requirements for these particular contaminants. Given that these are "Odour based" limits in the Regulation, future odour test results and/or odour complaints may provide an indication as to when TRS testing may be required down the road.

Obviously relaxing any source testing requirements would be to the discretion of the District and dependant on your comfort level. We can always touch base following the report submission.

Regards,

Neil Hannington
Source Assessment Specialist
Ministry of the Environment
Standards Development Branch
Tel: 416-327-0696
Fax: 416-327-9187

Ministry of the Environment | **Ministère de l'Environnement**

Standards Development Branch | **Direction de l'élaboration des normes**

40 St. Clair Avenue West
Toronto ON M4V 1M2

40, avenue St. Clair ouest
Toronto, ON M4V 1M2

www.ene.gov.on.ca | www.ene.gov.on.ca

Ontario

2011/07/18

SOURCE TESTING WITNESSING REPORT

Witnessing Report Sent to:	SDB File - AQ-02 (Orgaworld – Ottawa Facility)	
Witness:	Neil Hannington, Source Assessment Specialist Technology Standards Section Standards Development Branch	
Witnessing Date:	2011/07/06	
Project Number:	ER:SA:108851:11	
MOE Office:	Ottawa District Office	
MOE Contact:	Ms. Tracy Hart	- Phone: 613-521-3450 - Fax: 613-521-5437 - email: Tracy.Hart@ontario.ca

Company Background:

- Company Name: Orgaworld Canada Ltd. – Ottawa Facility
- Plant Address: 5123 Hawthorne Road
Ottawa, Ontario
- Project Coordinator: Greg Mariotti
Compost Facility Manager
Phone: (613) 822-2056
Fax: (613) 822-2058
Email: gmariotti@orgaworld.ca
- Target contaminants: Odour, Hydrogen Sulphide, Total Mercaptans
- Sampling Protocol: Approved by N. Hannington (2011/06/28).

Sampling Company Background:

- Company Name: Conestoga-Rovers & Associates
  651 Colby Drive
  Waterloo, Ontario
  N2V 1C2

- Project Coordinator: Brent Boss
  - Phone: 519-884-0510 ext. 2268
  - Fax: 519-884-0525
  - email: bboss@craworld.com

- Sampling Team: John McRae (Team Lead)
  Mike Masschaele (Technician)
  Chris Adam (Technician)

Sampling Methodologies:

- Odour – Dynamic Dilution
- Odour Analysis – Triplicate Forced Choice Olfactometry
- TRS Sampling/analysis – Environment Canada EPS 1/RM/6

The Orgaworld Canada Ltd. Ottawa facility (Orgaworld) is located at 5123 Hawthorne Road. The facility currently operates a fully enclosed composting operation which receives compost materials from the City of Ottawa's source separated organics program. The site, pictured below, operates under CofA No. 7021-7HQNDE and is limited to receiving a maximum of 150,000 tonnes per year of organic waste materials.



Currently the facility is operating at a reduced capacity based on the total tonnage of materials permitted. However due to the composition of the materials being received (mostly leaf and yard waste which has a lower density compared to household organics) the facility was near maximum storage capacity during the witnessed test period.

Process Description

Organic waste is transported to the Orgaworld facility via garbage collection trucks. As the trucks fill during their regular collection, they make their way to Orgaworld to unload. Trucks back into the enclosed facility and drop their loads on the tipping floor. Materials are quickly moved to a storage pad which comprises the majority of the buildings footprint. Piled waste sits on the storage / processing pad before being loaded into one of the 6 curing tunnels.

Between 300 and 600 tonnes of materials are loaded into each tunnel for the curing process. There are six (6) curing tunnels currently in operation. During the curing process air is continuously passed through the piled material. With properly maintained parameters (oxygen concentration, temperature, relative humidity and air flow) the organic material is fully composted and ready for market within 6 – 7 days.

Following the curing stage the tunnel is opened and the material is transported to the screening room via front-end loader. The front-end loader dumps the composted material into a screener where the fine and coarse material is separated. The material <10mm diameter is piled and prepared for sale while the 10 – 100 mm diameter material is recycled back through the process. Larger materials >100mm are shredded and pass through the process in the same manner as the 10-100mm material.

The temperature profile for the curing process is cyclical; for roughly the first three days of the curing cycle the tunnel temperature is maintained around 55 – 60 degrees Celsius. The remaining three or four days the tunnel is maintained at a temperature of approximately 40 degrees Celsius. The tunnel is allowed to reach ambient temperature before the tunnel doors are opens and the material is sent to the screening room. It is expected that the highest odour emission potential would be at the beginning of the cycle as the tunnel is being heated and the material is coming up to temperature.

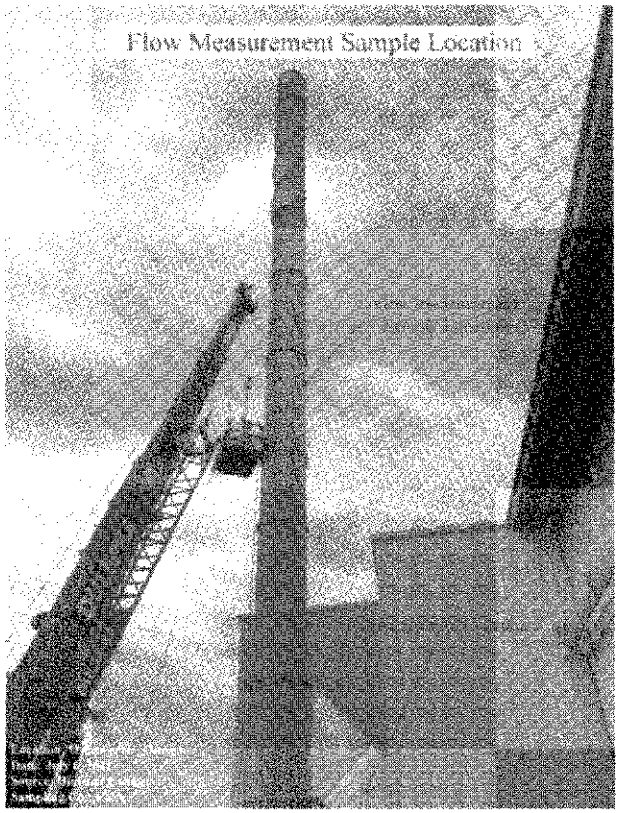
Process air is collected from the receiving area, storage pad and the curing tunnels where it is directed to the pollution control system which consists of an ammonia scrubber, two biofilters

(working in parallel) and a bioscrubber.

Sampling Locations

Odour sampling was conducted via sampling port installed on the breaching leading to the stack from the bioscrubber. Volumetric flow measurements were completed via two ports situated 90 degrees to one another approximately 4 diameters downstream of the breaching in a straight length of duct. This sample location was non-ideal

The following photos depict the main stack and the odour sampling location.



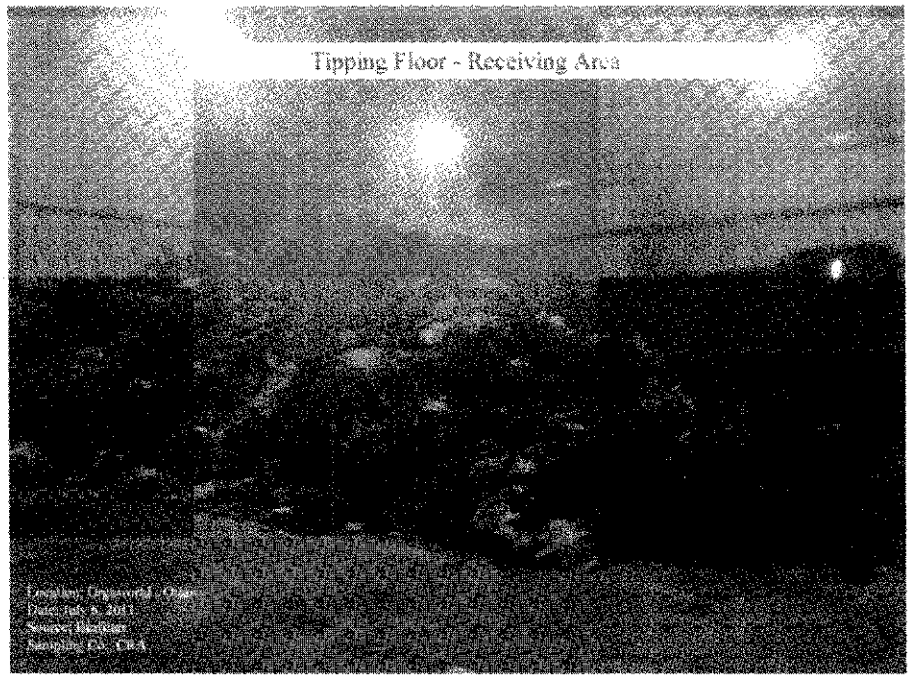
Site Observation

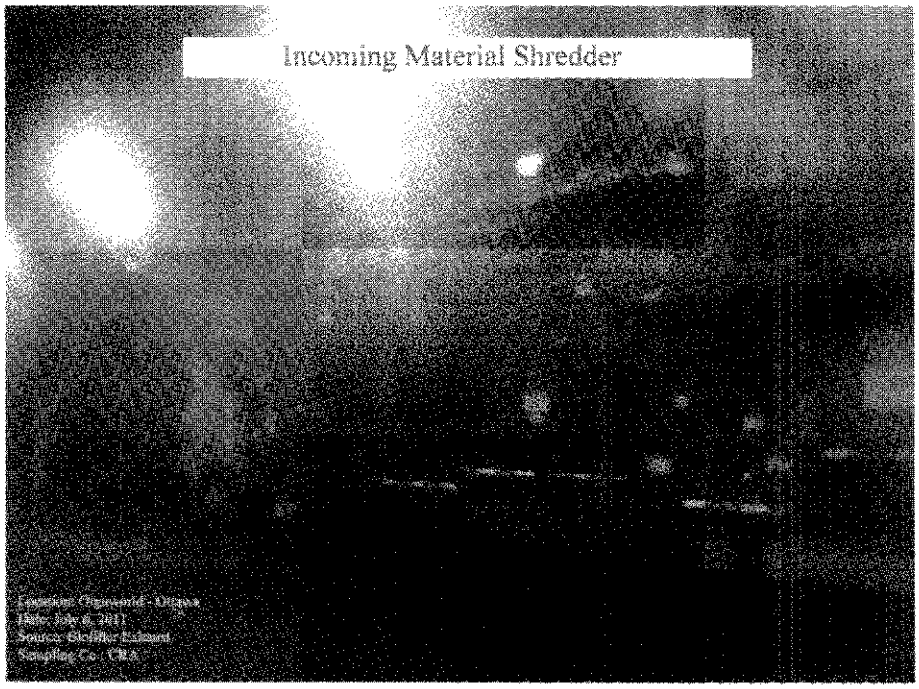
On the test date (July 6, 2011) three of the six tunnels were in the heating stage. Two other tunnels

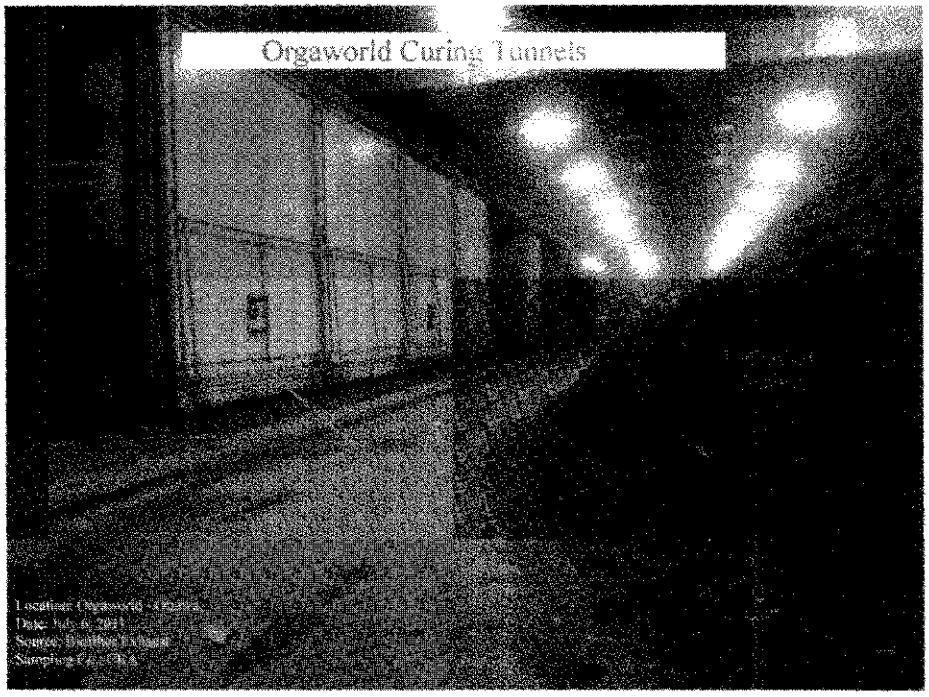
were in transition (either being filled or emptied) and one tunnel was empty. This is consistent with production typically seen at the site. It should be noted however that unlike the previous round of testing there was a significant amount of material in the building, both on the tipping floor and on the storage/processing pad. It appeared that the facility was near its volumetric capacity and process data provided by Orgaworld indicates that a significantly higher amount of materials were being received on a daily basis, for the weeks prior to testing, as compared to previous test programs. All process data, as provided by Orgaworld, has been appended to this report.

Two other notable changes at the facility since the last round of testing include the addition of an on-site shredder which is housed within the building on the processing floor between the tipping floor and the tunnels. This unit is used prior to the curing process. Materials are shredded providing a more consistent feed that can lead to shorter processing times. In addition it was stated that the reject materials which fell in the 10 – 100 mm range are now between the 10 – 20 mm range. Though not confirmed it was assumed that changes have been made in the screening process. Reasons for the changes were not discussed.

A site tour was completed with Michael Rooke (Orgaworld Compliance Officer) and Tracy Hart (MOE Ottawa District Environmental Officer). At the time of the tour (~10:00 a.m.) there was a significant amount of material in the receiving area of the plant and the processing area appeared to be near capacity. The storage pads located across from the curing tunnels (called the mixing/shredding pile by Mr. Rooke) appeared to be completely full. Mr. Rooke estimated the material to consist of approximately 1,200 tonnes. Photos of the facility's processing areas can be seen on the following pages.


Tipping Floor - Receiving Area


Incoming Material Shredder



Both tunnels 7 and 8, which have not been commissioned to-date, were being used to store what appeared to be "10 – 20" material.

A summary of the various stages of each tunnel (as of ~9:00a.m, July 6) can be seen below:

	Mode	Decription
Tunnel #1	Stage II	~80 hrs - estimated 300T material in tunnel
Tunnel #2	---	Being filled with fresh material ~1/2 full
Tunnel #3	Stage IV	~175 hrs - estimated 300T material in tunnel
Tunnel #4	Stage V	~270 hrs - estimated 300T material in tunnel
Tunnel #5	---	Being emptied ~2/3 full or 200T material in tunnel
Tunnel #6	---	Empty

Estimates of materials in tunnels provided by Michael Rooke (Compliance Officer - Orgaworld)

Unlike the previous round of testing there was a significant amount of material in the building, both on the tipping floor and in the processing floor. It appeared that the facility was near its volumetric capacity. Process data, as provided by Orgaworld, has been appended to this report.

Sampling Methodology / Observations

Sampling was completed by John McRae and Chris Adam of CRA. Flow measurements were obtained with the assistance of a crane and a basket, while odour samples were collected from ground level using a port installed on the breaching leading to the main stack.

A moisture test was completed for a period of twenty minutes following the Ontario Source Testing Code Version #2, Nov 1980 – Method 4, to obtain the stack gas moisture content. Odour sampling was completed following procedures outlined in the Draft odour sampling method ON-6 found in the Draft Ontario Source Testing Code, Version #3, July 2009.

TRS sampling was completed following Environment Canada Method EPS 1/RM/6 which utilizes an 85% solution of phosphoric acid contained within a midget impinger for the purpose of removing moisture prior to capturing the stack gas in a Tedlar® sample container. Samples were analyzed on-site using CRA's GC-FPD analyzer.

TRS sampling was completed prior to odour sampling. TRS analysis was completed on-site by CRA using a GC-FPD analyzer. In the previous program personnel from the analytical laboratory (Air Zone) came to the site with the GC analyzer to complete the TRS analysis. For this round of testing CRA had employed their own GC-FPD analyzer. Only portions of the GC-FPD calibration were witnessed prior to departure from site.

Ambient temperature and meteorological data were obtained from Environment Canada. The data originates from a weather station located at the Ottawa International Airport which is located within approximately 15 kilometers of the Orgaworld facility. This data can be seen on the following page:

Latitude: 45°19'21.000" N Longitude: 75°40'09.000 " W Elevation: 114.00 m

limate ID: 6106000 WMO ID: 71628 TC ID: YOW

Hourly Data Report for July 6, 2011

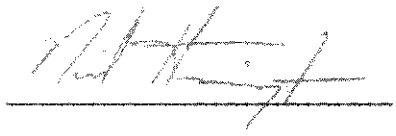
Time	Temp °C	Dew Point Temp °C	Rel Hum %	Wind Dir 10's deg	Wind Spd km/h	Stn Press kPa	Weather
00:00	22.0	14.4	62	23	15	99.71	Mostly Cloudy
01:00	21.6	13.5	60	22	13	99.68	Clear
02:00	20.9	13.2	61	20	9	99.63	Mainly Clear
03:00	19.6	13.9	70	19	9	99.64	Mostly Cloudy
04:00	19.3	14.3	73	25	4	99.64	Mostly Cloudy
05:00	19.0	14.7	76		0	99.63	Mostly Cloudy
06:00	19.8	15.7	77	19	7	99.57	Mostly Cloudy
07:00	21.5	17.2	77	21	9	99.61	Mostly Cloudy
08:00	20.3	18.3	88	19	15	99.55	Rain
09:00	19.8	19.0	95	24	9	99.62	Thunderstorms,Rain
10:00	21.3	19.9	92	19	7	99.58	Cloudy
11:00	21.2	20.0	93	24	15	99.62	Thunderstorms,Rain
12:00	22.5	18.6	79	26	24	99.62	Cloudy
13:00	22.9	18.9	78	28	26	99.63	Cloudy
14:00	24.1	17.6	67	28	22	99.63	Mainly Clear
15:00	24.8	18.1	66	27	20	99.63	Mainly Clear
16:00	24.8	17.6	64	30	20	99.62	Mainly Clear
17:00	24.3	17.1	64	31	22	99.60	Mainly Clear
18:00	23.3	17.9	72	34	24	99.66	Mostly Cloudy
19:00	21.3	16.0	72	33	22	99.73	Mostly Cloudy
20:00	20.7	15.8	74	33	20	99.75	Mostly Cloudy
21:00	18.8	15.5	81	30	11	99.84	Mainly Clear
22:00	19.1	15.5	80	28	6	99.88	Clear
23:00	17.9	15.8	88	27	11	99.90	Clear

Final Comments

In general, the portions of the sampling program which were witnessed were completed following the methodology outlined in the approved pre-test plan protocol. As a result of the analysis limitations in the TRS sampling method (Environment Canada EPS Method 1/RM/6) which states

that sample analysis should begin within one (1) hour of sampling, CRA opted to complete on-site analysis. It was clear that CRA was not well versed with the analytical equipment and methodology. Unfortunately as a result of previous commitments, only a portion of the time consuming calibration procedure could be witnessed.

The Orgaworld facility was operating at a much higher production level as compared to previous test programs. Though the facility appeared to be near its volumetric capacity, the low density characteristics of the waste materials (mostly leaf and yard) means they are likely operating below their annual permitted capacity.



Neil Hannington
Source Assessment Specialist
Standards Development Branch

c.c. T. Hart – Ottawa District Office (via email: Tracy.Hart@ontario.ca)
R. Wan – EA&AB (via email: Rudolf.Wan@ontario.ca)
J. Fani/G. Azocar – SDB (via email)
File AQ-02 (Orgaworld Canada Ltd. – Ottawa)

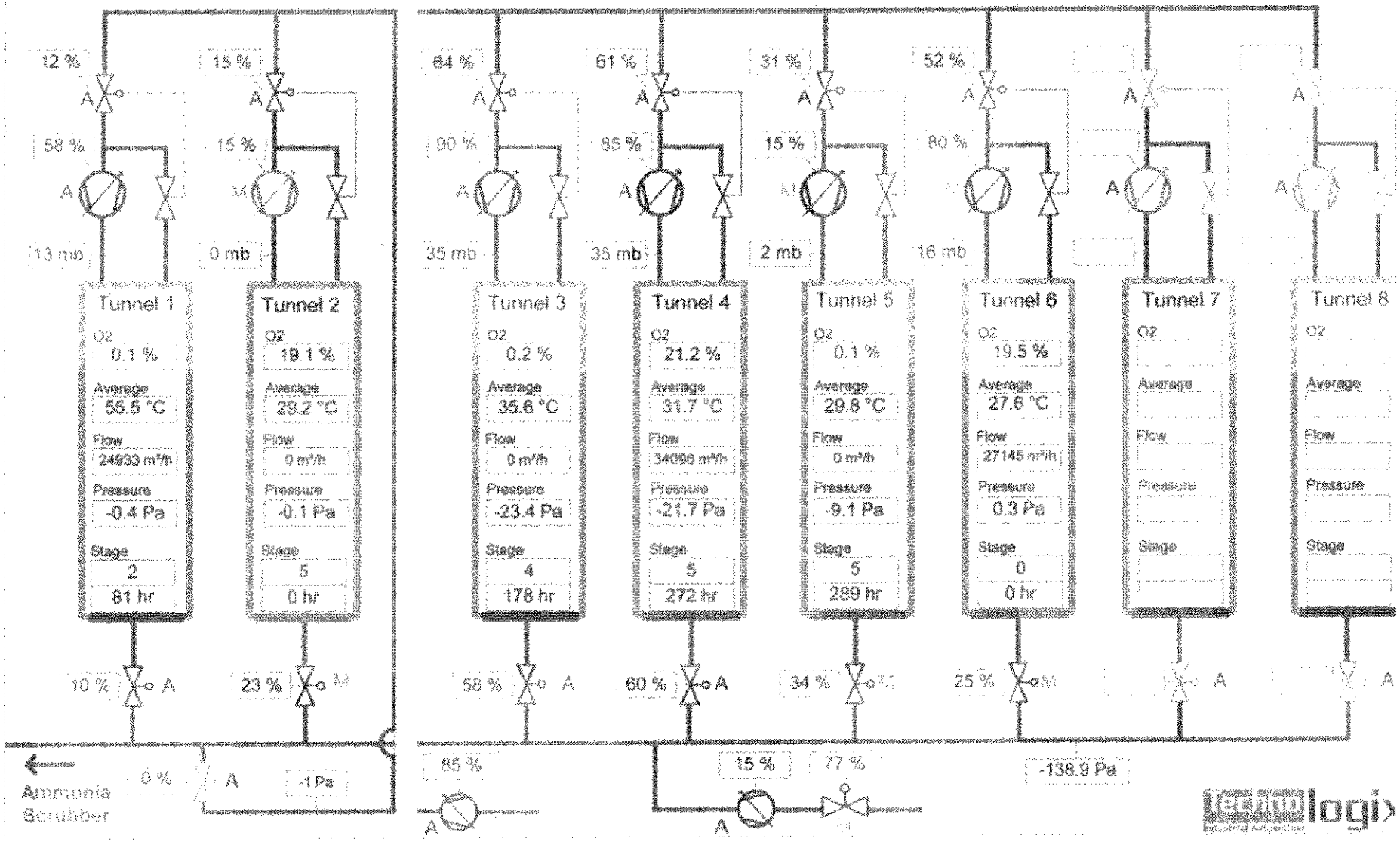
(Doc.Mgmt # 5U070106)

TUNNELS OVERVIEW

Outside Temperature 29.2 °C

31.5 °C -157 Pa A

OxyaWorld



enviologik

004696

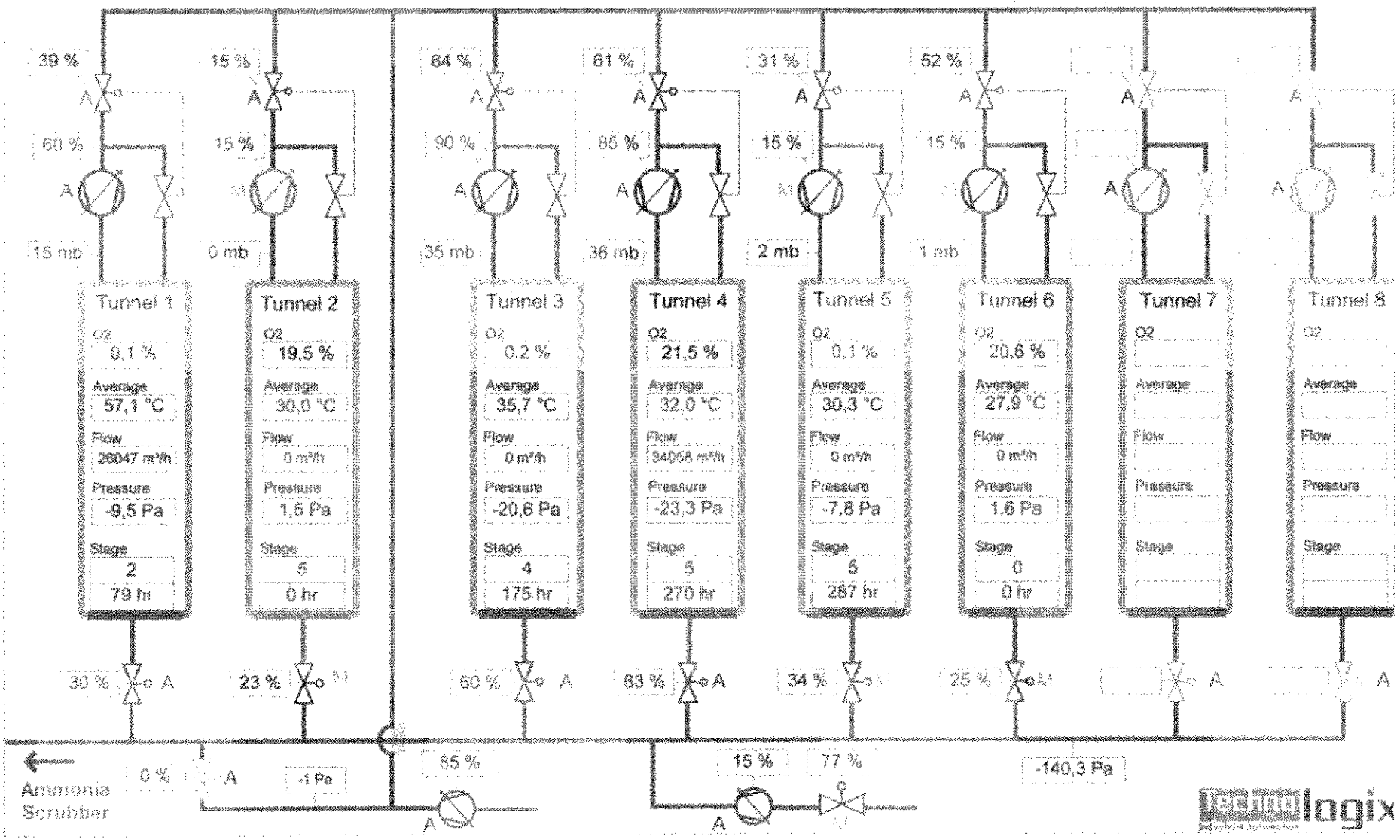
TUNNELS OVERVIEW

Outside temp 8.6 °C

29,2 °C -139 Pa

A

OrcaWorld



Logix

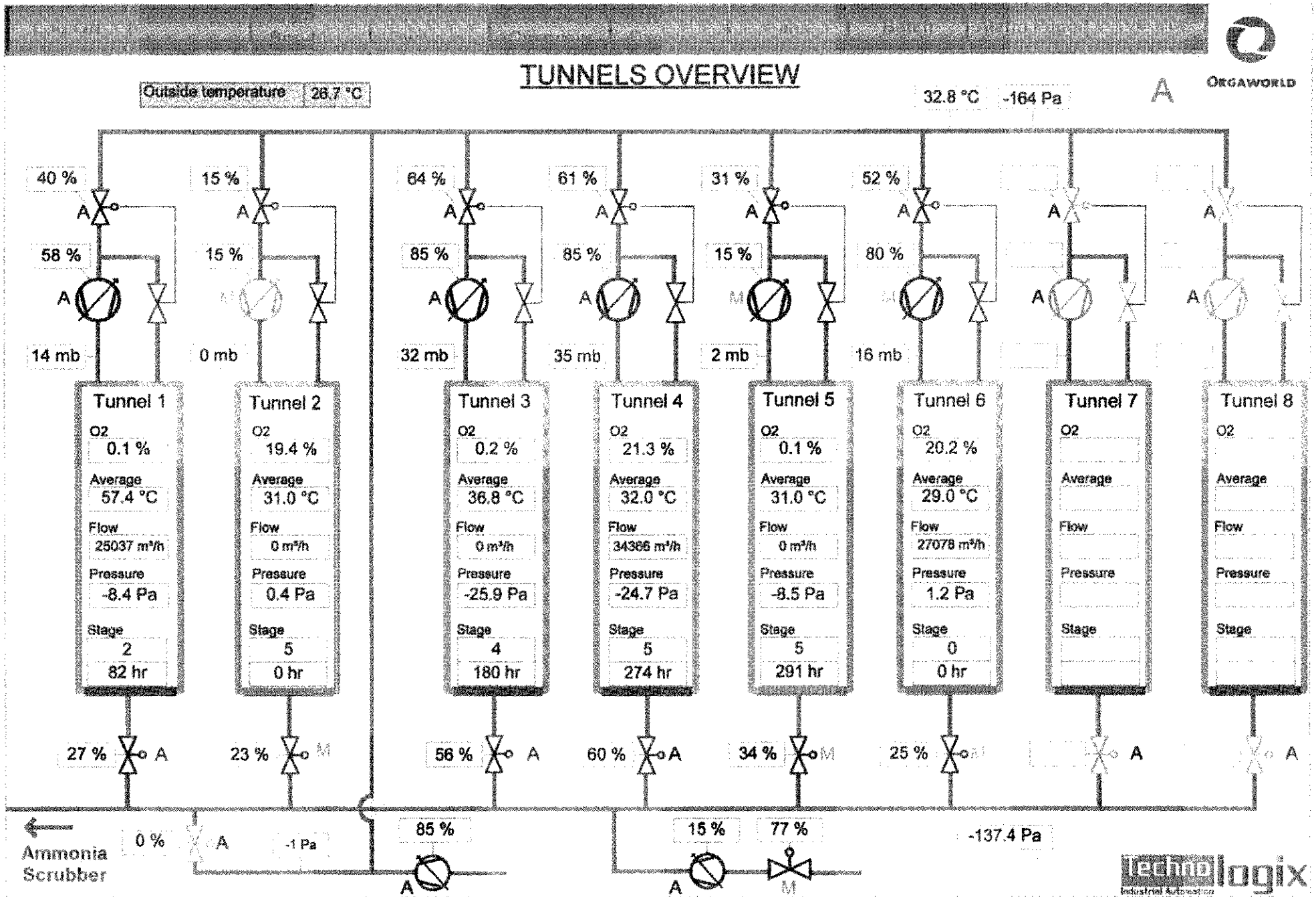
004697

TUNNELS OVERVIEW

ORGAWORLD

Outside temperature 26.7 °C

32.8 °C -164 Pa



technologix Industrial Automation

004698

OVERVIEW BIOFILTERS

A ORGAWORLD

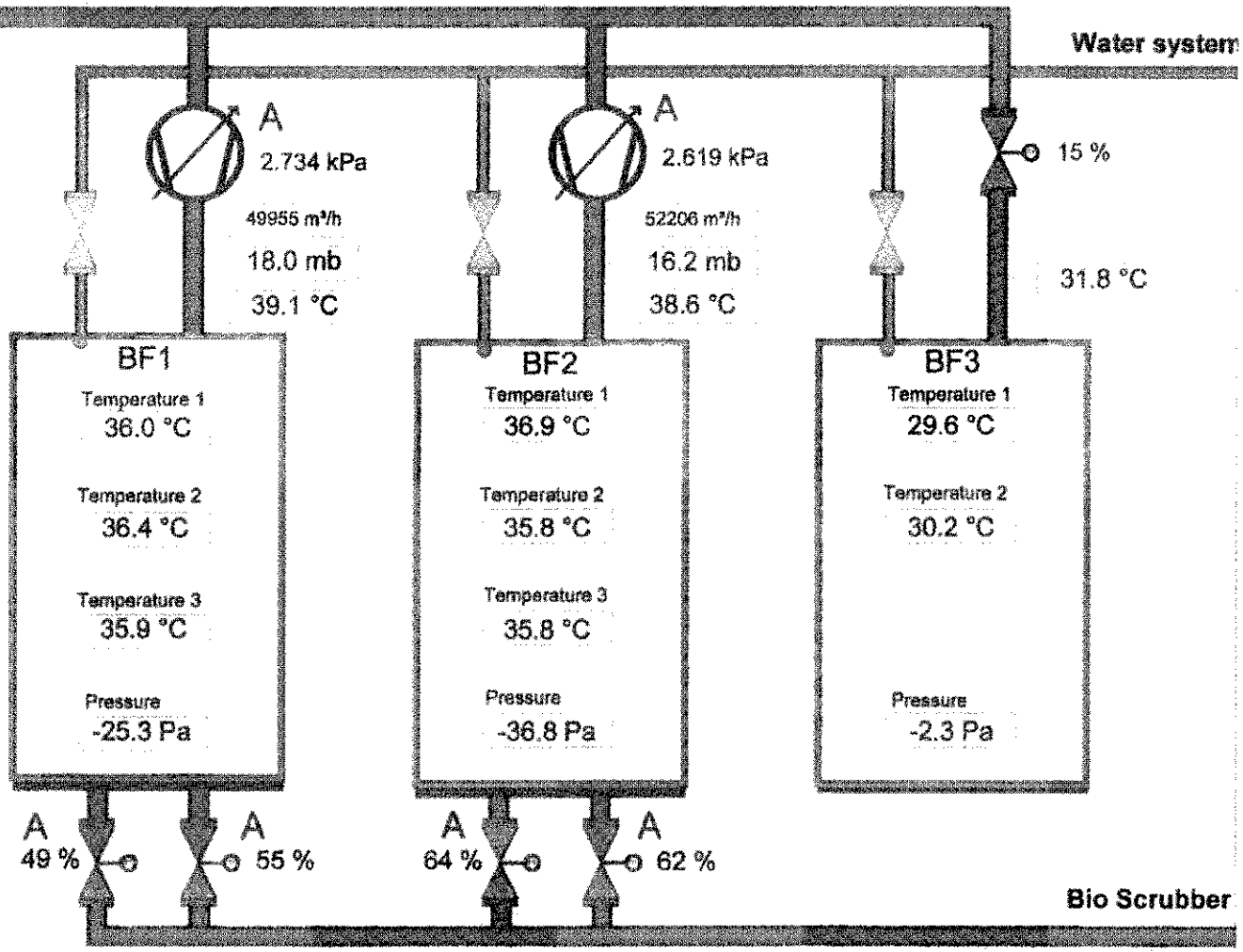
Ammonia Scrubber -142.7 Pa 37.6 °C 20.3 %

Pressure setpoint -140.0 Pa

Fan 1	
90 %	54.0 Hz
49955 m³/h	62.9 A
1119 rpm	49.1 KW

Fan 2	
90 %	54.0 Hz
52206 m³/h	67.2 A
1119 rpm	52.5 KW

Fan 3	
0 %	0.0 Hz
0 m³/h	0.0 A
0 rpm	0.0 KW



Average temperature biofilter 1	36.1 °C
Actual humidity biofilter 1	98.5 %
Average temperature biofilter 2	36.1 °C
Actual humidity biofilter 2	98.5 %
Average temperature biofilter 3	0.0 °C
Actual humidity biofilter 3	0.0 %

-452.3 Pa 18.4 %

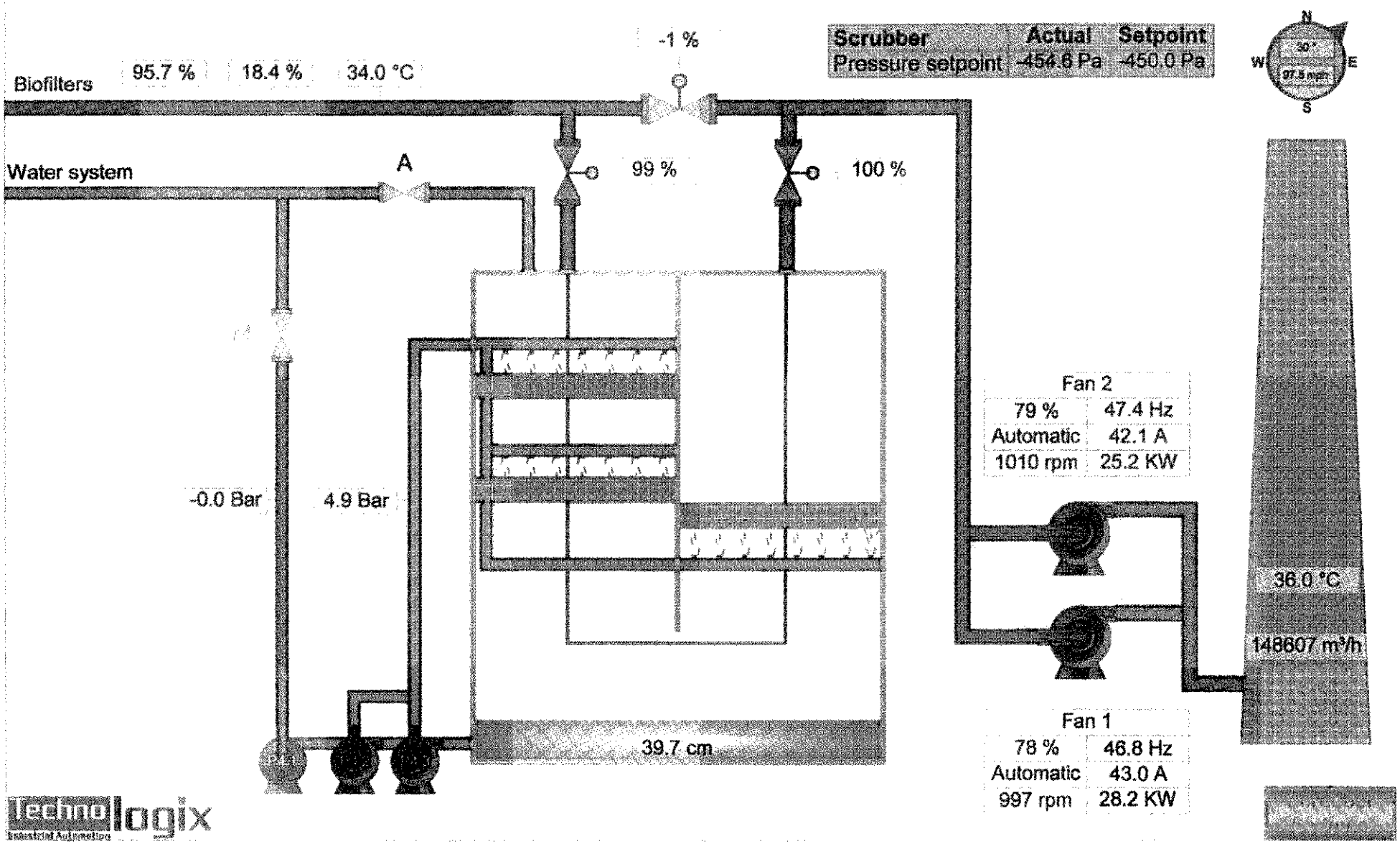
Technologix Industrial Automation

004699

SCRUBBER OVERVIEW

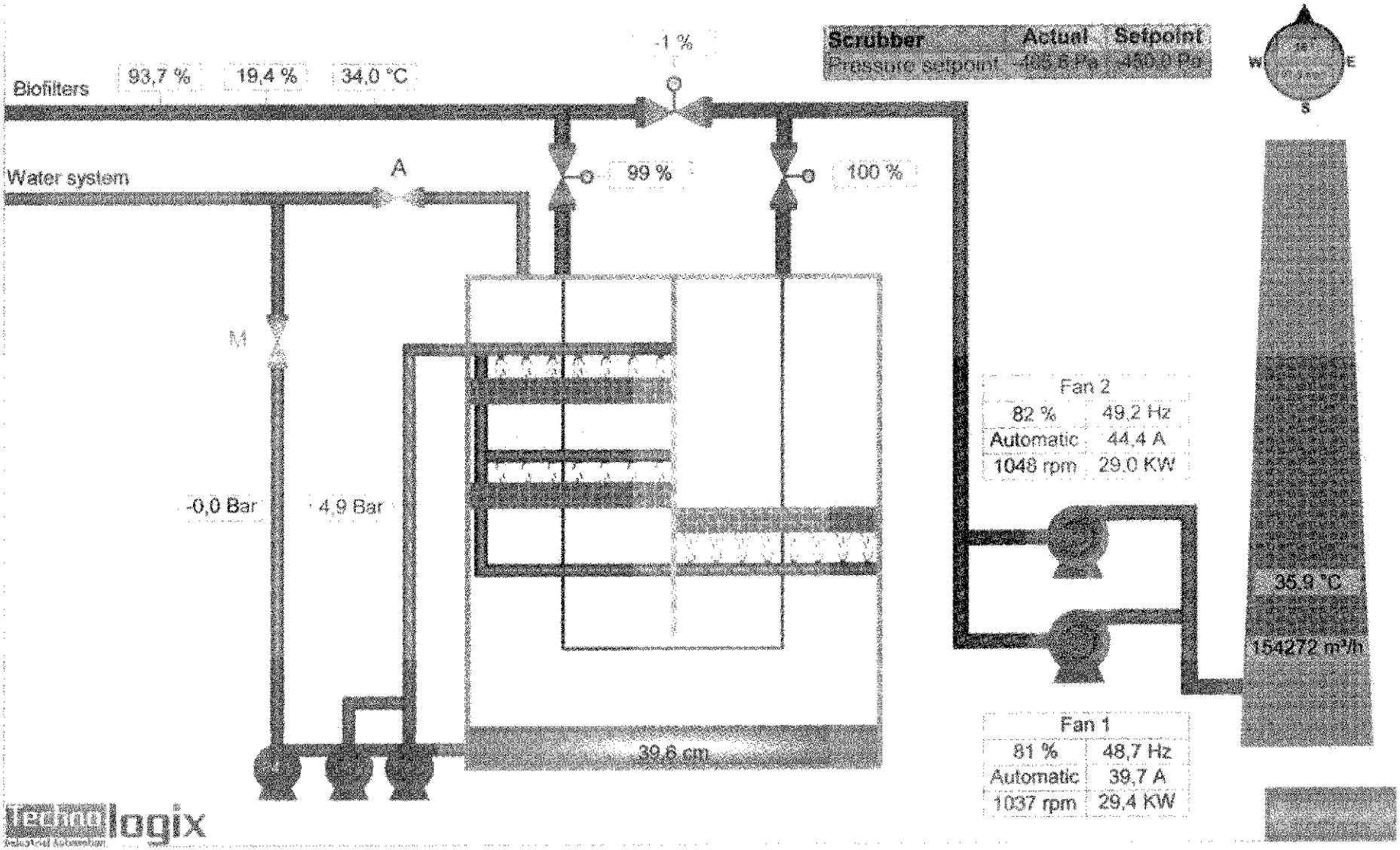
A ORGAWORLD

Scrubber	Actual	Setpoint
Pressure setpoint	-454.6 Pa	-450.0 Pa



Technologix
Industrial Automation

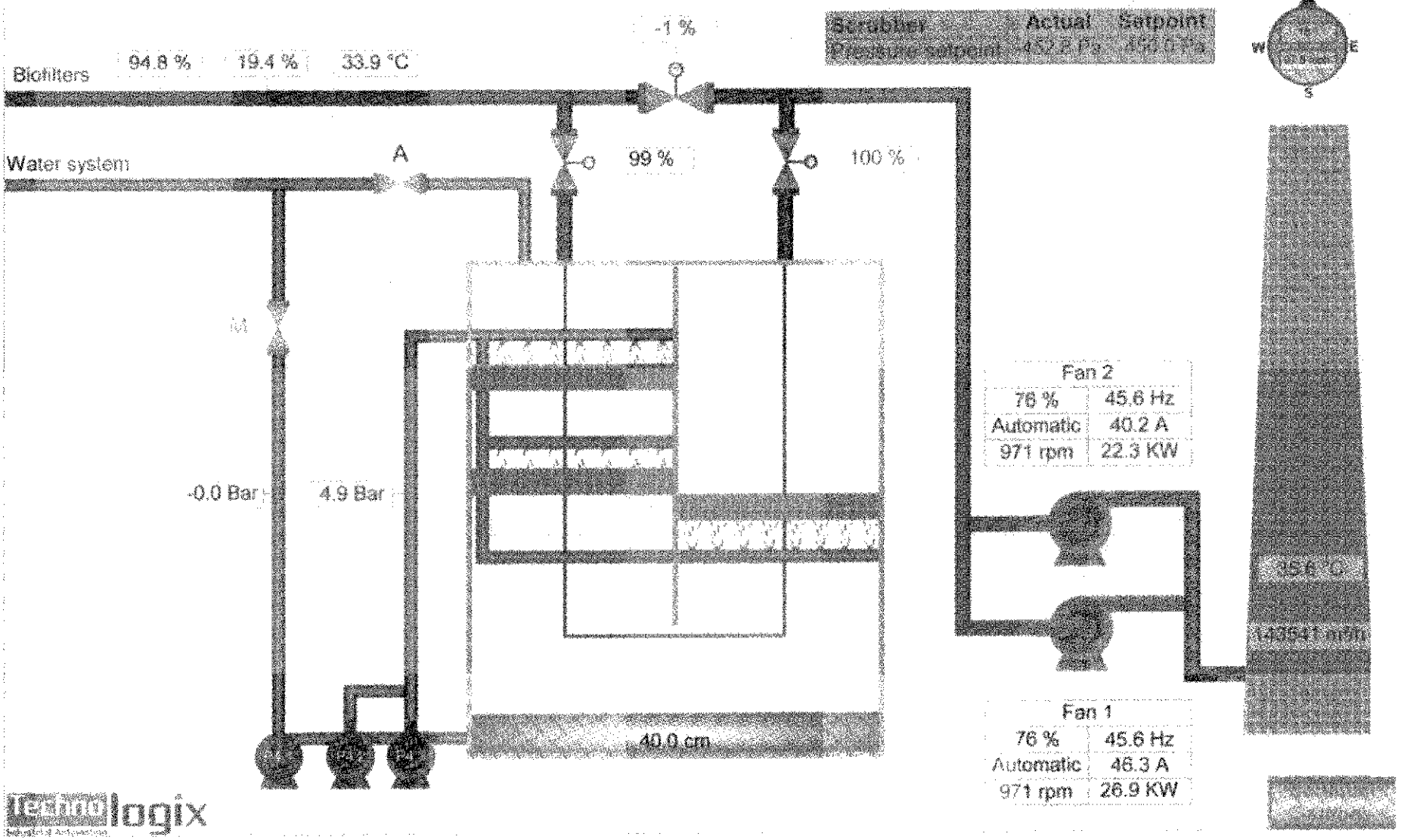
SCRUBBER OVERVIEW



004701

SCRUBBER OVERVIEW

A



OVERVIEW BIOFILTERS

ORGAWORLD

Ammonia Scrubber -135.1 Pa 35.0 °C 20.4 %

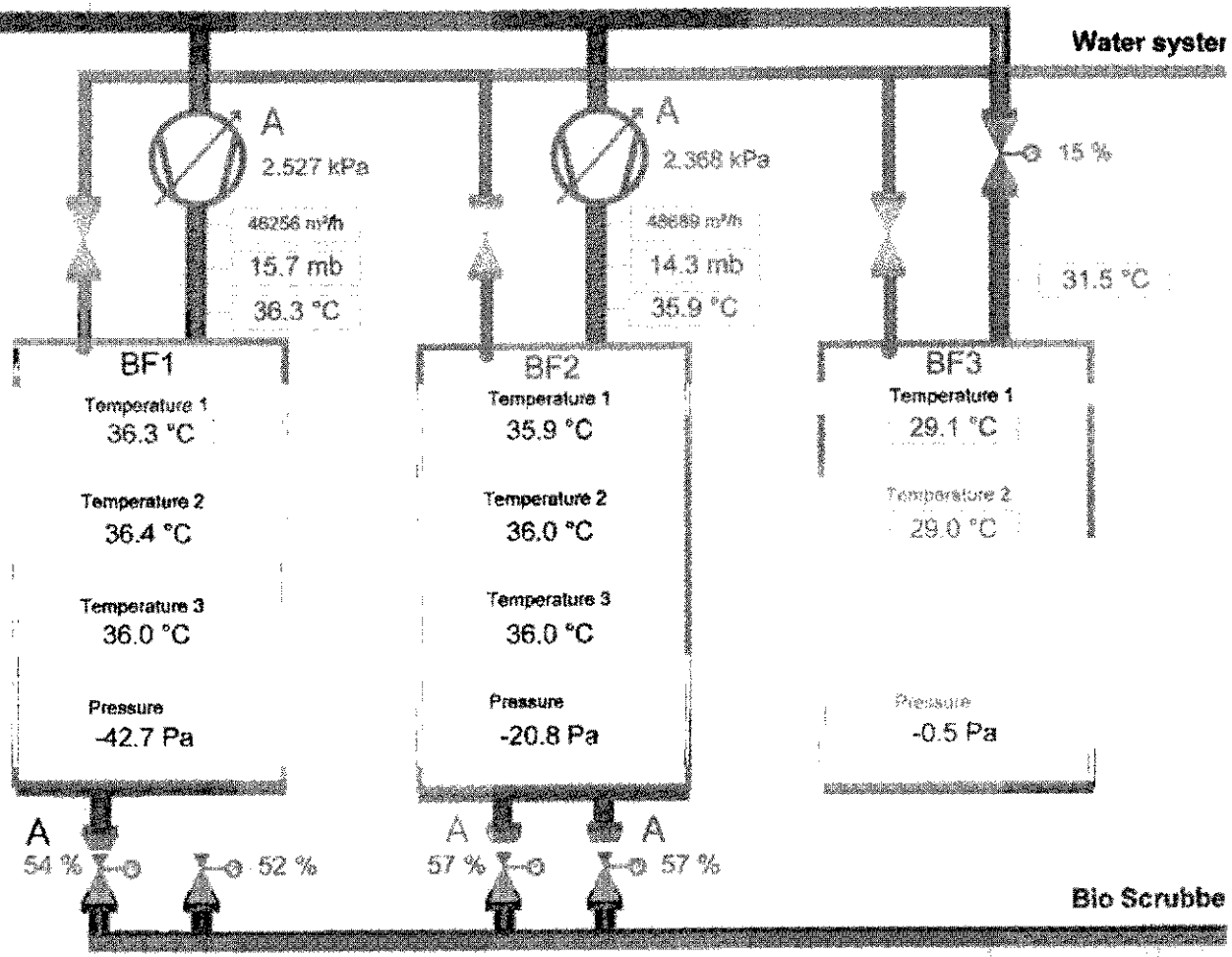
Pressure setpoint -140.0 Pa

Water syster

Fan 1	
85 %	51.0 Hz
46256 m³/h	57.6 A
1056 rpm	41.4 KW

Fan 2	
85 %	51.0 Hz
48689 m³/h	62.5 A
1056 rpm	45.1 KW

Fan 3	
0 %	0.0 Hz
0 m³/h	0.0 A
0 rpm	0.0 KW



Average temperature biofilter 1	36.2 °C
Actual humidity biofilter 1	98.9 %
Average temperature biofilter 2	36.0 °C
Actual humidity biofilter 2	98.5 %
Average temperature biofilter 3	0.0 °C
Actual humidity biofilter 3	0.0 %

Bio Scrubbe

-439.2 Pa 19.4 %

logix

004703

OVERVIEW BIOFILTERS

Ammonia Scrubber -141,9 Pa 36,8 °C 20,3 %

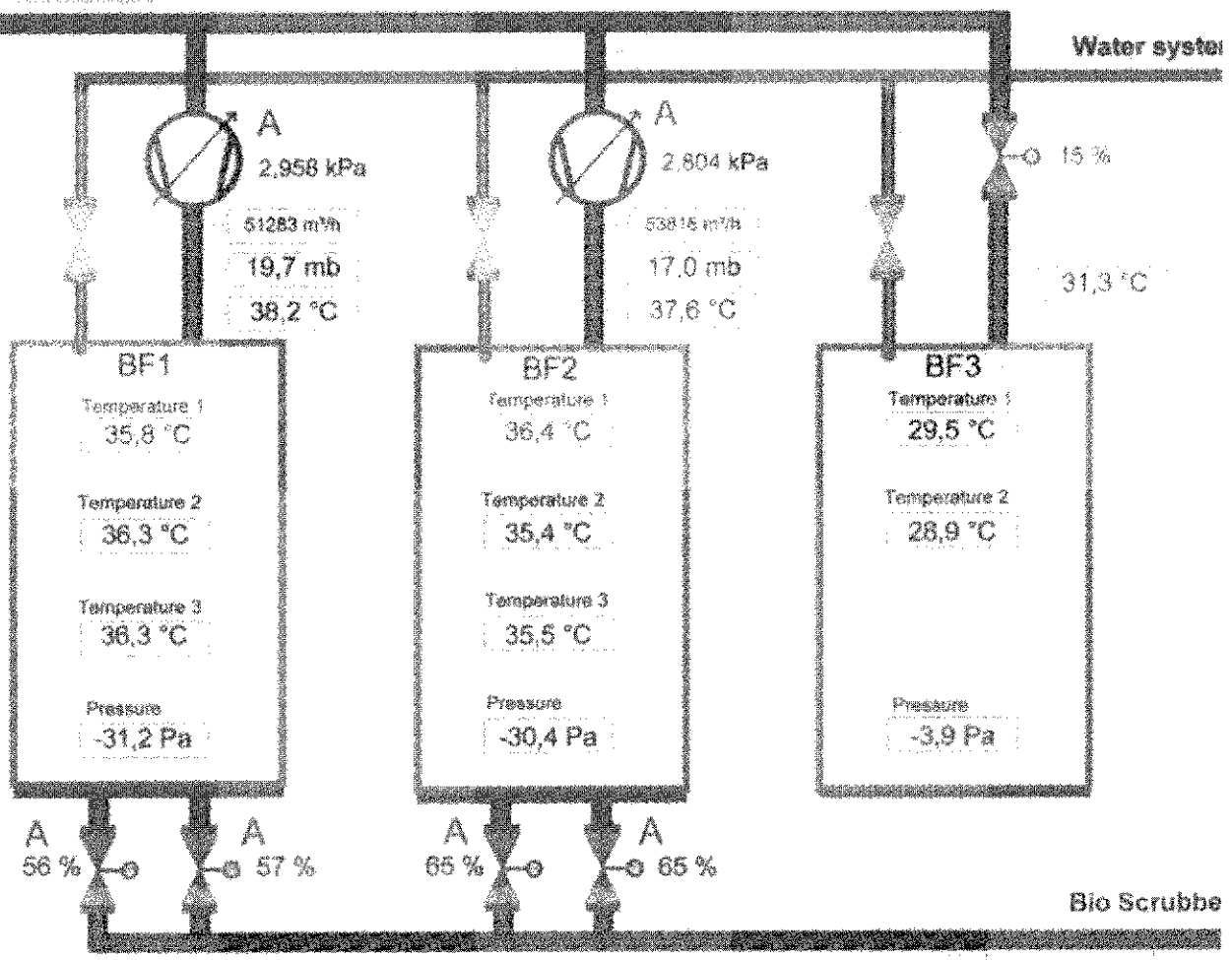
Pressure setpoint -140,0 Pa

Fan 1	
93 %	55,8 Hz
51283 m³/h	67,8 A
1156 rpm	53,2 KW

Fan 2	
93 %	55,8 Hz
53818 m³/h	69,1 A
1156 rpm	54,6 KW

Fan 3	
0 %	0,0 Hz
0 m³/h	0,0 A
0 rpm	0,0 KW

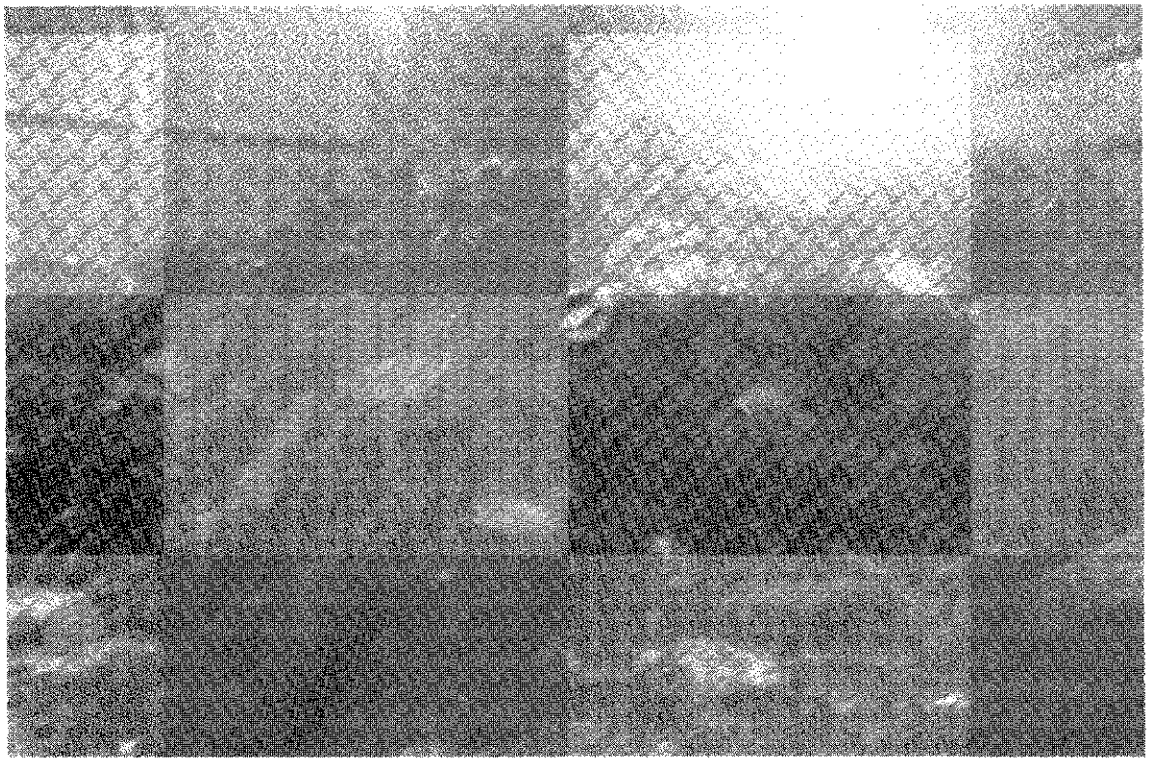
Average temperature biofilter 1	36,1 °C
Actual humidity biofilter 1	97,8 %
Average temperature biofilter 2	35,8 °C
Actual humidity biofilter 2	98,8 %
Average temperature biofilter 3	0,0 °C
Actual humidity biofilter 3	0,0 %



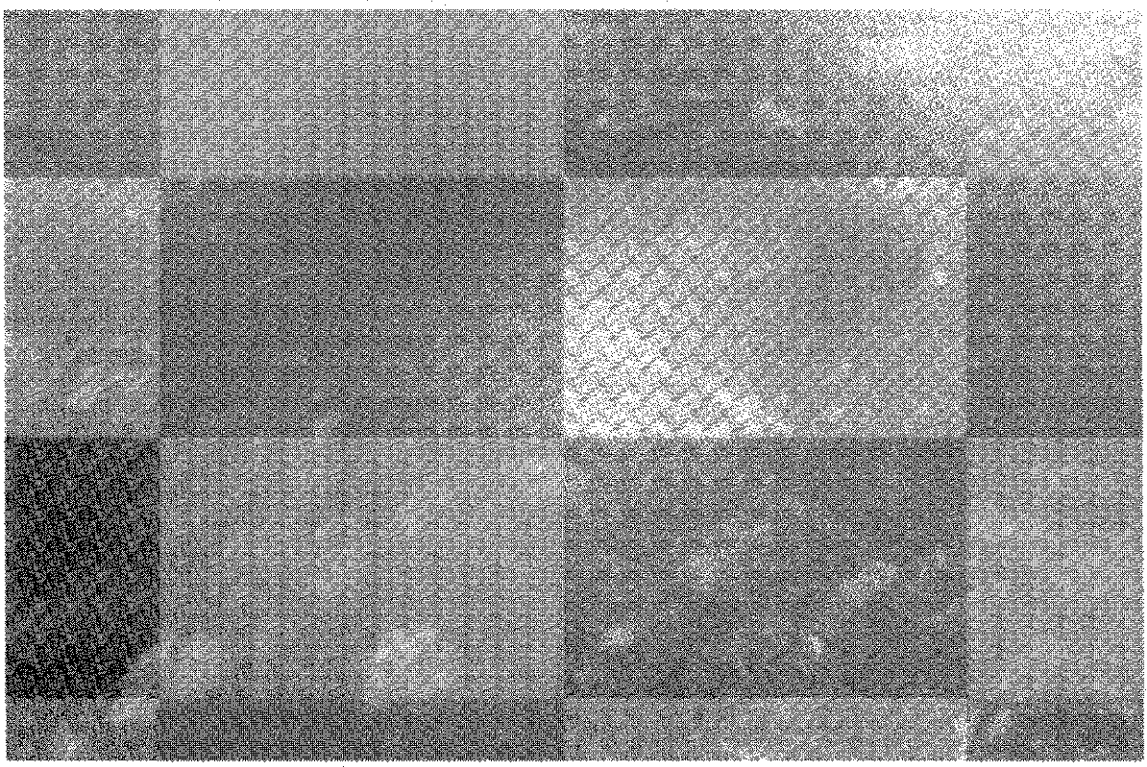
-435,2 Pa 19,4 %

Date	# of Deliveries	SSO Received (kg)	Ave Wgts/Delivery	SSO Tx to Processing Hall (kg)	Tunnel #'s Active	Tunnel Preparation	SSO in Processing Hall	SSO Mixed in Mixing Area	10-100(kg)
01/05/2011									
02/05/2011	38	331150	8714	331150	1,2,5,6	Screen 3	94370	606340	606860
03/05/2011	33	303310	9191	303310	1,2,4,6	Screen 6, Fill 4	96160	606340	606860
04/05/2011	37	364660	9856	364660	1,3,4,6	Fill 3, Screen 2	152640	606340	606860
05/05/2011	36	353370	9816	353370	1,2,3,4,6	Screen 5, Fill 2, Fill 6	116210	106340	606860
06/05/2011	37	334250	9034	334250	2,3,4,5,6	Screen 1, Fill 5	100460	156800	656860
07/05/2011									
08/05/2011									
09/05/2011	26	303800	10850	303800	1,2,5,6,8	Fill 1, Screen 4	104260	111060	606800
10/05/2011	33	338720	10264	338720	1,2,4,5,6	Fill 4, Screen 3	142980	106040	656860
11/05/2011	52	514180	9888	514180	1,2,4,5,6		257160	594040	606860
12/05/2011	53	481610	9087	481610	1,2,3,4,5,6	Fill 3	238770	554040	606860
13/05/2011	51	432490	8480	432490	1,2,3,4,5,6		471260	754040	606860
14/05/2011							271260	954040	606860
15/05/2011					1,2,3,4,5	Screen 6	271260	954040	606860
16/05/2011	31	336250	10848	336250	1,3,4,5,6	Fill 6, Screen 2	207950	904040	656860
17/05/2011	25	277350	11094	277350	1,2,3,4,5,6	Fill 2	184900	57850	606860
18/05/2011	32	352230	11007	352230	1,2,3,4,6	Screen 5, fill 5	357130	-192450	656860
19/05/2011	29	289840	9960	289840	1,2,3,5,6	Screen 4	125970	307550	956860
20/05/2011	28	320270	11044	320270	1,2,4,5,6	Screen 3, fill 4	146240	157550	706860
21/05/2011									
22/05/2011									
23/05/2011									
24/05/2011	31	455880	14706	455880	1,2,4,6	Screen 6	102120	857550	606860
25/05/2011	47	643710	13696	643710	1,2,3,4,5,6	fill 6, Fill 3	445830	57550	706860
26/05/2011	51	734050	14393	734050	1,3,4,5,6	screen 2	1179680	57550	806860
27/05/2011	36	407760	11582	407760	2,3,4,5,6	FILL 2, SCREEN 1	987640	207550	856860
28/05/2011	28	415740	14848	415740	2,3,4,5,6		803380	607550	656860
29/05/2011									
30/05/2011	19	216210	11379	216210	1,2,3,4	screen 6, screen 5, fill 1	419590	957550	1006860
31/05/2011	21	261710	9805	261710	1,2,3,6	screen 4, Fill 6	621300	907550	1056860
01/06/2011	23	275110	11961	275110	1,2,3,5,6	fill 5	296410	857550	1006860
02/06/2011	28	332510	11875	332510	1,2,4,5	screen 3, screen 6, fill4	628920	207550	1156860
03/06/2011	46	480710	10015	480710	1,2,3,4,6	fill 3	789630	57550	906860
04/06/2011									
05/06/2011									
06/06/2011	35	355290	10151	355290	1,3,4,5,6	screen 2, fill 6	644920	107550	956850
07/06/2011	33	414440	12559	414440	1,3,4,5,6		1059360	107550	
08/06/2011	42	409610	9753	409610	3,4,5,6	screen 1	668970	907550	1056860
09/06/2011	36	422180	11727	422180	2,3,4,6	screen 5, fill 2	1091150	457550	1106860
10/06/2011	34	268620	7901	268620	1,2,3,4,6	Fill 1	1359770	7550	1056860
11/06/2011	1	26880	26880	26880	1,2,3,4,6		986450	407550	1056819
12/06/2011									
13/06/2011	38	356030	9369	356030	1,2,3,5,6	Screen 4, Fill 5	1042480	257550	1106706
14/06/2011	29	288680	9954	288680	1,2,4,5,6	screen 3, fill 4	931160	207550	1156575
15/06/2011	37	410760	11102	410760	1,2,4,5,	fill 3, screen 6	741920	357550	1206575
16/06/2011	30	343060	11435	343060	2,4,5,6	screen 1, fill 6, 3 still open	484980	507550	1256364
17/06/2011	33	294730	8931	294730	2,3,4,5,6	screen 1, 3 closed	179710	657550	1356298
18/06/2011									
19/06/2011									
20/06/2011	30	280320	9677	280320	1,2,3,4,5,6	fill 1	470030	207550	1306230
21/06/2011	27	238320	8827	238320	1,3,4,5,6	screen 2	708350	207550	1406230
22/06/2011	33	314020	9518	314020	1,2,3,5,6	fill 2, screen 4	522370	257550	1456230
23/06/2011	29	293840	10132	293840	1,2,4,5,6	Screen 3, fill 4	316210	307550	1506196
24/06/2011	30	239920	7994	239920	1,2,4,5,6	screen3	556030	307550	1506196
25/06/2011									
26/06/2011									
27/06/2011	28	291040	10394	291040	1,2,3,4,5,6	fill 5	247070	457550	1456189
28/06/2011	28	277000	9893	277000	2,3,4,5,6	screen 1	524070	457550	1556189
29/06/2011	30	275960	9199	275960	2,3,4,5,6		860030	457550	1305119
30/06/2011	30	278520	9284	278520	2,3,4,5,6,		1078550	457550	1055033
01/07/2011									
02/07/2011	26	221710	8527	221710	1,2,3,4,5,6	fill 1	1300260	7550	805693
03/07/2011									
04/07/2011	27	261290	9677	261290	1,3,4,5,6	screen 2	781550	907550	905822
05/07/2011	26	251807	10070	251870	1,3,4,5,	screen 6	1023420	907550	905790
06/07/2011	35	272820	9747	272920	1,3,4,6	screening 5, filled 6	1266340	357550	855827
07/07/2011	31	340630	10988	340630	1,3,5,6	filled 5, screened 4	1238970	307550	903313
08/07/2011	29	279400	9324	280400	1,3,4,5,6	fill 4	927370	457550	855008
09/07/2011									

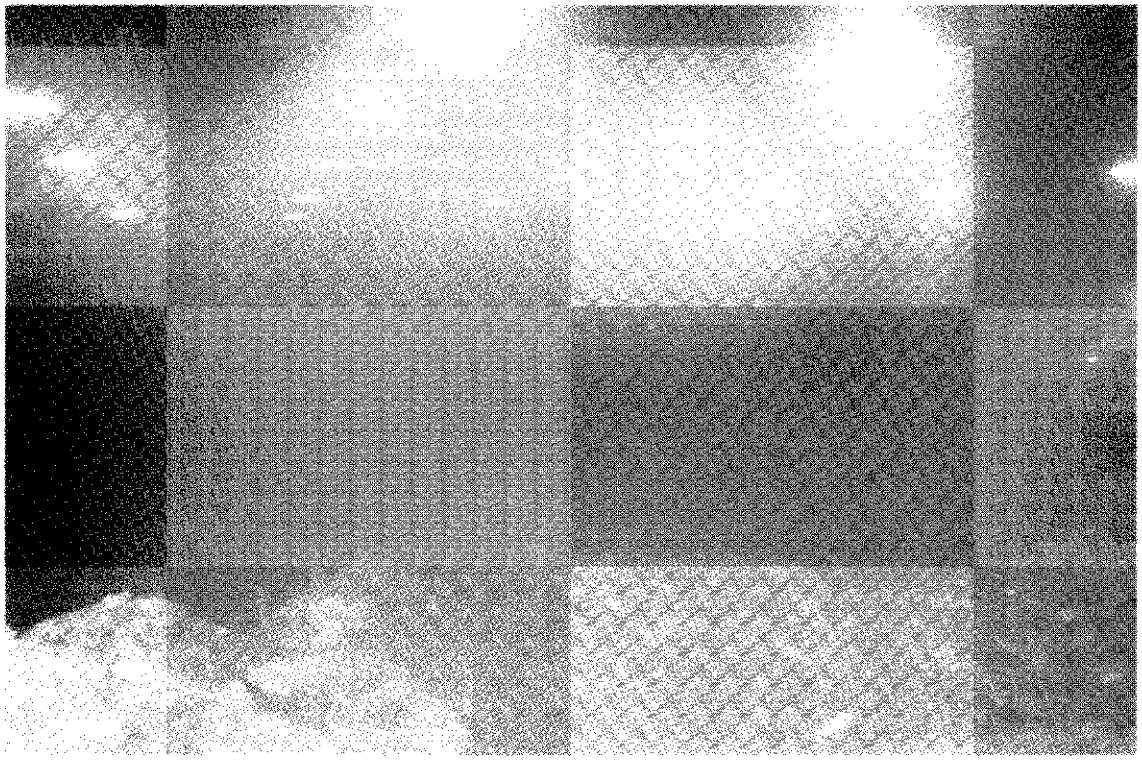
Orgaworld July 6, 2011
On Site with MOE Neil Hannington during STAE testing



incoming waste



incoming waste



View into entrance hall



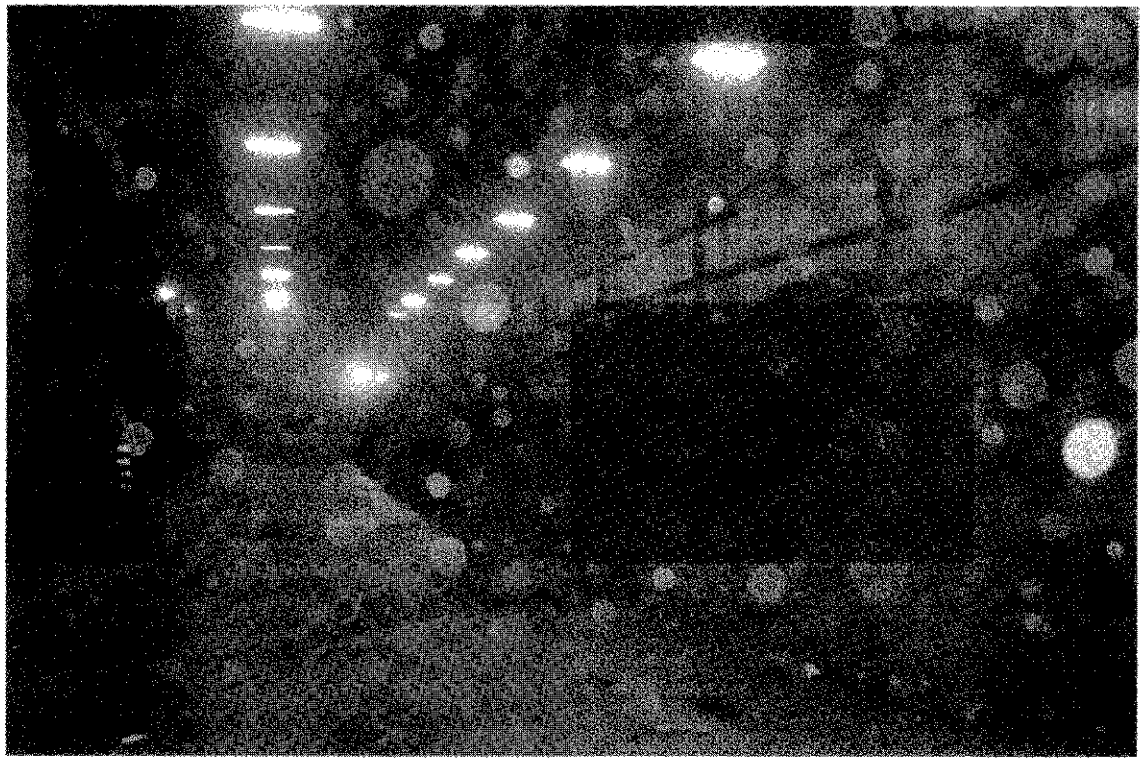
1 meeting hall

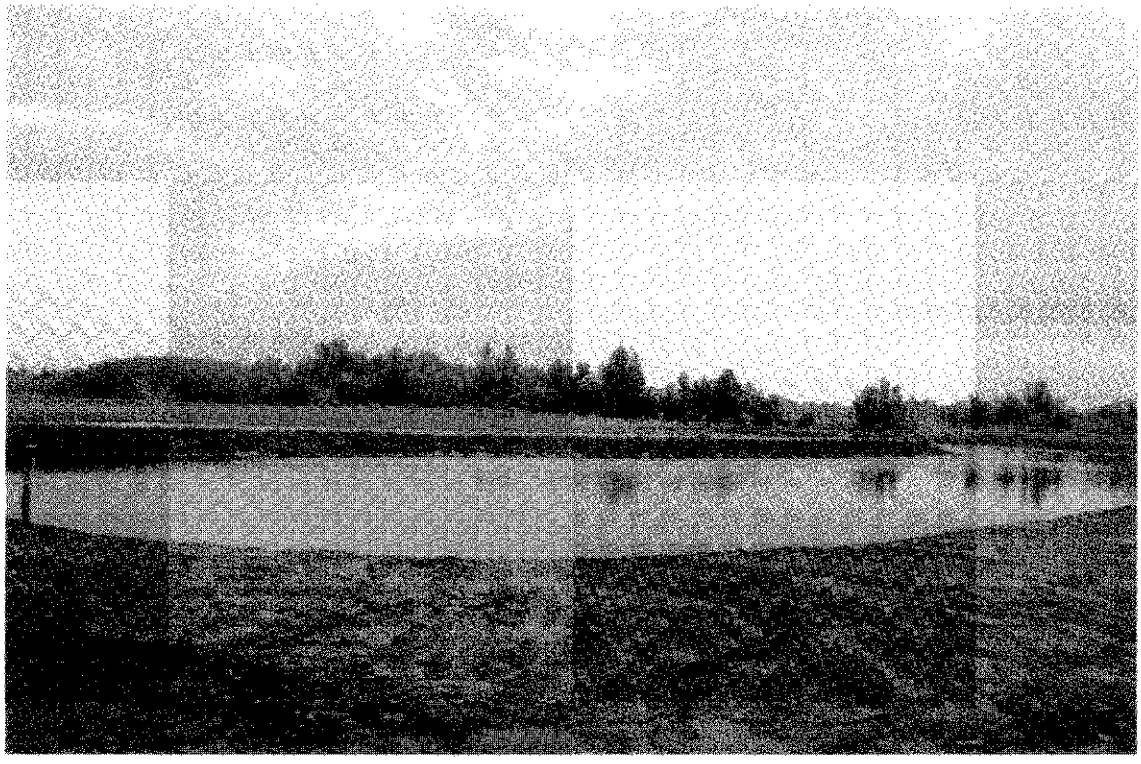


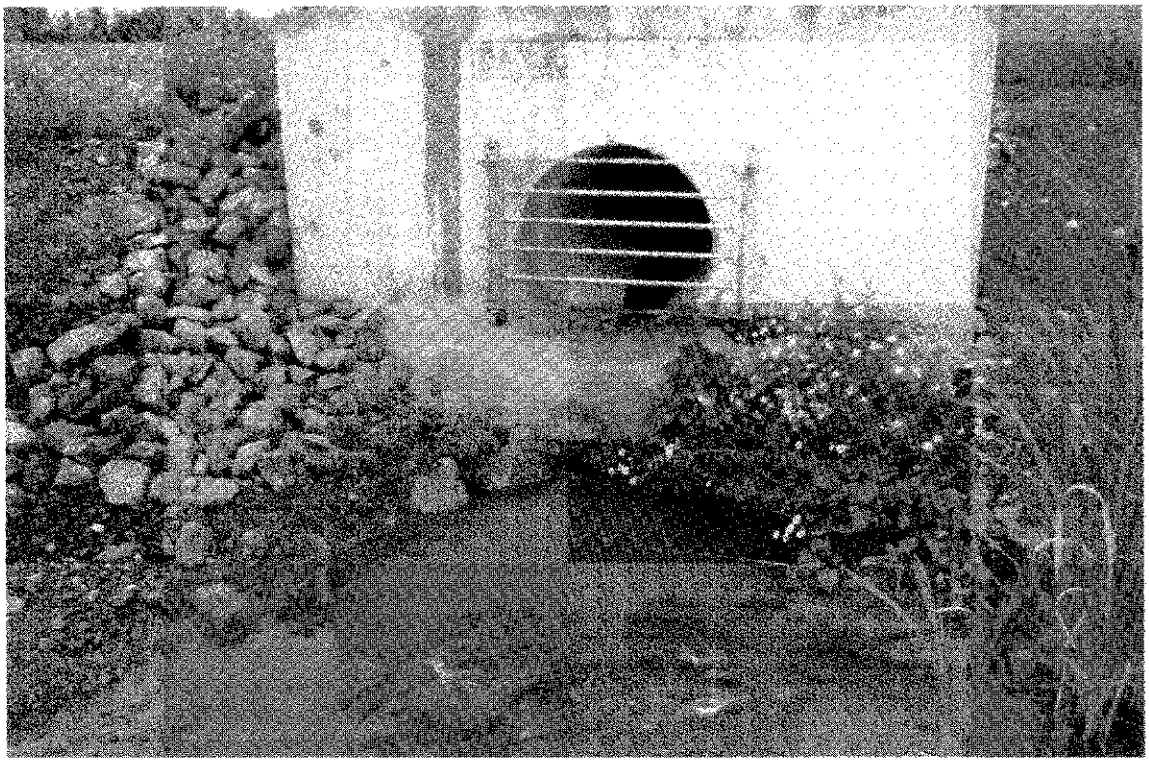
Waste blocking entrance hall



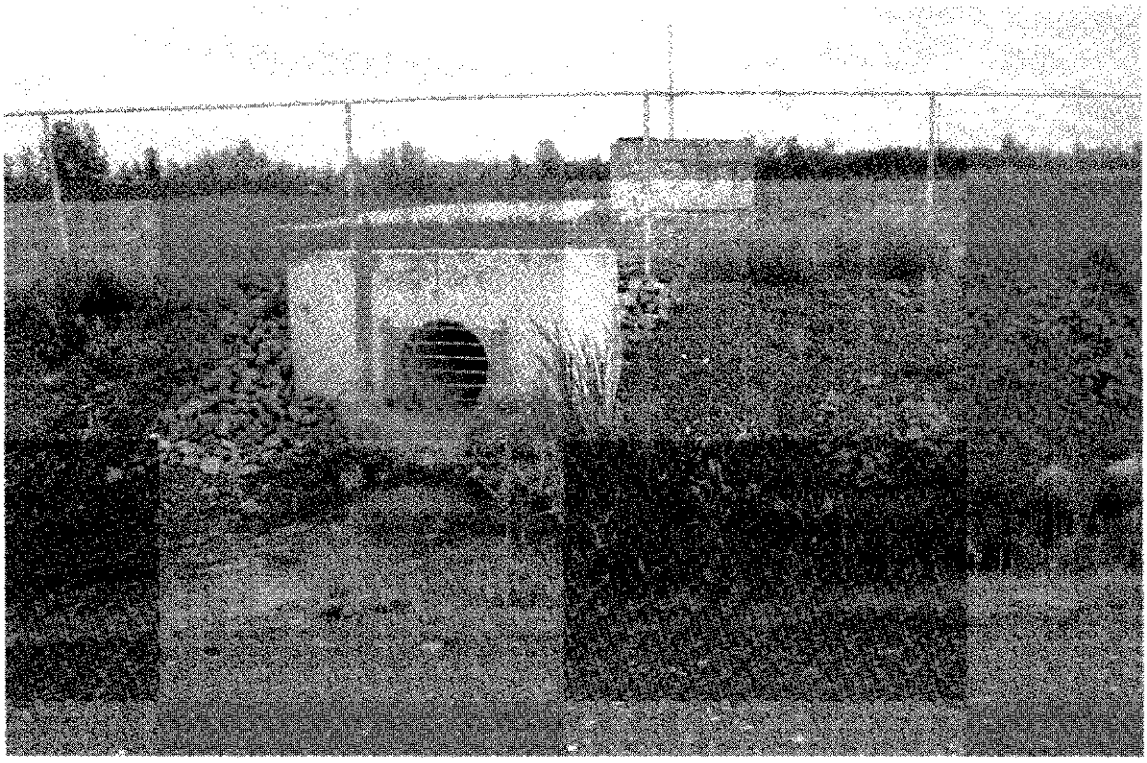
mixing hall







Organworld outfall





Tomlinson site
Compost storage.





004712

ORGAWORLD

TUNNELS OVERVIEW

Outside temperature 20.8 °C

30.5 °C -108 Pa

	Tunnel 1	Tunnel 2	Tunnel 3	Tunnel 4	Tunnel 5	Tunnel 6	Tunnel 7	Tunnel 8
	44 %	12 %	60 %	29 %	19 %	14 %		
	A	A	A	A	A	A	A	A
	82 %	15 %	79 %	84 %	89 %	88 %		
	A	M	A	A	A	A	A	A
	28 mb	2 mb	25 mb	29 mb	34 mb	23 mb		
O2	0.1 %	17.0 %	0.2 %	16.3 %	0.1 %	20.9 %		
Average	44.6 °C	29.1 °C	32.2 °C	60.0 °C	55.5 °C	44.0 °C		
Flow	29851 m³/h	0 m³/h	27845 m³/h	36586 m³/h	0 m³/h	30174 m³/h		
Pressure	-25.6 Pa	-0.9 Pa	-26.6 Pa	-1.0 Pa	-7.8 Pa	-5.2 Pa		
Stage	4	5	5	2	2	4		
	138 hr	283 hr	253 hr	124 hr	63 hr	79 hr		
	51 % A	20 % M	69 % A	32 % A	19 % A	15 % A	A	A

Ammonia Scrubber

-0 % A -1 Pa

95 % A

0 % 82 % A M

-123.7 Pa

Boosts fan tunnels in (T2)

Tunnels out (outside of barn)

Techno Logix Industrial Automation

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Rick Mosher	REF. NO.:	045804
FROM:	Sarah Tebbutt/Stephen Koo/ca/2	DATE:	March 5, 2009
RE:	**AERMOD Odour Modelling** **Orgaworld Canada Limited, Ottawa, Ontario**		

1.0 INTRODUCTION

This memorandum has been prepared for the Orgaworld Canada Limited facility located in Ottawa, Ontario (Facility). Conestoga-Rovers & Associates (CRA) performed AERMOD dispersion modelling of the Facility to assess future air contaminant compliance against Ontario Regulation 419/05 Schedule 3 standards, and proposed Ontario Ministry of the Environment (MOE) odour guidance.

The dispersion modelling was performed using the United States Environmental Protection Agency (USEPA) multi-source dispersion model, AERMOD, to assess the Facility's ground level concentrations (GLCs). AERMOD is an advanced steady-state plume model that has the ability to incorporate building cavity downwash, actual source parameters, emission rates, terrain, and historical meteorological information to predict ground level concentrations (GLCs) at specified locations.

The AERMOD air dispersion model was used for this assessment as it has been scheduled by the MOE to replace the Regulation 346 model as the new regulatory model in Ontario after a phase in period, as specified by Ontario Regulation 419/05. The Facility's North American Industry Classification System Code is 562210, and the AERMOD model will become the regulatory model for the Facility with Ontario Regulation 419/05 Schedule 3 air quality standards beginning in 2013.

For air contaminants, the MOE air dispersion modelling guidance document "Air Dispersion Modelling Guideline for Ontario" (ADMGO) dated July 2005 was followed. For odour, the MOE position paper "Proposed Approach for the Implementation of Odour-Based Standards and Guidelines" dated June 2006 was followed.

2.0 MODEL DEVELOPMENT

2.1 Computational Models

The following approved dispersion models and pre-processor models were used in the assessment:

- AERMOD dispersion model (v. 07026);
- AERMAP surface pre-processor (v. 06341); and

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

- BPIP building downwash pre-processor (v. 04274).

2.2 Meteorological Data

MOE provides three sets of pre-processed meteorological screening data for use with dispersion modelling. They are: urban, crops and forest. Based on the land-use characteristics around the Facility, the "crops" dataset was used. The surface data is from the Ottawa Airport and Upper Air Data is from Maniwaki, Quebec. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data included many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

2.3 Averaging Periods

Averaging periods were selected based on the type of air contaminants modelled. For the unitized emission rate model, the following averaging periods were selected: 1-hour, 24-hour, and 30-day. For the odour model, only the 1-hour averaging period was selected.

2.4 Digital Elevation Model Data

Digital elevation model (DEM) data was obtained from the MOE website and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD. The DEM data was provided by the MOE (tile set 135).

2.5 Source Input Parameters

The Facility bio-scrubber was modelled as a point source, with parameters based on the final operational design specifications. The area sources, used in the odour models, are based on predicted operational conditions.

A summary of the AERMOD source input parameters is provided in Table 1.

2.6 Ground Level Concentration Receptor Grid

A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 to 500 m;
- 100 m spacing from 500 to 1,000 m; and
- 200 m spacing from 1,000 to 2,000 m.

A property line ground level receptor grid with 10 m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Facility's property line.

2.7 Discrete Sensitive Receptors

For the evaluation of odour, discrete sensitive receptors were defined around the Facility based on the locations of nearby homes and communities. MOE defines a sensitive receptor as: residences, camping grounds, schools, community centres, day care centres, recreational centres and outdoor recreational areas; or any other locations as specified by the MOE. A total of 79 sensitive receptors were identified and modelled.

Table 2 provides a list of modelled sensitive receptors.

2.8 On-Site Building Data

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP), and run to evaluate any building cavity downwashing that may be occurring. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions.

The single on-site building was modelled with an average roof height of 11 metres.

3.0 DISPERSION MODELLING RESULTS

The AERMOD models were developed and executed following the methodology described above.

The five years of meteorological data included over 43,800 hours of data. For the unitized emission rate AERMOD model, the model was run to calculate the maximum 1-hour and 24-hour unitized GLC dispersion factors, in micrograms per cubic metre per one gram per second ($\mu g/m^3$ per g/s), potentially emitted from the Facility through the bio-scrubber. By multiplying the bio-scrubber contaminant emission rate, in grams per second, by the unitized GLC dispersion factor, a contaminant specific GLC is calculated. For the odour models, the 1-hour 99.85th percentile GLC was calculated for comparison against the odour guideline limit. The MOE proposed guidance specifies the 99.85th percentile modelled maximum concentration to be used for odour assessment. The meteorological conditions, which result in the maximum concentration, are typically stable atmospheric conditions such as an inversion with low wind speed.

MOE guidance allows for the removal of meteorological outliers for comparison of GLCs against a standard or guideline limit. For the 1-hour averaging period, the eight highest 1-hour averaging periods for each single year was removed for a total of 40 one-hour periods. For the 24-hour averaging period, the single highest 24-hour averaging period for each single year was removed for a total of five 24-hour periods. For each air contaminant, the appropriate unitized averaging period GLC dispersion factor was multiplied by the emission rate of the contaminant to calculate its GLC.

Table 3 summarizes the maximum predicted GLCs for each air contaminant and its percentage of the POI.

For odour, the calculated 1-hour 99.85th percentile odour value was converted to a 10-minute odour value using the MOE time-based conversion factor of 1.65. Figure 1 presents the maximum calculated 10-minute 99.85th percentile odour level at each discrete receptor. Figure 2 presents the maximum calculated 10-minute 99.85th percentile odour isopleths around the Facility.

4.0 CONCLUSIONS

The AERMOD dispersion modelling assessment was completed for odour and each of the contaminants potentially emitted from the Facility.

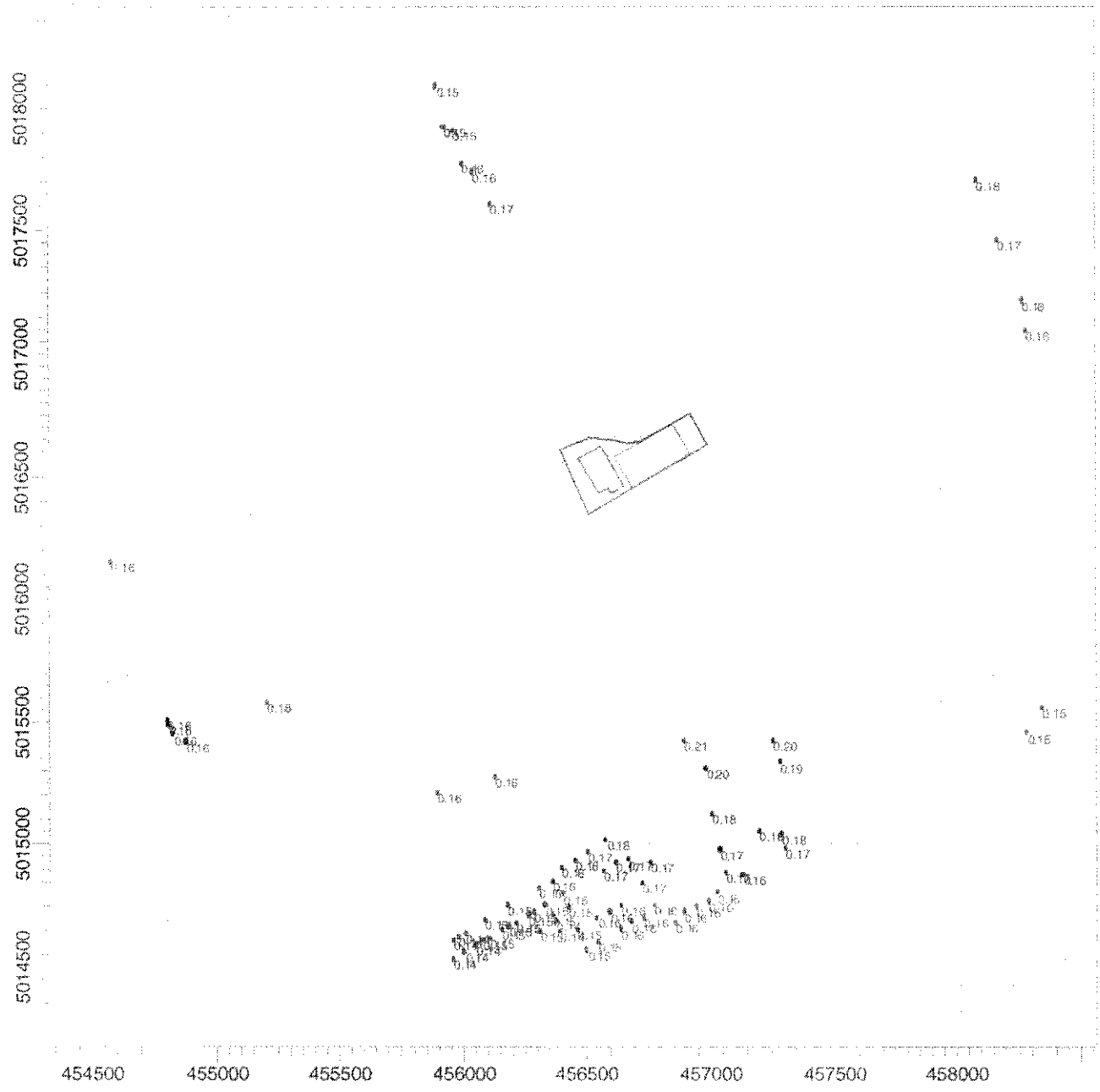
Based on the modelled GLC results, no air contaminants were identified to exceed any Ontario Regulation 419/05 Schedule 3 standard or MOE guideline.

Based on the modelled odour results, no sensitive receptors were identified that would be impacted with an odour value of greater than the allowable one odour unit.

Should you have any questions on the above, please do not hesitate to contact us.

PROJECT TITLE:

FIGURE 1 - MAXIMUM 10-MINUTE 99.85TH PERCENTILE ODOUR CONCENTRATIONS
RESIDENTIAL SENSITIVE RECEPTORS, ALL SOURCES



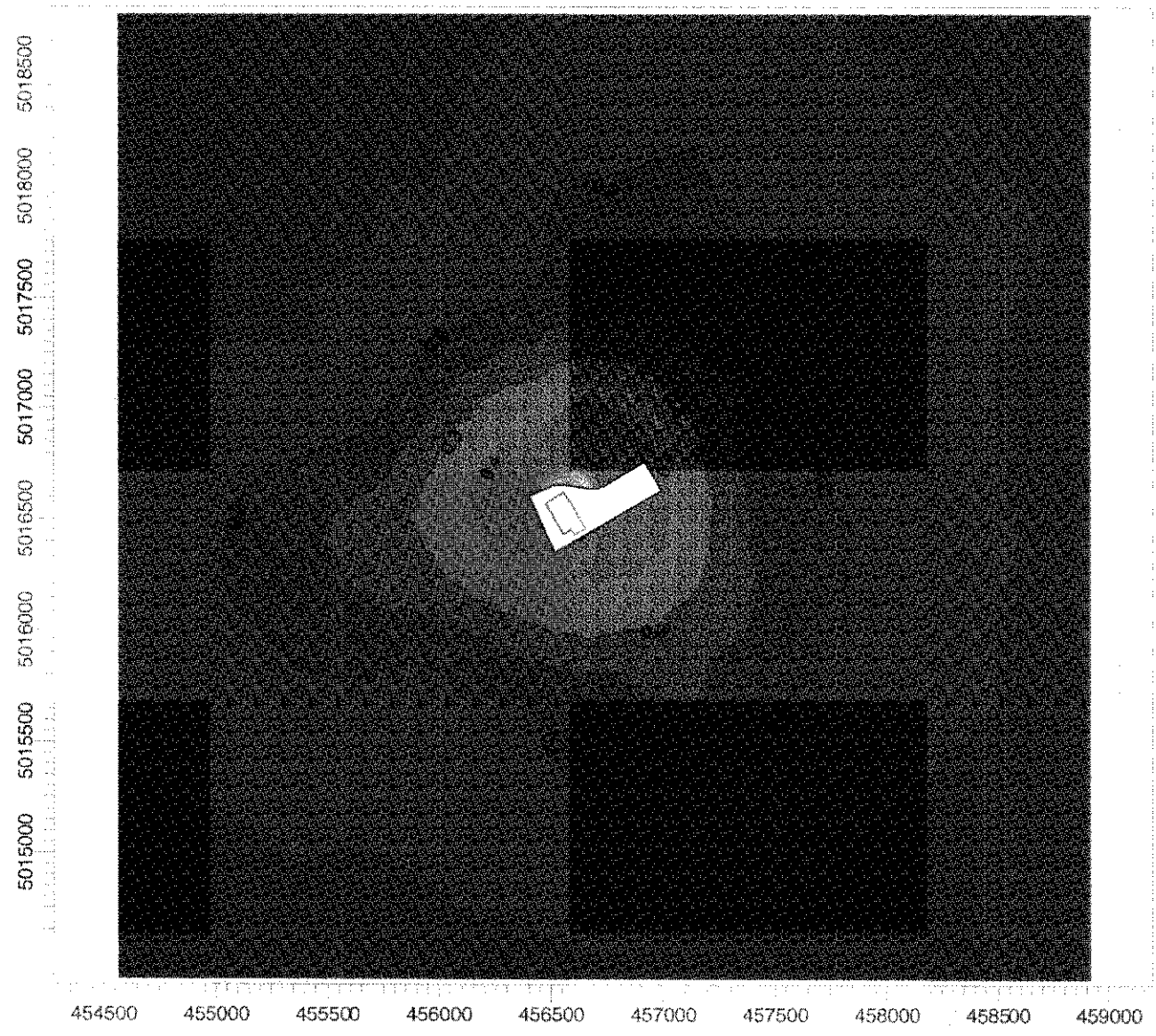
COMMENTS:	SOURCES: **3**	COMPANY NAME: **ORGAWORLD CANADA LTD., OTTAWA, ONTARIO**	
	RECEPTORS: **79**	MODELER: **CRA**	CONESTOGA-ROVERS & ASSOCIATES
	OUTPUT TYPE: **Concentration**	SCALE: 1:25,840 (0 ... 1 km)	
	MAX: **0.20978 OU**	DATE: **3/5/2009**	PROJECT NO.: **45804**

ISC-AERMOD View - Lakes Environmental Software

D:\45804_Orgaworld_Ottawa\2009_March\odor01r.isc

PROJECT TITLE:

FIGURE 2 - MAXIMUM 10-MINUTE 99.85TH PERCENTILE ODOUR CONCENTRATION ISOPLETHS ALL SOURCES



PLOT FILE OF 99.85TH PERCENTILE 10.0-MIN VALUES FOR SOURCE GROUP: ALL

OU

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

COMMENTS:	SOURCES: 3	COMPANY NAME: ORGAWORLD CANADA LTD., OTTAWA, ONTARIO	
	RECEPTORS: 2694	MODELER: CRA	CONESTOGA-ROVERS & ASSOCIATES
	OUTPUT TYPE: Concentration	SCALE: 1:30,000 (0 — 1 km)	
	MAX: 0.93248 OU	DATE: 3/5/2009	PROJECT NO.: 45804

ISC-AERMOD View - Lakes Environmental Software

D:\45804_Orgaworld_Ottawa\2009_March\odor01g.isc

TABLE 1

AERMOD INPUT MODELLING PARAMETERS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Table 1A: Point Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Release Height* (m)	*Exit Diameter* (m)	*Exit Flow Rate* (m^3/hr)	*Exit Velocity* (m/s)	*Exit Temperature* (K)	*Modelled Emission Rate* (ou/s or g/s)
BIOSCRUB	Bioscrubber Stack, odour	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	6.11E-02 ou/s
	Bioscrubber Stack, unit emission rate	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	1.00 g/s

Table 1B: Area Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Release Height* (m)	*Total Area* (m^2)	*Number of Sources*	*Area per Source* (m^2)	*Radius of Source* (m)	*Modelled Emission Rate* (ou/m^2/s)
SICPILE	Small Immature Compost Pile, odour	circle area	456,662.54	5,016,557.69	2.5	2,900	1	2,900	30.38	0.00E+00 (1)
LEAFPILE	Leaf and Yard Pile, odour	circle area	456,584.57	5,016,612.31	2.5	600	1	600	13.82	1.00E-07

Note:

(1) The compost pile is modelled with zero odour emissions as it will be maintained in an enclosed building with potential odours directed to the Facility's abatement equipr

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates* X (m)	*UTM Coordinates* Y (m)	*Approximate Distance* (m)	*Approximate Direction*
1	5023 Bank Street	454,577.90	5,016,159.86	2,057	WSW
2	5201 Bank Street	454,804.74	5,015,514.93	2,083	WSW
3	5207 Bank Street	454,815.64	5,015,478.88	2,092	WSW
4	5217 Bank Street	454,833.51	5,015,446.96	2,094	WSW
5	5227 Bank Street	454,875.57	5,015,431.23	2,068	SW
6	5401 Bank Street	455,890.82	5,015,215.67	1,540	SSW
7	7354 Dawn Tara Drive	456,484.33	5,014,574.93	2,015	S
8	7363 Dawn Tara Drive	456,454.63	5,014,654.49	1,938	S
9	7364 Dawn Tara Drive	456,555.19	5,014,604.89	1,983	S
10	7373 Dawn Tara Drive	456,556.97	5,014,706.51	1,881	S
11	7383 Dawn Tara Drive	456,623.45	5,014,659.55	1,928	S
12	7384 Dawn Tara Drive	456,589.80	5,014,729.71	1,858	S
13	7393 Dawn Tara Drive	456,653.83	5,014,753.92	1,835	S
14	7394 Dawn Tara Drive	456,689.29	5,014,689.19	1,901	S
15	7404 Dawn Tara Drive	456,721.27	5,014,707.38	1,885	S
16	7413 Dawn Tara Drive	456,711.60	5,014,845.71	1,746	S
17	7414 Dawn Tara Drive	456,782.47	5,014,754.41	1,843	S
18	7420 Dawn Tara Drive	456,857.18	5,014,684.98	1,921	S
19	7426 Dawn Tara Drive	456,884.13	5,014,729.14	1,882	S
20	7438 Dawn Tara Drive	456,946.70	5,014,751.42	1,870	S
21	7442 Dawn Tara Drive	456,976.47	5,014,768.34	1,860	SSE
22	7446 Dawn Tara Drive	457,032.97	5,014,810.03	1,832	SSE
23	7454 Dawn Tara Drive	457,075.38	5,014,894.09	1,762	SSE
24	7455 Dawn Tara Drive	457,048.43	5,014,988.06	1,664	SSE
25	7462 Dawn Tara Drive	457,142.93	5,014,885.13	1,790	SSE
26	7486 Dawn Tara Drive	457,301.45	5,014,989.10	1,750	SSE
27	7494 Dawn Tara Drive	457,277.39	5,015,043.14	1,691	SSE
28	7497 Dawn Tara Drive	457,206.04	5,015,062.26	1,645	SSE
29	4751 Hawthorne Road	455,889.72	5,018,088.84	1,657	NNW
30	4791 Hawthorne Road	455,933.86	5,017,932.37	1,496	NNW
31	4811 Hawthorne Road	455,970.66	5,017,915.26	1,465	NNW
32	4839 Hawthorne Road	456,007.06	5,017,782.29	1,329	NNW
33	4865 Hawthorne Road	456,048.32	5,017,748.72	1,281	NNW
Closest – 34	4885 Hawthorne Road	456,111.86	5,017,612.44	1,131	NNW
35	5529 Hawthorne Road	456,979.58	5,015,312.58	1,333	SSE
36	1075 John Quinn Road	458,350.30	5,015,571.08	2,033	ESE
37	1100 John Quinn Road	458,276.95	5,015,449.50	2,035	ESE
38	7265 Mitch Owens Road	455,949.38	5,014,616.50	2,072	SSW
39	7268 Mitch Owens Road	455,962.50	5,014,535.71	2,146	SSW
40	7273 Mitch Owens Road	455,989.32	5,014,623.43	2,054	SSW
41	7274 Mitch Owens Road	456,010.07	5,014,565.75	2,103	SSW
42	7277 Mitch Owens Road	455,996.22	5,014,646.00	2,030	SSW
43	7280 Mitch Owens Road	456,055.71	5,014,594.23	2,064	SSW

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate Distance*	*Approximate Direction*
		X (m)	*Y (m)*	*(m)*	
44	7286 Mitch Owens Road	456,096.80	5,014,610.17	2,038	SSW
45	7291 Mitch Owens Road	456,084.24	5,014,700.71	1,953	SSW
46	7292 Mitch Owens Road	456,100.53	5,014,625.13	2,022	SSW
47	7298 Mitch Owens Road	456,137.27	5,015,273.27	1,390	SSW
48	7304 Mitch Owens Road	456,144.84	5,014,660.17	1,978	SSW
49	7310 Mitch Owens Road	456,182.98	5,014,673.57	1,957	SSW
50	7313 Mitch Owens Road	456,168.21	5,014,761.40	1,874	SSW
51	7316 Mitch Owens Road	456,219.49	5,014,682.42	1,941	S
52	7320 Mitch Owens Road	456,317.26	5,014,648.26	1,958	S
53	7322 Mitch Owens Road	456,259.95	5,014,716.81	1,900	S
54	7328 Mitch Owens Road	456,295.32	5,014,728.24	1,882	S
55	7342 Mitch Owens Road	456,332.68	5,014,757.98	1,848	S
56	7343 Mitch Owens Road	456,310.31	5,014,822.88	1,787	S
57	7355 Mitch Owens Road	456,346.53	5,014,856.54	1,748	S
58	7385 Mitch Owens Road	456,384.12	5,014,912.33	1,688	S
59	7391 Mitch Owens Road	456,445.83	5,014,941.87	1,652	S
60	7400 Mitch Owens Road	456,560.33	5,014,898.97	1,689	S
61	7401 Mitch Owens Road	456,505.35	5,014,976.09	1,614	S
62	7409 Mitch Owens Road	456,589.80	5,015,024.66	1,563	S
63	7410 Mitch Owens Road	456,618.66	5,014,934.09	1,654	S
64	7420 Mitch Owens Road	456,675.92	5,014,944.17	1,646	S
65	7432 Mitch Owens Road	456,763.97	5,014,930.40	1,666	S
66	7481 Mitch Owens Road	456,900.57	5,015,427.69	1,201	SSE
67	7563 Mitch Owens Road	457,259.06	5,015,428.31	1,339	SSE
68	7564 Mitch Owens Road	457,281.10	5,015,340.35	1,459	SSE
69	5130 Ramsayville Road	458,081.87	5,017,711.85	1,868	NE
70	5208 Ramsayville Road	458,171.37	5,017,464.18	1,808	ENE
71	5280 Ramsayville Road	458,262.45	5,017,229.57	1,792	ENE
72	5300 Ramsayville Road	458,279.83	5,017,104.19	1,767	ENE
73	1013 Sale Barn Road	456,402.20	5,014,802.57	1,795	S
74	1018 Sale Barn Road	456,360.14	5,014,717.08	1,884	S
75	1023 Sale Barn Road	456,428.85	5,014,747.86	1,847	S
76	1028 Sale Barn Road	456,390.64	5,014,692.63	1,905	S
77	1038 Sale Barn Road	456,386.26	5,014,650.98	1,947	S
78	Trailer Park	455,209.77	5,015,584.85	1,706	SW
79	7474 Mitch Owens Road	457,007.62	5,015,130.39	1,516	SSE

TABLE 3

AERMOD MAXIMUM PREDICTED GROUND LEVEL CONCENTRATIONS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Air Contaminant	*CAS No.*	*Total Site-Wide Emission Rate (g/s)*	*Maximum Predicted GLC (ug/m^3)*	*MOE POI (ug/m^3) (1)*	*Averaging Period (hours)*	*Status*	*Regulation Schedule*	*Limiting Effect*	*Percentage of MOE POI (%)*
Odour	NA	6.12E-02	2.10E-01 (2)	1 ou	10-minute	PS	NA	NA	21.0%
Carbon Monoxide, Single Source	630-08-0	1.56E+00	1.16E+01 (5)	6000	0.5	S	3	health	0.2%
Nitrogen Oxides	10102-44-0	7.22E+00	4.50E+01 (3)	400	1	S	3	health	11.3%
			1.36E+01	200	24	S	3	health	6.8%
Sulphur Oxides (as Sulphur Dioxide)	7446-09-5	4.77E-01	2.98E+00 (3)	690	1	S	3	health & vegetation	0.4%
			8.98E-01 (4)	275	24	S	3	health & vegetation	0.3%
Total Suspended Particulates	NA	5.15E-01	9.68E-01 (4)	120	24	S	3	visibility	0.8%
Ammonia	7664-41-7	2.65E+00	4.99E+00 (4)	100	24	S	3	health	5.0%

Notes:
NA - Not Available.
PS - Proposed standard.
S - Ontario Regulation 419/05 published standard.
(1) Units are in ug/m^3 unless otherwise noted.
(2) The odour value represents the maximum predicted 10-minute 99.85th percentile value at any sensitive receptor identified in Table 2.
(3) Based on a 1-hour unitized dispersion factor, after removal of meteorological outliers, of 6.24 ug/m^3 per g/s.
(4) Based on a 24-hour unitized dispersion factor, after removal of meteorological outliers, of 1.88 ug/m^3 per g/s.
(5) Based on the 1-hour unitized dispersion factor as described in note (3) and applying the MOE 1-hour to 30-minute time-based conversion factor of 1.2.

004722

CONESTOGA-ROVERS & ASSOCIATES

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

MEMORANDUM

TO:	Rick Mosher	REF. NO.:	045804
FROM:	Sarah Tebbutt/Stephen Koo/ca/2	DATE:	March 5, 2008
RE:	**AERMOD Odour Modelling** **Orgaworld Canada Limited, Ottawa, Ontario**		

1.0 INTRODUCTION

This memorandum has been prepared for the Orgaworld Canada Limited facility located in Ottawa, Ontario (Facility). Conestoga-Rovers & Associates (CRA) performed AERMOD dispersion modelling of the Facility to assess future air contaminant compliance against Ontario Regulation 419/05 Schedule 3 standards, and proposed Ontario Ministry of the Environment (MOE) odour guidance.

The dispersion modelling was performed using the United States Environmental Protection Agency (USEPA) multi-source dispersion model, AERMOD, to assess the Facility's ground level concentrations (GLCs). AERMOD is an advanced steady-state plume model that has the ability to incorporate building cavity downwash, actual source parameters, emission rates, terrain, and historical meteorological information to predict ground level concentrations (GLCs) at specified locations.

The AERMOD air dispersion model was used for this assessment as it has been scheduled by the MOE to replace the Regulation 346 model as the new regulatory model in Ontario after a phase in period, as specified by Ontario Regulation 419/05. The Facility's North American Industry Classification System Code is 562210, and the AERMOD model will become the regulatory model for the Facility with Ontario Regulation 419/05 Schedule 3 air quality standards beginning in 2013.

For air contaminants, the MOE air dispersion modelling guidance document "Air Dispersion Modelling Guideline for Ontario" (ADMGO) dated July 2005 was followed. For odour, the MOE position paper "Proposed Approach for the Implementation of Odour-Based Standards and Guidelines" dated June 2006 was followed.

2.0 MODEL DEVELOPMENT

2.1 Computational Models

The following approved dispersion models and pre-processor models were used in the assessment:

- AERMOD dispersion model (v. 07026);
- AERMAP surface pre-processor (v. 06341); and

REGISTERED COMPANY FOR ISO 9001 ENGINEERING DESIGN

- BPIP building downwash pre-processor (v. 04274).

2.2 Meteorological Data

MOE provides three sets of pre-processed meteorological screening data for use with dispersion modelling. They are: urban, crops and forest. Based on the land-use characteristics around the Facility, the "crops" dataset was used. The surface data is from the Ottawa Airport and Upper Air Data is from Maniwaki, Quebec. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data included many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

2.3 Averaging Periods

Averaging periods were selected based on the type of air contaminants modelled. For the unitized emission rate model, the following averaging periods were selected: 1-hour, 24-hour, and 30-day. For the odour model, only the 1-hour averaging period was selected.

2.4 Digital Elevation Model Data

Digital elevation model (DEM) data was obtained from the MOE website and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD. The DEM data was provided by the MOE (tile set 135).

2.5 Source Input Parameters

The Facility bio-scrubber was modelled as a point source, with parameters based on the final operational design specifications. The area sources, used in the odour models, are based on predicted operational conditions.

A summary of the AERMOD source input parameters is provided in Table 1.

2.6 Ground Level Concentration Receptor Grid

A tiered receptor grid was defined starting with a rectangular boundary that encloses all the modelled sources (bounding box). A tiered grid was then defined starting from the edge of the bounding box with a fine resolution, to coarser resolutions further away. All tiered distances were defined relative to the bounding box. The receptor grid used is described as follows:

- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 to 500 m;
- 100 m spacing from 500 to 1,000 m; and
- 200 m spacing from 1,000 to 2,000 m.

A property line ground level receptor grid with 10 m spacing was used to evaluate the maximum property boundary concentration. No receptors were placed inside the Facility's property line.

2.7 Discrete Sensitive Receptors

For the evaluation of odour, discrete sensitive receptors were defined around the Facility based on the locations of nearby homes and communities. MOE defines a sensitive receptor as: residences, camping grounds, schools, community centres, day care centres, recreational centres and outdoor recreational areas; or any other locations as specified by the MOE. A total of 79 sensitive receptors were identified and modelled.

Table 2 provides a list of modelled sensitive receptors.

2.8 On-Site Building Data

The Facility buildings were entered into the model using the USEPA Building Profile Input Program (BPIP), and run to evaluate any building cavity downwashing that may be occurring. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions.

The single on-site building was modelled with an average roof height of 11 metres.

3.0 DISPERSION MODELLING RESULTS

The AERMOD models were developed and executed following the methodology described above.

The five years of meteorological data included over 43,800 hours of data. For the unitized emission rate AERMOD model, the model was run to calculate the maximum 1-hour and 24-hour unitized GLC dispersion factors, in micrograms per cubic metre per one gram per second ($\mu g/m^3$ per g/s), potentially emitted from the Facility through the bio-scrubber. By multiplying the bio-scrubber contaminant emission rate, in grams per second, by the unitized GLC dispersion factor, a contaminant specific GLC is calculated. For the odour models, the 1-hour 99.85th percentile GLC was calculated for comparison against the odour guideline limit. The MOE proposed guidance specifies the 99.85th percentile modelled maximum concentration to be used for odour assessment. The meteorological conditions, which result in the maximum concentration, are typically stable atmospheric conditions such as an inversion with low wind speed.

MOE guidance allows for the removal of meteorological outliers for comparison of GLCs against a standard or guideline limit. For the 1-hour averaging period, the eight highest 1-hour averaging periods for each single year was removed for a total of 40 one-hour periods. For the 24-hour averaging period, the single highest 24-hour averaging period for each single year was removed for a total of five 24-hour periods. For each air contaminant, the appropriate unitized averaging period GLC dispersion factor was multiplied by the emission rate of the contaminant to calculate its GLC.

Table 3 summarizes the maximum predicted GLCs for each air contaminant and its percentage of the POI.

For odour, the calculated 1-hour 99.85th percentile odour value was converted to a 10-minute odour value using the MOE time-based conversion factor of 1.65. Figure 1 presents the maximum calculated 10-minute 99.85th percentile odour level at each discrete receptor. Figure 2 presents the maximum calculated 10-minute 99.85th percentile odour isopleths around the Facility.

4.0 CONCLUSIONS

The AERMOD dispersion modelling assessment was completed for odour and each of the contaminants potentially emitted from the Facility.

Based on the modelled GLC results, no air contaminants were identified to exceed any Ontario Regulation 419/05 Schedule 3 standard or MOE guideline.

Based on the modelled odour results, no sensitive receptors were identified that would be impacted with an odour value of greater than the allowable one odour unit.

Should you have any questions on the above, please do not hesitate to contact us.

TABLE 1

AERMOD INPUT MODELLING PARAMETERS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Table 1A: Point Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	Y (m)	*Release Height* (m)	*Exit Diameter* (m)	*Exit Flow Rate* (m^3/hr)	*Exit Velocity* (m/s)	*Exit Temperature* (K)	*Modelled Emission Rate* (ou/s or g/s)
BIOSCRUB	Bioscrubber Stack, odour	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	6.11E-02 ou/s
	Bioscrubber Stack, unit emission rate	point	456,589.80	5,016,587.50	40	2	200,000	17.68	313.15	1.00 g/s

Table 1B: Area Sources

Source Identifier	*Description*	*Source Type*	*UTM Coordinates* X (m)	Y (m)	*Release Height* (m)	*Total Area* (m^2)	*Number of Sources*	*Area per Source* (m^2)	*Radius of Source* (m)	*Modelled Emission Rate* ($ou/m^2/s$)
SICPILE	Small Immature Compost Pile, odour	circle area	456,662.54	5,016,557.69	2.5	2,900	1	2,900	30.38	0.00E+00 (1)
LEAFPILE	Leaf and Yard Pile, odour	circle area	456,584.57	5,016,612.31	2.5	600	1	600	13.82	1.00E-07

Note:
(1) The compost pile is modelled with zero odour emissions as it will be maintained in an enclosed building with potential odours directed to the Facility's abatement equipr

004727

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate Distance*	*Approximate Direction*
		X (m)	*Y (m)*	*(m)*	
1	5023 Bank Street	454,577.90	5,016,159.86	2,057	WSW
2	5201 Bank Street	454,804.74	5,015,514.93	2,083	WSW
3	5207 Bank Street	454,815.64	5,015,478.88	2,092	WSW
4	5217 Bank Street	454,833.51	5,015,446.96	2,094	WSW
5	5227 Bank Street	454,875.57	5,015,431.23	2,068	SW
6	5401 Bank Street	455,890.82	5,015,215.67	1,540	SSW
7	7354 Dawn Tara Drive	456,484.33	5,014,574.93	2,015	S
8	7363 Dawn Tara Drive	456,454.63	5,014,654.49	1,938	S
9	7364 Dawn Tara Drive	456,555.19	5,014,604.89	1,983	S
10	7373 Dawn Tara Drive	456,556.97	5,014,706.51	1,881	S
11	7383 Dawn Tara Drive	456,623.45	5,014,659.55	1,928	S
12	7384 Dawn Tara Drive	456,589.80	5,014,729.71	1,858	S
13	7393 Dawn Tara Drive	456,653.83	5,014,753.92	1,835	S
14	7394 Dawn Tara Drive	456,689.29	5,014,689.19	1,901	S
15	7404 Dawn Tara Drive	456,721.27	5,014,707.38	1,885	S
16	7413 Dawn Tara Drive	456,711.60	5,014,845.71	1,746	S
17	7414 Dawn Tara Drive	456,782.47	5,014,754.41	1,843	S
18	7420 Dawn Tara Drive	456,857.18	5,014,684.98	1,921	S
19	7426 Dawn Tara Drive	456,884.13	5,014,729.14	1,882	S
20	7438 Dawn Tara Drive	456,946.70	5,014,751.42	1,870	S
21	7442 Dawn Tara Drive	456,976.47	5,014,768.34	1,860	SSE
22	7446 Dawn Tara Drive	457,032.97	5,014,810.03	1,832	SSE
23	7454 Dawn Tara Drive	457,075.38	5,014,894.09	1,762	SSE
24	7455 Dawn Tara Drive	457,048.43	5,014,988.06	1,664	SSE
25	7462 Dawn Tara Drive	457,142.93	5,014,885.13	1,790	SSE
26	7486 Dawn Tara Drive	457,301.45	5,014,989.10	1,750	SSE
27	7494 Dawn Tara Drive	457,277.39	5,015,043.14	1,691	SSE
28	7497 Dawn Tara Drive	457,206.04	5,015,062.26	1,645	SSE
29	4751 Hawthorne Road	455,889.72	5,018,088.84	1,657	NNW
30	4791 Hawthorne Road	455,933.86	5,017,932.37	1,496	NNW
31	4811 Hawthorne Road	455,970.66	5,017,915.26	1,465	NNW
32	4839 Hawthorne Road	456,007.06	5,017,782.29	1,329	NNW
33	4865 Hawthorne Road	456,048.32	5,017,748.72	1,281	NNW
34	4885 Hawthorne Road	456,111.86	5,017,612.44	1,131	NNW
35	5529 Hawthorne Road	456,979.58	5,015,312.58	1,333	SSE
36	1075 John Quinn Road	458,350.30	5,015,571.08	2,033	ESE
37	1100 John Quinn Road	458,276.95	5,015,449.50	2,035	ESE
38	7265 Mitch Owens Road	455,949.38	5,014,616.50	2,072	SSW
39	7268 Mitch Owens Road	455,962.50	5,014,535.71	2,146	SSW
40	7273 Mitch Owens Road	455,989.32	5,014,623.43	2,054	SSW
41	7274 Mitch Owens Road	456,010.07	5,014,565.75	2,103	SSW
42	7277 Mitch Owens Road	455,996.22	5,014,646.00	2,030	SSW
43	7280 Mitch Owens Road	456,035.71	5,014,594.23	2,064	SSW

TABLE 2

DISCRETE SENSITIVE RECEPTORS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Receptor ID	*Description*	*UTM Coordinates*		*Approximate Distance*	*Approximate Direction*
		X (m)	*Y (m)*	*(m)*	
44	7286 Mitch Owens Road	456,096.80	5,014,610.17	2,038	SSW
45	7291 Mitch Owens Road	456,084.24	5,014,700.71	1,953	SSW
46	7292 Mitch Owens Road	456,100.53	5,014,625.13	2,022	SSW
47	7298 Mitch Owens Road	456,137.27	5,015,273.27	1,390	SSW
48	7304 Mitch Owens Road	456,144.84	5,014,660.17	1,978	SSW
49	7310 Mitch Owens Road	456,182.98	5,014,673.57	1,957	SSW
50	7313 Mitch Owens Road	456,168.21	5,014,761.40	1,874	SSW
51	7316 Mitch Owens Road	456,219.49	5,014,682.42	1,941	S
52	7320 Mitch Owens Road	456,317.26	5,014,648.26	1,958	S
53	7322 Mitch Owens Road	456,259.95	5,014,716.81	1,900	S
54	7328 Mitch Owens Road	456,295.32	5,014,728.24	1,882	S
55	7342 Mitch Owens Road	456,332.68	5,014,757.98	1,848	S
56	7343 Mitch Owens Road	456,310.31	5,014,822.88	1,787	S
57	7355 Mitch Owens Road	456,346.53	5,014,856.54	1,748	S
58	7385 Mitch Owens Road	456,384.12	5,014,912.33	1,688	S
59	7391 Mitch Owens Road	456,445.83	5,014,941.87	1,652	S
60	7400 Mitch Owens Road	456,560.33	5,014,898.97	1,689	S
61	7401 Mitch Owens Road	456,505.35	5,014,976.09	1,614	S
62	7409 Mitch Owens Road	456,589.80	5,015,024.66	1,563	S
63	7410 Mitch Owens Road	456,618.66	5,014,934.09	1,654	S
64	7420 Mitch Owens Road	456,675.92	5,014,944.17	1,646	S
65	7432 Mitch Owens Road	456,763.97	5,014,930.40	1,666	S
66	7481 Mitch Owens Road	456,900.57	5,015,427.69	1,201	SSE
67	7563 Mitch Owens Road	457,259.06	5,015,428.31	1,339	SSE
68	7564 Mitch Owens Road	457,281.10	5,015,340.35	1,459	SSE
69	5130 Ramsayville Road	458,081.87	5,017,711.85	1,868	NE
70	5208 Ramsayville Road	458,171.37	5,017,464.18	1,808	ENE
71	5280 Ramsayville Road	458,262.45	5,017,229.57	1,792	ENE
72	5300 Ramsayville Road	458,279.83	5,017,104.19	1,767	ENE
73	1013 Sale Barn Road	456,402.20	5,014,802.57	1,795	S
74	1018 Sale Barn Road	456,360.14	5,014,717.08	1,884	S
75	1023 Sale Barn Road	456,428.85	5,014,747.86	1,847	S
76	1028 Sale Barn Road	456,390.64	5,014,692.63	1,905	S
77	1038 Sale Barn Road	456,386.26	5,014,650.98	1,947	S
78	Trailer Park	455,209.77	5,015,584.85	1,706	SW
79	7474 Mitch Owens Road	457,007.62	5,015,130.39	1,516	SSE

TABLE 3

AERMOD MAXIMUM PREDICTED GROUND LEVEL CONCENTRATIONS
ORGAWORLD CANADA LIMITED
OTTAWA, ONTARIO

Air Contaminant	*CAS No.*	*Total Site-Wide Emission Rate (g/s)*	*Maximum Predicted GLC (ug/m^3)*	*MOE POI (ug/m^3) (1)*	*Averaging Period (hours)*	*Status*	*Regulation Schedule*	*Limiting Effect*	*Percentage of MOE POI (%)*
Odour	NA	6.12E-02	2.10E-01 (2)	1 ou	10-minute	PS	NA	NA	21.0%
Carbon Monoxide, Single Source	630-08-0	1.56E+00	1.16E+01 (5)	6000	0.5	S	3	health	0.2%
Nitrogen Oxides	10102-44-0	7.22E+00	4.50E+01 (3)	400	1	S	3	health	11.3%
			1.36E+01	200	24	S	3	health	6.8%
Sulphur Oxides (as Sulphur Dioxide)	7446-09-5	4.77E-01	2.98E+00 (3)	690	1	S	3	health & vegetation	0.4%
			8.98E-01 (4)	275	24	S	3	health & vegetation	0.3%
Total Suspended Particulates	NA	5.15E-01	9.68E-01 (4)	120	24	S	3	visibility	0.8%
Ammonia	7664-41-7	2.65E+00	4.99E+00 (4)	100	24	S	3	health	5.0%

Notes:
NA - Not Available.
PS - Proposed standard.
S - Ontario Regulation 419/05 published standard
(1) Units are in ug/m^3 unless otherwise noted.
(2) The odour value represents the maximum predicted 10-minute 99.85th percentile value at any sensitive receptor identified in Table 2.
(3) Based on a 1-hour unitized dispersion factor, after removal of meteorological outliers, of 6.24 ug/m^3 per g/s.
(4) Based on a 24-hour unitized dispersion factor, after removal of meteorological outliers, of 1.88 ug/m^3 per g/s.
(5) Based on the 1-hour unitized dispersion factor as described in note (3) and applying the MOE 1-hour to 30-minute time-based conversion factor of 1.2.

004730

5107GL AA 610

Straberger, Kyle (MOECC)

From: Straberger, Kyle (MOECC)
Sent: April 17, 2018 8:51 AM
To: David Veinot (dveinot@orgaworld.ca)
Cc: Brian Begg (bbegg@orgaworld.ca); Andre Boucher
Subject: MOECC Inspection Reports - Orgaworld Canada Inc., 5123 Hawthorne Road, Ottawa, On
Attachments: Air Facility Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Industrial Sewage Works Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Non-Hazardous Waste Transfer Processing Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf; Subject Waste Generator Inspection Report - Orgaworld Canada Ltd (March 15, 2018).pdf

Hello David,

Please find attached copies of the inspection reports completed at Orgaworld Ottawa, dated March 15, 2018, located at 5123 Hawthorne Road, Ottawa, On. If you have any questions after the review of the reports please contact me to discuss.

Attachments:

- Air Facility Inspection Report
- Industrial Sewage Works Inspection Report
- Non-Hazardous Waste Transfer Processing Inspection Report
- Subject Waste Generator Inspection Report

The Subject Waste Generator Inspection Report outlines an action item for the confirmation of Copy 6 of Waste Manifest No. RS77263. In your email, dated March 23, 2018, the copy was provided to me therefore the action item has been addressed. The report was already completed and sent for sign-off when you provided the information therefore I couldn't make any changes at that time.

Thank you,

Kyle Straberger

Environmental Officer

Ministry of the Environment and Climate Change

Ottawa District Office

2430 Don Reid Drive, Ottawa

K1H 1E1

(613) 521-3450 ext. 232

(613) 521-5437 fax

1-800-860-2195

Kyle.Straberger@ontario.ca

file: S1 OT GL HA 6TH
5123 Hawthorne

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-02040

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 31-Jan-14
DATE REPORTED: 04-Feb-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Incoming SSO			
			Sample I.D.		B14-02040-1			
			Date Collected		31-Jan-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
Arsenic	µg/g	2	EPA 6020	04-Feb-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	03-Feb-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	03-Feb-14/O	10			
Cobalt	µg/g	1	EPA 6010	03-Feb-14/O	< 1			
Copper	µg/g	1	EPA 6010	03-Feb-14/O	9			
Lead	µg/g	5	EPA 6010	03-Feb-14/O	5			
Mercury	µg/g	0.005	EPA 7471A	04-Feb-14/O	< 0.01			
Molybdenum	µg/g	1	EPA 6010	03-Feb-14/O	1			
Nickel	µg/g	1	EPA 6010	03-Feb-14/O	3			
Selenium	µg/g	2	EPA 6020	04-Feb-14/O	< 2			
Zinc	µg/g	3	EPA 6010	03-Feb-14/O	40			

no exceedance

K. Pipin

Krystyna Pipin , M. Sc.
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004732

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-03737

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 25-Feb-14
DATE REPORTED: 27-Feb-14
SAMPLE MATRIX: Compost

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

Parameter			Poly-Chlorinated Biphenyls (PCB's)	Aroclor			
	Units		µg/g	-			
	M.D.L.		0.02				
	Reference Method		EPA 8081	-			
	Date Analyzed/Site		26-Feb-14/O	26-Feb-14			
Client I.D.	Sample I.D.	Date Collected					
Incoming SSO	B14-03737-1	25-Feb-14	< 0.02	-			

no exceedance

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-06650

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 03-Apr-14
DATE REPORTED: 17-Apr-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.				Incoming SSO			
	Sample I.D.				B14-06650-1			
	Date Collected				31-Mar-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			08-Apr-14/O	87.8	✓		
Arsenic	µg/g	2	EPA 6020	08-Apr-14/O	< 2	✓		
C/N Ratio	-		Calc.	17-Apr-14	18.6	✓		
Cadmium	µg/g	0.5	EPA 6010	07-Apr-14/O	< 0.5	✓		
Chromium	µg/g	1	EPA 6010	07-Apr-14/O	15	✓		
Cobalt	µg/g	1	EPA 6010	07-Apr-14/O	< 1	✓		
Copper	µg/g	1	EPA 6010	07-Apr-14/O	13	✓		
Lead	µg/g	5	EPA 6010	07-Apr-14/O	< 5	✓		
Mercury	µg/g	0.005	EPA 7471A	08-Apr-14/O	0.041	✓		
Molybdenum	µg/g	1	EPA 6010	07-Apr-14/O	< 1	✓		
Nickel	µg/g	1	EPA 6010	07-Apr-14/O	8	✓		
Selenium	µg/g	2	EPA 6020	08-Apr-14/O	< 2	✓		
Zinc	µg/g	3	EPA 6010	07-Apr-14/O	49	✓		
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	08-Apr-14/K	< 0.3	✓		
Aroclor	-		-	08-Apr-14	-	✓		

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G12322

REPORT No. B14-12322

Report To:
Orgaworld
2123 Hawthorne Rd.
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 29-May-14
DATE REPORTED: 17-Jun-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: SSO
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.	Incoming SSO			
			Sample I.D.	B14-12322-1			
			Date Collected	29-May-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed			
% moisture	%			30-May-14/O	62.0		
Arsenic	µg/g	2	EPA 6020	02-Jun-14/O	< 2		
Total Organic Carbon	% by wt	0.005	EPA 415.1	11-Jun-14/O	11.5		
C/N Ratio	-		Calc.	11-Jun-14	11.5		
Aluminum	µg/g	10	EPA 6010	03-Jun-14/O	4150		
Cadmium	µg/g	0.5	EPA 6010	03-Jun-14/O	< 0.5		
Calcium	µg/g	10	EPA 6010	03-Jun-14/O	18600		
Chromium	µg/g	1	EPA 6010	03-Jun-14/O	119		
Cobalt	µg/g	1	EPA 6010	03-Jun-14/O	5		
Copper	µg/g	1	EPA 6010	03-Jun-14/O	18		
Lead	µg/g	5	EPA 6010	03-Jun-14/O	8		
Mercury	µg/g	0.005	EPA 7471A	03-Jun-14/O	0.025		
Molybdenum	µg/g	1	EPA 6010	03-Jun-14/O	1		
Nickel	µg/g	1	EPA 6010	03-Jun-14/O	55		
Selenium	µg/g	2	EPA 6020	02-Jun-14/O	< 2		
Zinc	µg/g	3	EPA 6010	03-Jun-14/O	62		
Poly-Chlorinated Biphenyls (PCB's)	µg/g	0.3	EPA 8080	05-Jun-14/K	< 0.3		
Aroclor	-		-	05-Jun-14	-		

1 Subcontracted to SGS Lakefield

no reference

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories

004735

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed, Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-19099

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 30-Jul-14
DATE REPORTED: 14-Aug-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Incoming SSO			
	Sample I.D.	B14-19099-1			
	Date Collected	30-Jul-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			30-Jul-14/O	52.1			
Aluminum	µg/g	10	EPA 6010	05-Aug-14/O	6180			
Arsenic	µg/g	2	EPA 6020	05-Aug-14/O	< 2			
Calcium	µg/g	10	EPA 6010	05-Aug-14/O	18800			
Cadmium	µg/g	0.5	EPA 6010	05-Aug-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	05-Aug-14/O	49			
Cobalt	µg/g	1	EPA 6010	05-Aug-14/O	< 1			
Copper	µg/g	1	EPA 6010	05-Aug-14/O	19			
Mercury	µg/g	0.005	EPA 7471A	01-Aug-14/O	0.043			
Molybdenum	µg/g	1	EPA 6010	05-Aug-14/O	2			
Nickel	µg/g	1	EPA 6010	05-Aug-14/O	21			
Lead	µg/g	5	EPA 6010	05-Aug-14/O	12			
Selenium	µg/g	2	EPA 6020	05-Aug-14/O	< 2			
Zinc	µg/g	3	EPA 6010	05-Aug-14/O	66			
C/N Ratio	-		Calc	14-Aug-14	14.2			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8081	06-Aug-14/K	< 1			

PO exempt - CL

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Greg Clarkin , BSc., C. Chem
Lab Manager - Ottawa District

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004736

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed, Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-24599

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 22-Sep-14
DATE REPORTED: 30-Sep-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Incoming SSO			
	Sample I.D.	B14-24599-1			
	Date Collected	19-Sep-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%			30-Sep-14/O	73.0			
C/N Ratio	-		Calc.	29-Sep-14	15.8			
Aluminum	µg/g	10	EPA 6010	25-Sep-14/O	3060			
Arsenic	µg/g	2	EPA 6020	24-Sep-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	25-Sep-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	25-Sep-14/O	23300			
Chromium	µg/g	1	EPA 6010	25-Sep-14/O	9			
Cobalt	µg/g	1	EPA 6010	25-Sep-14/O	2			
Copper	µg/g	1	EPA 6010	25-Sep-14/O	44			
Lead	µg/g	5	EPA 6010	25-Sep-14/O	17			
Mercury	µg/g	0.005	EPA 7471A	24-Sep-14/O	0.035			
Molybdenum	µg/g	1	EPA 6010	25-Sep-14/O	1			
Nickel	µg/g	1	EPA 6010	25-Sep-14/O	6			
Selenium	µg/g	2	EPA 6020	24-Sep-14/O	< 2			
Zinc	µg/g	3	EPA 6010	25-Sep-14/O	104			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	25-Sep-14/K	< 1			

NO EXCEEDANCE

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

Gord Murphy
Lab Supervisor

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004737

CADUCEON ENVIRONMENTAL LABORATORIES

Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-31656

Report To:

Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Leigh Moulton

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 08-Dec-14

DATE REPORTED: 16-Dec-14

SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Incoming SSO

P.O. NUMBER:

WATERWORKS NO.

	Client I.D.	Incoming SSO			
	Sample I.D.	B14-31656-1			
	Date Collected	29-Nov-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%	0.1		11-Dec-14/O	54.6			
C/N Ratio	-		Calc.	16-Dec-14	27.8			
Aluminum	µg/g	10	EPA 6010	10-Dec-14/O	1410			
Arsenic	µg/g	2	EPA 6020	10-Dec-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	10-Dec-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	10-Dec-14/O	18500			
Chromium	µg/g	1	EPA 6010	10-Dec-14/O	7			
Cobalt	µg/g	1	EPA 6010	10-Dec-14/O	< 1			
Copper	µg/g	1	EPA 6010	10-Dec-14/O	15			
Lead	µg/g	5	EPA 6010	10-Dec-14/O	6			
Mercury	µg/g	0.005	EPA 7471A	10-Dec-14/O	0.024			
Molybdenum	µg/g	1	EPA 6010	10-Dec-14/O	1			
Nickel	µg/g	1	EPA 6010	10-Dec-14/O	12			
Selenium	µg/g	2	EPA 6020	10-Dec-14/O	< 2			
Zinc	µg/g	3	EPA 6010	10-Dec-14/O	72			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	10-Dec-14/K	< 1			

No Exceedance

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004738

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-32460

Report To:
Orgaworld
5123 Hawthorne Rd.
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 17-Dec-14
DATE REPORTED: 24-Dec-14
SAMPLE MATRIX: Solid

JOB/PROJECT NO.: Sawdust - Feedstock
P.O. NUMBER:
WATERWORKS NO.

	Client I.D.	Sawdust - Feedstock			
	Sample I.D.	B14-32460-1			
	Date Collected	16-Dec-14			

Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
% moisture	%	0.1		22-Dec-14/O	11.1			
Total Organic Carbon	%	0.005	Subcontract	22-Dec-14	49.1 [2]			
C/N Ratio	-		Calc.	24-Dec-14	480			
Aluminum	µg/g	10	EPA 6010	18-Dec-14/O	240			
Arsenic	µg/g	2	EPA 6020	18-Dec-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	18-Dec-14/O	< 0.5			
Calcium	µg/g	10	EPA 6010	18-Dec-14/O	2510			
Chromium	µg/g	1	EPA 6010	18-Dec-14/O	4			
Cobalt	µg/g	1	EPA 6010	18-Dec-14/O	< 1			
Copper	µg/g	1	EPA 6010	18-Dec-14/O	4			
Lead	µg/g	5	EPA 6010	18-Dec-14/O	< 5			
Mercury	µg/g	0.005	EPA 7471A	19-Dec-14/O	< 0.01			
Molybdenum	µg/g	1	EPA 6010	18-Dec-14/O	< 1			
Nickel	µg/g	1	EPA 6010	18-Dec-14/O	3			
Selenium	µg/g	2	EPA 6020	18-Dec-14/O	< 2			
Zinc	µg/g	3	EPA 6010	18-Dec-14/O	23			
Poly-Chlorinated Biphenyls (PCB's)	µg/g	1	EPA 8082	18-Dec-14/K	< 3 [1]	0.5		

1. Elevated MDL due to sample matrix
2. Subcontracted to SGS Lakefield

no exceedance for metals.

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004739

CADUCEON ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

C.O.C.: ---

2013/2014 waste inspections - analytical results - SCADA

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

DATE RECEIVED: 13-Jan-14
DATE REPORTED: 20-Jan-14
SAMPLE MATRIX: Compost

Client I.D.								
Sample I.D.								
Date Collected								
Parameter	Units	M.D.L.	Reference Method	D Analyzed				
pH @25°C	pH Units		SM 4500H	15-Jan-14/O	5.88			
% moisture	%			13-Jan-14/O	51.5			
Non-Biodegradable material ->No.8 Mesh	%	1	IN-HOUSE	17-Jan-14/O	< 1			
Plastic->No. 8	%	1	IN-HOUSE	17-Jan-14/O	< 1			
Org. Matter (LOI @550)	% by wt	1	Agri.-Food 84-045	13-Jan-14/O	72			
C/N Ratio	-		Calc.	17-Jan-14	41.9			
Ammonia (N)-Total	µg/g	0.01	MOEE 3364	15-Jan-14/O	2380			
Total Kjeldahl Nitrogen	µg/g	0.05	MOEE 3367	14-Jan-14/O	14200			
Phosphorus-Total	µg/g	0.01	MOEE 3367	14-Jan-14/O	2330			
Arsenic	µg/g	2	EPA 6020	14-Jan-14/O	< 2			
Cadmium	µg/g	0.5	EPA 6010	14-Jan-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	14-Jan-14/O	12			
Cobalt	µg/g	1	EPA 6010	14-Jan-14/O	2			
Copper	µg/g	1	EPA 6010	14-Jan-14/O	42			
Lead	µg/g	5	EPA 6010	14-Jan-14/O	17			
Mercury	µg/g	0.005	EPA 7471A	14-Jan-14/O	0.035			
Molybdenum	µg/g	1	EPA 6010	14-Jan-14/O	1			
Nickel	µg/g	1	EPA 6010	14-Jan-14/O	6			
Selenium	µg/g	2	EPA 6020	14-Jan-14/O	< 2			
Zinc	µg/g	3	EPA 6010	14-Jan-14/O	108			
E coli	cfu/g	1	MOE E3371	13-Jan-14/O	< 100			
Salmonella	MPN/4g	0.0	CSMSAL01	14-Jan-14	0			

1 % WW of "dry"sample (34.8% of "wet" sample)

no exceedance

K. Pipin

Krystyna Pipin , M. Sc.
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004740

CADUCEON ENVIRONMENTAL LABORATORIES

Client committed. Quality assured.

CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: ---

REPORT No. B14-04018

Report To:
Orgaworld
5123 Hawthorne Rd,
Ottawa ON K1G 3Y3 Canada
Attention: Tanya Minarik

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa Ontario K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 28-Feb-14
DATE REPORTED: 17-Mar-14
SAMPLE MATRIX: Compost

JOB/PROJECT NO.: Compost
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.		Bunker #3			
			Sample I.D.		B14-04018-1			
			Date Collected		28-Feb-14			
Parameter	Units	M.D.L.	Reference Method	Date/Site Analyzed				
pH @25°C	pH Units		SM 4500H	03-Mar-14/O	7.12			
% moisture	%			03-Mar-14/O	26.9			
Total Solids	% by wt	0.1	SM 2540	03-Mar-14/O	73.1			
Plastic->No. 8	%	1	IN-HOUSE	06-Mar-14/O	< 1			
Non-Biodegradable material ->No.8 Mesh	%	1	IN-HOUSE	06-Mar-14/O	< 1			
Nitrite (N)	µg/g	1	SM4110C	03-Mar-14/O	5			
Nitrate (N)	µg/g	1	SM4110C	03-Mar-14/O	10			
Total Organic Carbon	% by wt	0.1	EPA 415.1	10-Mar-14/O	33.8	3		
Ammonia (N)-Total	µg/g	0.01	MOEE 3364	06-Mar-14/O	2340			
Total Kjeldahl Nitrogen	µg/g	0.05	MOEE 3367	10-Mar-14/O	22600			
Phosphorus-Total	µg/g	0.01	MOEE 3367	10-Mar-14/O	4460			
C/N Ratio	%		Calc.	11-Mar-14	15.0			
Org. Matter (LOI @550)	% by wt	1	Agri.-Food 84-045	03-Mar-14/O	72	1		
Arsenic	µg/g	2	EPA 6020	04-Mar-14/O	2			
Cadmium	µg/g	0.5	EPA 6010	03-Mar-14/O	< 0.5			
Chromium	µg/g	1	EPA 6010	03-Mar-14/O	90			
Cobalt	µg/g	1	EPA 6010	03-Mar-14/O	2			
Copper	µg/g	1	EPA 6010	03-Mar-14/O	37			
Lead	µg/g	5	EPA 6010	03-Mar-14/O	13			
Mercury	µg/g	0.005	EPA 7471A	04-Mar-14/O	0.027			
Molybdenum	µg/g	1	EPA 6010	03-Mar-14/O	2			
Nickel	µg/g	1	EPA 6010	03-Mar-14/O	44			
Selenium	µg/g	2	EPA 6020	04-Mar-14/O	< 2			
Zinc	µg/g	3	EPA 6010	03-Mar-14/O	110			
E coli	cfu/g	1	MOE E3371	28-Feb-14/O	<100			
Salmonella	MPN/4g	0.1	CSMSAL01	17-Mar-14	< 0.1	2		

no exceedance

Moisture content low (50%).

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed=K-Kingston,W-Windsor,O-Ottawa,R-Richmond Hill

The analytical results reported herein refer to the samples as received. Reproduction of this analytical report in full or in part is prohibited without prior consent from Caduceon Environmental Laboratories.

004741

REPORT NO.
C14111-70000

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1117001
SAMPLE ID:COMPOST

Bunker # 3

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-04-16
DATE RECEIVED:2014-04-21
DATE REPORTED:2014-04-28
DATE PRINTED:2014-04-28

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.20 ✓	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL* ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	1.06 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	6.84 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	32.69 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL* ✓	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5 ✓	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.96 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	11.16 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL* ✓	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	106.05 ✓	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

no exceedances

Moisture low

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14111-70000

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14111-70000

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1117002
SAMPLE ID:COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-04-16
DATE RECEIVED:2014-04-21
DATE REPORTED:2014-04-28
DATE PRINTED:2014-04-28

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Ammonia (NH3/NH4-N)	1858.50	ug/g	.01	Colourimetric
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.19	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.19	%	0.01	TMECC 03.08
Total FM > 25 mm	0.04	%	.01	TMECC 03.08
Total FM > 25 mm	4	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.13	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.13	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	3	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	3	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Nitrogen (Total)	2.29	%	0.01	TMECC.04.02-D
pH	8.1	---	0.1	TMECC.04.11
Phosphorus	7840.00	ug/g	5.00	TMECC.04.06 *
Potassium	12570.00	ug/g	5.00	TMECC.04.06
Organic Matter	59.00	%	0.10	TMECC.05.07-A
Moisture	26.34	%	0.10	TMECC.03.09-A
C:N Ratio	14:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

he results of this report relate to the sample submitted and analyzed.

C14111-70000

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14142-70015

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1427038
SAMPLE ID:BUNKER 2

COMPOST
Bunker "2"

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-05-28
DATE RECEIVED:2014-05-22
DATE REPORTED:2014-05-29
DATE PRINTED:2014-05-29

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	1.70	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	1.21	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	8.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	31.57	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.2	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.71	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	17.35	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	92.80	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exception

low moisture

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14142-70015

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14142-70015

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1427039
SAMPLE ID:BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-05-20
DATE RECEIVED:2014-05-22
DATE REPORTED:2014-05-29
DATE PRINTED:2014-05-29

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.52	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.52	%	0.01	TMECC 03.08
Total FM > 25 mm	0.02	%	.01	TMECC 03.08
Total FM > 25 mm	2	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.52	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.52	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	66.02	%	0.10	TMECC.05.07-A
Moisture	14.94	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14142-70015

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14176-70007

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1767018
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-06-23
DATE RECEIVED:2014-06-25
DATE REPORTED:2014-07-03
DATE PRINTED:2014-07-03

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.70	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.53	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	15.24	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	25.76	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	7.82	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	12.71	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	82.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14176-70007

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14176-70007

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2056

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1767019
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-06-23
DATE RECEIVED:2014-06-25
DATE REPORTED:2014-07-03
DATE PRINTED:2014-07-03

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Ammonia (NH3/NH4-N)	1135.97	ug/g	.01	Colourimetric
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.08	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.08	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	1	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.08	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.08	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Nitrogen (Total)	1.50	%	0.01	TMECC.04.02-D
pH	8.0	---	0.1	TMECC.04.11
Phosphorus	3357.00	ug/g	5.00	TMECC.04.06 *
Potassium	7210.00	ug/g	5.00	TMECC.04.06
Organic Matter	53.55	%	0.10	TMECC.05.07-A
Moisture	20.69	%	0.10	TMECC.03.09-A
C:N Ratio	20:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14176-70007

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A & L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14220-70009

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2207021
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-06
DATE RECEIVED:2014-08-08
DATE REPORTED:2014-08-15
DATE PRINTED:2014-08-15

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.00	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	3.05	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	22.14	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	30.32	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	2.0	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.97	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	13.23	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	77.15	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance.

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
he results of this report relate to the sample submitted and analyzed.

C14220-70009

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14220-70009

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2207022
SAMPLE ID:COMPOST BUNKER 2

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-06
DATE RECEIVED:2014-08-08
DATE REPORTED:2014-08-15
DATE PRINTED:2014-08-15

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	BDL*	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	BDL*	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	BDL*	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	BDL*	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	49.54	%	0.10	TMECC.05.07-A
Moisture	36.09	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

he results of this report relate to the sample submitted and analyzed.

C14220-70009

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14246-70002

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2467005
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-29
DATE RECEIVED:2014-09-03
DATE REPORTED:2014-09-10
DATE PRINTED:2014-09-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Ammonia (NH3/NH4-N)	2596.00	ug/g	.01	Colourimetric
Total FM >8 mesh	0.77	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.77	%	0.01	TMECC 03.08
Total FM > 25 mm	0.17	%	.01	TMECC 03.08
Total FM > 25 mm	3	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.20	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.20	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	1	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	1	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	1	pieces/500ml		TMECC 03.08
Nitrogen (Total)	1.58	%	0.01	TMECC.04.02-D
pH	6.5	---	0.1	TMECC.04.11
Phosphorus	2321.00	ug/g	5.00	TMECC.04.06 *
Potassium	7945.00	ug/g	5.00	TMECC.04.06
Organic Matter	57.55	%	0.10	TMECC.05.07-A
Moisture	42.81	%	0.10	TMECC.03.09-A
C:N Ratio	23:1			TMECC.05.02-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14246-70002

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14246-70002

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2467004
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-08-29
DATE RECEIVED:2014-09-03
DATE REPORTED:2014-09-10
DATE PRINTED:2014-09-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.39	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.14	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	21.31	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	21.42	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.5	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.58	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	10.52	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	59.85	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance.

low moisture & check sharps.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14246-70002

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14268-70004

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minank

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2687017
SAMPLE ID:70/30 BLEND COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-22
DATE RECEIVED:2014-09-25
DATE REPORTED:2014-10-02
DATE PRINTED:2014-10-02

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.47	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.09	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	23.49	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	22.27	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.7	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.34	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	8.16	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	65.15	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No exceedance

low moisture.

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14268-70004

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14268-70004

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2687018
SAMPLE ID:70/30 BLEND COMPOST

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-22
DATE RECEIVED:2014-09-25
DATE REPORTED:2014-10-02
DATE PRINTED:2014-10-02

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	112	CFU/g		MFHPB-34 *
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.11	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.11	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.11	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.11	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	69.47	%	0.10	TMECC.05.07-A
Moisture	33.07	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

ne results of this report relate to the sample submitted and analyzed.

C14268-70004

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14275-70001

ACCOUNT NUMBER
08200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik
Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2757003
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-30
DATE RECEIVED:2014-10-02
DATE REPORTED:2014-10-10
DATE PRINTED:2014-10-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.60	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	22.22	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	34.43	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.8	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.64	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	12.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	70.20	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

No excess *

low moisture

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels
The results of this report relate to the sample submitted and analyzed.

C14275-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14275-70001

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2757004
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-09-30
DATE RECEIVED:2014-10-02
DATE REPORTED:2014-10-10
DATE PRINTED:2014-10-10

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	>1000	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.02	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.02	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	1	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.02	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.02	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	53.20	%	0.10	TMECC.05.07-A
Moisture	29.21	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14275-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14304-70003

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3047005
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-10-29
DATE RECEIVED:2014-10-31
DATE REPORTED:2014-11-07
DATE PRINTED:2014-11-07

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	2.10	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.19	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	13.35	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Copper	27.84	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.6	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	5.87	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	10.74	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	70.50	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

no exceedances -

low moisture

- re-Test e-coli (pass)

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14304-70003

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14304-70003

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3047006
SAMPLE ID:COMPOST BUNKER 1

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-10-29
DATE RECEIVED:2014-10-31
DATE REPORTED:2014-11-07
DATE PRINTED:2014-11-07

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	CFU/g		MFHPB-34 *
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.05	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.05	%	0.01	TMECC 03.08
Total FM > 25 mm	BDL*	%	.01	TMECC 03.08
Total FM > 25 mm	BDL*	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.05	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.05	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	63.08	%	0.10	TMECC.05.07-A
Moisture	30.55	%	0.10	TMECC.03.09-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14304-70003

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14296-90006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3

ATTN:Tanya, Leigh, Mike

Phone:613-822-2056
Fax:613-822-2056

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:2969056
SAMPLE ID:RE-TEST COMPOST BUNKER 1

SAMPLE MATRIX:SOLID
DATE SAMPLED:2014-10-21
DATE RECEIVED:2014-10-23
DATE REPORTED:2014-11-03
DATE PRINTED:2014-11-03

PARAMETER	RESULT	UNIT	METHOD REFERENCE
E. coli	<3	MPN/g dry	MFHPB-19*

Results reported on a as is basis
* - accredited test
ND - Not Detected
P/A - Presence / Absence

The results of this report relate to the sample submitted and analyzed.

C14296-90006

Results Authorized By:

Keri Wang, Microbiology Manager

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14335-70001

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3

FOR:BIOFILTER

ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:3357003
SAMPLE ID:BIOFILTER 3

SAMPLE MATRIX:SOLID
DATE SAMPLED:2014-11-27
DATE RECEIVED:2014-12-01
DATE REPORTED:2014-12-08
DATE PRINTED:2014-12-09

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	<3	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.45	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.45	%	0.01	TMECC 03.08
Total FM > 25 mm	0.39	%	.01	TMECC 03.08
Total FM > 25 mm	2	pieces/500ml		TMECC 03.08
Total plastics > 8 mesh	0.45	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.45	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	1	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	1	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
OM @ 550 deg C	71.23	%	0.10	LOI@550C
Moisture (as received)	51.40	%	0.10	Moisture @ 105C

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

The results of this report relate to the sample submitted and analyzed.

C14335-70001

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14199-70006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1997013
SAMPLE ID:10-100 TUNNEL 7

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-07-16
DATE RECEIVED:2014-07-18
DATE REPORTED:2014-07-24
DATE PRINTED:2014-07-24

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
Arsenic	3.20	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod*
Cadmium	BDL*	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
Cobalt	2.63	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Chromium	19.20	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod*
opper	23.21	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Mercury	BDL*	ug/g	0.10	TMECC.04.13A *
Molybdenum	1.8	ug/g	1.0	TMECC.04.06;EPA 3050/6010 (mod*
Nickel	6.40	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Lead	9.77	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)
Selenium	BDL*	ug/g	1.00	TMECC.04.13;EPA 3050/6010 (mod)
Zinc	57.45	ug/g	1.00	TMECC.04.06;EPA 3050/6010 (mod)

Comment:

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

he results of this report relate to the sample submitted and analyzed.

C14199-70006

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca

REPORT NO.
C14199-70006

ACCOUNT NUMBER
06200

A & L Canada Laboratories Inc.

2136 Jetstream Road, London, ON, N5V 3P5 Tel: (519) 457-2575 Fax: (519) 457-2664

TO:ORGAWORLD CANADA LIMITED
5123 HAWTHORNE ROAD
OTTAWA, ON K1G 3Y3
CANADA
CANADA
ATTN:Tanya Minarik

Phone:613-822-2056
Fax:613-822-2058

Compost Analysis Proficiency Testing Program

CERTIFICATE OF ANALYSIS

PROJECT NO:
PO#:
LAB NUMBER:1997014
SAMPLE ID:10-100 TUNNEL 7

SAMPLE MATRIX:COMPOST
DATE SAMPLED:2014-07-16
DATE RECEIVED:2014-07-18
DATE REPORTED:2014-07-24
DATE PRINTED:2014-07-24

PARAMETER	RESULT	UNIT	DETECTION LIMIT	METHOD REFERENCE
E. coli	>1000	MPN/g dry		MFHPB-19*
Salmonella spp.	NEGATIVE	P-A/25.0g(ml)		MFLP-75 *
Total FM >8 mesh	0.96	%	0.01	TMECC 03.08
Total FM > 2.8 mm*	0.96	%	0.01	TMECC 03.08
Total FM > 25 mm	0.78	%	.01	TMECC 03.08
Total FM > 25 mm	6	pieces/500ml		TMECC 03.08
otal plastics > 8 mesh	0.93	%	0.01	TMECC 03.08
Total plastics > 2.8 mm*	0.93	%	0.01	TMECC 03.08
Total sharps > 2.36 mm	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 2.8 mm*	BDL*	pieces/500ml		TMECC 03.08
Total sharps > 12.5 mm	BDL*	pieces/500ml		TMECC 03.08
Organic Matter	67.09	%	0.10	TMECC.05.07-A

Comment:

1.FM(Foreign matter) = glass,metal,plastic
2.Sharps = foreign matter pieces of a size or shape that can cause human or animal injury
3.8 mesh screen = 2.36mm
4.*2.8mm screen is used since 3.0mm screen does not exist

Results reported on a dry weight basis
* - accredited test
BDL - Below detectable levels

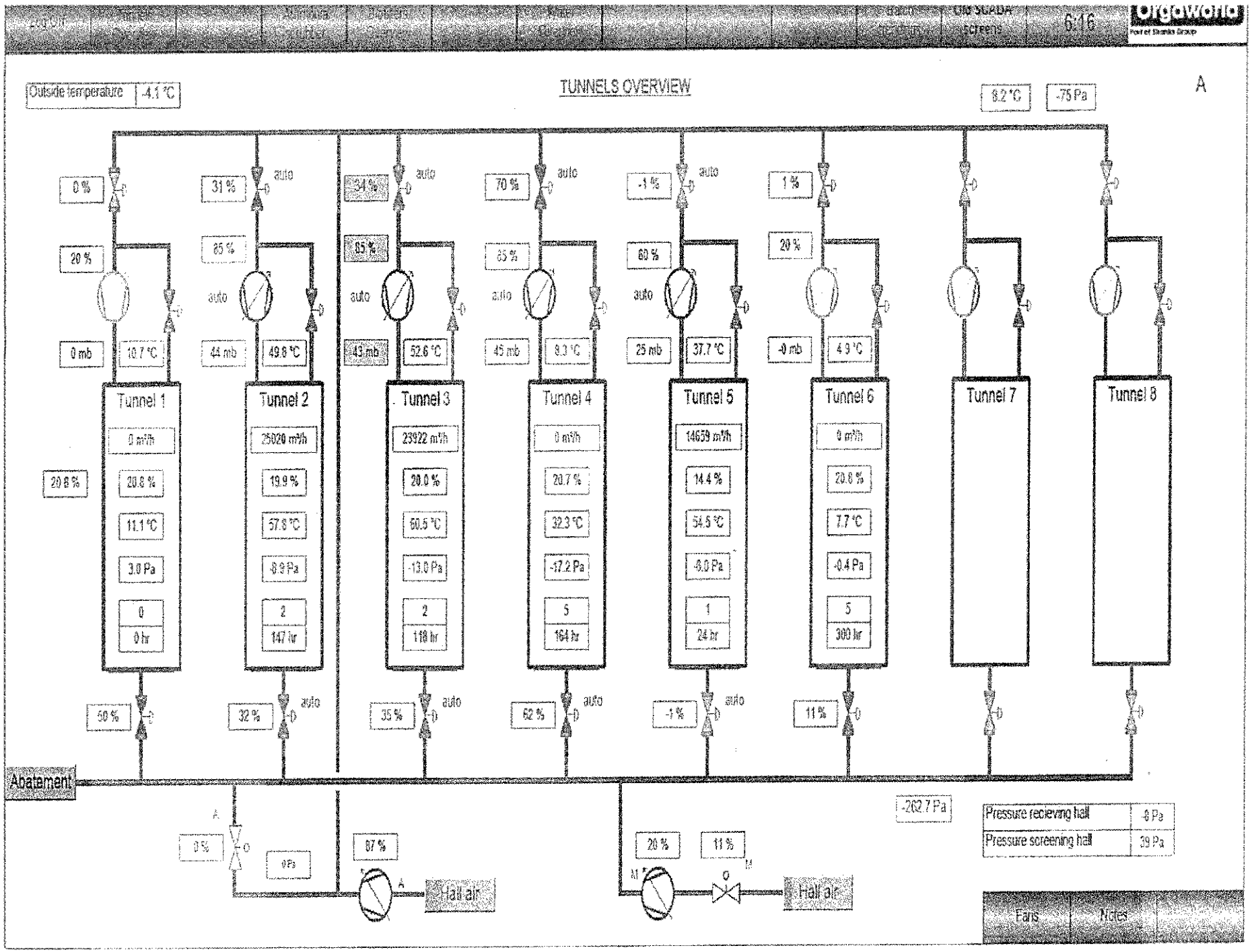
The results of this report relate to the sample submitted and analyzed.

C14199-70006

Results Authorized By:

Haifeng Song, Senior Chemist / Agriculture Supervisor

A&L Canada Laboratories Inc. is accredited by the Standards Council of Canada for specific tests as listed on www.scc.ca and by the Canadian Association for Laboratory Accreditation as listed on www.cala.ca


Logout
Trends
Summary
Logbook
Setup
Help
Orig SCADA screens
6:16
Orgaworld
TUNNELS OVERVIEW
Outside temperature
-4.1 °C
8.2 °C
-75 Pa
A
Tunnel 1
Tunnel 2
Tunnel 3
Tunnel 4
Tunnel 5
Tunnel 6
Tunnel 7
Tunnel 8
0 %
31 %
34 %
70 %
-1 %
1 %
auto
20 %
65 %
60 %
0 mb
10.7 °C
44 mb
49.8 °C
43 mb
52.6 °C
45 mb
9.3 °C
25 mb
37.7 °C
-0 mb
4.9 °C
0 m³/h
25020 m³/h
23922 m³/h
0 m³/h
14659 m³/h
0 m³/h
20.8 %
20.0 %
19.9 %
20.0 %
20.7 %
14.4 %
20.8 %
11.1 °C
57.8 °C
60.5 °C
32.3 °C
54.5 °C
7.7 °C
3.0 Pa
-8.9 Pa
-13.0 Pa
-17.2 Pa
-6.0 Pa
-0.4 Pa
0
0 hr
2
147 hr
2
119 hr
5
164 hr
1
24 hr
5
300 hr
50 %
32 %
35 %
62 %
-1 %
11 %
Abatement
3 %
0 Pa
87 %
Hall air
20 %
11 %
Hall air
-262.7 Pa
Pressure recieving hall
-8 Pa
Pressure screening hall
39 Pa
Faris
Notes

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
2-Jan-2014	7:50AM	20.5	20.5	0
3-Jan-2014	10:50AM	21.5	22.5	1
6-Jan-2014	5:18PM	22	20.5	-1.5

Bunder #2

Date	Time	Temp Out	Temp In	Net Rise
17-Jan-2014	8:51AM	19	19	0
20-Jan-2014	12:17pm	18.5	18.5	0
21-Jan-2014	8:05am	18.5	18.5	0
22-Jan-2014	8:35am	18	18.5	0.5
23-Jan-2014	10:26am	18	19.5	1.5
24-Jan-2014	8:20am	19	19.5	0.5

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
27-Jan-2014	8:12am	18.5	19	0.5
28-Jan-2014	7:44am	18.5	20.5	2
29-Jan-2014	8:14am	19	21	2
30-Jan-2014	7:11am	18.5	21	2.5
31-Jan-2014	9:09am	19.5	22	2.5
3-Feb-2014	8:34am	20	22	2

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
4-Feb-2014	8:54am	20.5	22	1.5
5-Feb-2014	7:37am	20	21.5	1
6-Feb-2014	7:15am	19.5	21	1.5
7-Feb-2014	8:45am	20	21	1
10-Feb-2014	7:18am	20	21.5	1.5
11-Feb-2014	7:51am	20	21	1
12-Feb-2014	7:20am	20.5	21.5	1

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
18-Feb-2014	7:29am	20.5	21	0.5
19-Feb-2014	7:28am	20.5	21	0.5
20-Feb-2014	7:54am	20.5	21	0.5
21-Feb-2014	9:31am	21	20.5	-0.5
24-Feb-2014	8:38am	19.5	20	0.5
25-Feb-2014	8:20am	19.5	20	0.5
26-Feb-14	8:13am	19.5	20	0.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
28-Feb-14	7:23am	21	21.5	0.5
3-Mar-14	8:36am	20	22	2
4-Mar-14	7:22am	20.5	22	1.5
5-Mar-14	7:44am	20.5	22	1.5
6-Mar-14	7:49am	18.5	20	1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
7-Mar-14	7:52am	19.5	20	0.5
8-Mar-14	8:09am	20.5	21.5	1
10-Mar-14	8:11am	18	20	2

11-Mar-14	7:32am	20	22	2
12-Mar-14	9:22am	18.5	21.5	3
13-Mar-14	11:44am	20	21.5	1.5
14-Mar-14	10:11am	20	22	2

TUNNEL #8

Date	Time	Temp Out	Temp In	Net Rise
20-Mar-14	3:36pm	18.5	20	1.5
21-Mar-14	9:02am	19.5	20	0.5
24-Mar-14	7:44am	19	20	1
25-Mar-14	7:16am	19.5	20	0.5
26-Mar-14	12:04pm	20	21.5	1.5
27-Mar-14	7:30am	19.5	20	0.5
28-Mar-14	7:16am	19.5	20	0.5

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
1-Apr-14	8:19am	19.5	20	0.5
2-Apr-14	7:32am	19.5	20	0.5
3-Apr-14	11:09am	19.5	19.5	0
4-Apr-14	7:56am	19	20	1
7-Apr-14	8:16am	19.5	20.5	1
8-Apr-14	10:32am	20	21	1
9-Apr-14	11:39am	21	22	1

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
10-Apr-14	4:22pm	21	22	1
11-Apr-14	11:05am	20.5	21.5	1
14-Apr-14	7:58am	18.5	18	-0.5
15-Apr-14	1:19pm	21.5	20	-1.5
16-Apr-14	7:08am	19.5	17	-2.5
17-Apr-14	7:11am	18.5	20	-1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
28-Apr-14	4:35pm	22.5	22	-0.5
29-Apr-14	12:23pm	19.5	20.5	1
30-Apr-14	8:27am	22	21.5	-0.5
1-May-14	7:57am	22.5	20.5	-2
2-May-14	8:13am	23	22.5	-0.5
5-May-14	9:21am	23.5	22.5	-1
6-May-14	7:43am	22	22.5	0.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
12-May-14	8:11am	21	20.5	-0.5
13-May-14	9:16am	22.5	22.5	0
14-May-14	8:09am	19.5	21.5	-2
15-May-14	7:47am	21.5	20	1.5
16-May-14	8:55am	22	22	0
18-May-14	8:35am	19	19.5	-0.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
22-May-14	2:43pm	19.5	20	-0.5
23-May-14	8:43am	20.5	19	1.5

24-May-14	10:41am	21	21.5	-0.5
26-May-14	8:34am	19.5	21.5	-2
27-May-14	10:28am	22	23	-1
28-May-14	10:43am	23.5	22	1.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
29-May-14	1:53pm	20	21.5	-1.5
30-May-14	10:19am	22.5	22	0.5
2-Jun-14	8:19am	21.5	23	-1.5
3-Jun-14	8:05am	23	22.5	1.5
4-Jun-14	9:57am	23	23	0

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
5-Jun-14	8:23am	21.5	20.5	1
6-Jun-14	8:42am	23.5	23.5	0
9-Jun-14	7:49am	23	23.5	-0.5
10-Jun-14	8:11am	22.5	22.5	0
11-Jun-14	10:27am	23	22	1

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
13-Jun-14	2:03pm	22	21.5	0.5
14-Jun-14	1:13pm	21.5	22	-0.5
15-Jun-14	10:23am	22.5	21.5	1
16-Jun-14	8:02am	21	20.5	0.5
17-Jun-14	11:36am	22.5	22	0.5

Bunker #2 (sent to test)

Date	Time	Temp Out	Temp In	Net Rise
17-Jun-14	7:33am	22.5	20.5	2
18-Jun-14	8:18am	22	23	-1
19-Jun-14	9:16am	22	23	-1
20-Jun-14	10:15am	23	22.5	0.5
23-Jun-14	8:42am	19.5	20.5	-1

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
23-Jun-14	2:38pm	24.5	22.5	2
24-Jun-14	7:11am	23.5	24.5	-1
25-Jun-14	9:10am	24.5	23	1.5
26-Jun-14	9:09am	22	24.5	-2.5
27-Jun-14	10:40am	23	22.5	1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
3-Jul-14	8:21am	21.5	19.5	2
4-Jul-14	9:28am	22	23.5	-1.5
5-Jul-14	11:12am	23.5	22	1.5
7-Jul-14	8:49am	21.5	22	-0.5
8-Jul-14	8:22am	22	22.5	-0.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
11-Jul-14	11:19am	19.5	21	-1.5
14-Jul-14	7:51am	21.5	20	1.5
15-Jul-14	8:24am	20	22.5	-2.5

16-Jul-14	9:02am	22.5	21	1.5
17-Jul-14	8:14am	19.5	20	-0.5

BioFilter #3

Date	Time	Temp Out	Temp In	Net Rise
22-Jul-14	9:39am	21	19.5	1.5
23-Jul-14	7:57am	22.5	19.5	3
24-Jul-14	9:27am	21	21.5	-0.5
25-Jul-14	7:11am	22.5	19	3.5
28-Jul-14	7:22am	21.5	20.5	1

Bunker #2

August 6 = send for testing (lab)

Date	Time	Temp Out	Temp In	Net Rise
28-Jul-14	12:37pm	23	23.5	-0.5
29-Jul-14	11:56am	24.5	22	2.5
30-Jul-14	8:07am	22	23.5	-1.5
31-Jul-14	10:48am	21.5	20.5	1
1-Aug-14	9:16am	22.5	20.5	2

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
5-Aug-14	8:21am	22	19.5	2.5
6-Aug-14	9:39am	19.5	23	-3.5
7-Aug-14	7:47am	20.5	19.5	1
8-Aug-14	9:12am	21	19.5	2.5
11-Aug-14	8:16am	22	19.5	3.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
12-Aug-14	11:32am	23.5	19.5	4
13-Aug-14	8:21am	22.5	20	2.5
14-Aug-14	8:01am	19.5	22.5	-3
15-Aug-14	8:03am	21.5	19	2.5
18-Aug-14	7:12am	19	21.5	-2.5

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
18-Aug-14	8:12am	23.5	20.5	3
19-Aug-14	10:11am	23.5	22	1.5
20-Aug-14	8:18am	21.5	23.5	-2
21-Aug-14	7:36am	18.5	21	-2.5
22-Aug-14	8:11am	21.5	21	0.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
23-Aug-14	9:35am	22	21.5	0.5
24-Aug-14	7:56am	19.5	21.5	-2
25-Aug-14	8:50am	21	19.5	1.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
25-Aug-14	9:23am	21	19.5	1.5
26-Aug-14	10:30am	21	20	1
27-Aug-14	9:14am	23	19.5	3.5
28-Aug-14	10:31am	22.5	19.5	3
29-Aug-14	11:11am	21.5	19	2.5

Tunnel #3

Date	Time	Temp Out	Temp In	Net Rise

1-Sep-14	7:12am	19.5	22	-2.5
2-Sep-14	9:13am	21.5	20	1.5
3-Sep-14	10:01am	19	22.5	-3.5
4-Sep-14	8:14am	20.5	22	-1.5
5-Sep-14	8:26am	19.5	21.5	-2

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
4-Sep-14	7:13am	20.5	23	-2.5
5-Sep-14	9:14am	19.5	22	-2.5
6-Sep-14	7:12am	20.5	21.5	-1
7-Sep-14	9:52am	19.5	19	0.5
8-Sep-14	8:14am	21	22.5	-1.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
10-Sep-14	3:12pm	21.5	20.5	1
11-Sep-14	12:41am	22	22.5	-0.5
12-Sep-14	11:16am	21.5	19	2.5
15-Sep-14	9:03am	19.5	20	-0.5
16-Sep-14	10:12am	20.5	22	-1.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
24-Sep-14	9:21am	22.5	19	3.5
25-Sep-14	10:18am	19.5	20.5	-1
26-Sep-14	9:24am	21	21.5	-0.5
27-Sep-14	8:13am	22.5	22	0.5
28-Sep-14	11:13am	19.5	21	-1.5
29-Sep-14	9:39am	20.5	19	1.5

Bunker #2

Date	Time	Temp Out	Temp In	Net Rise
26-Sep-14	8:41am	19.5	20	-0.5
27-Sep-14	9:13am	22	19.5	2.5
28-Sep-14	10:11am	21.5	22	-0.5
29-Sep-14	11:14am	23	19.5	3.5
30-Sep-14	9:12am	21.5	20	1.5
1-Oct-14	7:32am	23.5	22	1.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise
2-Oct-14	2:48pm	19.5	19	0.5
3-Oct-14	7:18am	18	22.5	-4.5
6-Oct-14	8:44am	20	22.5	-2.5
7-Oct-14	10:41am	22.5	19	3.5

Tunnel #8

Date	Time	Temp Out	Temp In	Net Rise
15-Oct-14	8:22am	19.5	21.5	-2
16-Oct-14	11:42am	21.5	22	-0.5
17-Oct-14	9:13am	20	21.5	-1.5
18-Oct-14	11:11am	22	21.5	0.5
20-Oct-14	2:14pm	19.5	19.5	0
21-Oct-14	8:35am	22	22.5	-0.5

Bunker #3

Date	Time	Temp Out	Temp In	Net Rise

25-Oct-14	6:32am	19.5	22.5	-3
26-Oct-14	12:58pm	20.5	22	-1.5
27-Oct-14	7:44am	23	19.5	3.5
28-Oct-14	8:03am	22.5	20	2.5
29-Oct-14	8:51am	19.5	21.5	-2
30-Oct-14	9:13am	22	22.5	-0.5

Bunker #1

Date	Time	Temp Out	Temp In	Net Rise
23-Dec-14	4:11pm	21.5	22	-0.5
24-Dec-14	7:52am	20	19.5	0.5
26-Dec-14	8:22am	19.5	22	-2.5
27-Dec-14	9:10am	18	21.5	-3.5
28-Dec-14	10:11am	22	18	4

Tunnel #7

Date	Time	Temp Out	Temp In	Net Rise
2-Jan-15	9:13am	19.5	19	0.5
3-Jan-15	10:11am	22	21.5	0.5
5-Jan-15	8:16am	20.5	21.5	-1
6-Jan-15				
7-Jan-15				

Date	Time	Temp Out	Temp In	Net Rise

Witness Copy

Orgaworld Canada Ltd.

v

Director, MOE

ERT Files 09-115 and 09-126

COMMON DOCUMENTS BOOK

COMMON BOOK OF DOCUMENTS - INDEX

Tab	Date	Document Description
		Waste Approval Documents
1.	16-Sep-09	Provisional Certificate of Approval Waste Disposal Site - Number 2766-7HEPSZ
2.	10-Jun-08	Application for a Provisional Certificate of Approval for a Waste Disposal Site - Orgaworld Canada Ltd. - signed by Frederick Mosher
3.	Jun-08	Design and Operation Report supporting Application for a Provisional Certificate of Approval for a Waste Disposal Site, Prepared by Conestoga Rovers and Associates - June 2008, reference No. 045804
4.	02-Jul-08	EBR Registry Proposal Notice, Registry Number 10-4040, Orgaworld Canada Ltd., Approval for a waste disposal site, EPA s. 27
5.	10-Sep-08	Letter from M Wojcik to Frederick Mosher re Application for Approval of a Waste Disposal Site
6.	03-Oct-08	Letter from T Gidda to M Wojcik re Response to Ministry of Environment Concerns
7.	09-Jan-09	Email from Margaret Wojcik to Tej Gidda, subject Orgaworld - Ottawa site
8.	29-Jan-09	Letter from T Gidda to M Wojcik re Response to Request for Additional Information
9.	22-May-09	Draft Provisional Certificate of Approval Waste Disposal Site - Site Location: Organics Composting Facility (Orgaworld, Ottawa) with covering email from R Wan dated May 22, 2009
10.	17-Jul-09	Letter from T Gidda to M Wojcik re Response to Draft Provisional Certificate of Approval (Waste Disposal Site)
11.	20-Jul-09	Letter from T Gidda to M Wojcik re Response to Draft Provisional Certificate of Approval (Waste Disposal Site)
12.	24-Jul-09	Meeting Minutes - Project: Orgaworld Ottawa Organics Composting Plant with covering email from T Gidda dated July 27, 2009
13.	11-Aug-09	Draft Provisional Certificate of Approval Waste Disposal Site - Site Location: Organics Composting Facility (Orgaworld, Ottawa) with covering email dated Aug 11, 2009

Tab	Date	Document Description
14.	21-Aug-09	Letter - from Tej Gidda to Margret Wojcik Re: Response to Ministry of the Environment Alterations
15.		Portion of Source Separated Organics Services Agreement - City of Ottawa and Orgaworld Canada Ltd.
16.	04-Sep-09	Letter from T Gidda to M Wojcik re Draft Provisional Certificate of Approval (Waste Disposal Site)
17.	00-00-09	IDS Engineering Assessment Notes prepared by M. Wojcik
18.	28-Sep-09	EBR Registry Instrument Decision Notice, Registry Number 10-4040, Orgaworld Canada Ltd., Approval for a waste disposal site, EPA s. 27
Air Approval Documents		
19.	16-Sep-09	Certificate of Approval Air - Number 7021-7HQNDE
20.	10-Jun-08	Application for Approval (Air & Noise) - Orgaworld Canada Ltd. - signed by Frederick Mosher
21.		Supporting Documentation to the Application
22.	02-Jul-08	EBR Registry Proposal Notice, Registry Number 10-4049, Orgaworld Canada Ltd., Approval for discharge into the natural environment other than water (i.e. Air), EPA s. 9
23.	22-Aug-08	Letter from R Wan to F Mosher re Application for Approval Air
24.	22-Sep-08	Letter from T Gidda to R Wan re Response to Ministry of the Environment Comments
25.	16-Mar-09	Letter from T Gidda to R Wan re Response to Ministry of the Environment Concerns Regarding Potential Odour Issue for Composting Facility in Ottawa
26.	30-Mar-09	Letter from F Mosher to R Wan re Addendum to Application for Basic Comprehensive Certificate of Approval (Air & Noise)
27.	22-May-09	Draft Certificate of Approval Air; Site Location: Lot 27, Concession 6 (Rideau Front), Gloucester, Ottawa City with covering email from R Wan dated May 22, 2009
28.	17-Jul-09	Letter from T Gidda to R Wan re Response to Draft Certificate of Approval (Air) No. 7920-7FJPND

Tab	Date	Document Description
29.	21-Aug-09	Letter from T Gidda to R Wan re Response to Ministry of the Environment Alterations
30.	04-Sep-09	Letter from T Gidda to R Wan re Draft Provisional Certificate of Approval (Air)
31.	21-Sep-09	EBR Registry Instrument Decision Notice, Registry Number 10-4049, Orgaworld Canada Ltd., Approval for discharge into the natural environment other than water (i.e. Air), EPA s. 9
Photographs and Electronic Documents		
32.	03-May- 10	Initial Presentation
33.	00-00-08	Overhead photograph of location of Sensitive Receptors
34.	05-Feb- 10	Six photographs of SSO at facility
35.	11-Feb- 10	Three photographs of SSO at facility
36.	00-00-00	Four photographs of compost and plants
Pet Feces		
37.	31-Jul-09	E-mail chain from E. Tovilla to T. Hart of MOE
38.	26-Oct-09	E-mail chain from M. Wojcik to T. Hart of MOE forwarding October 26 e-mail from C. Wood of Ottawa
39.	27-Oct-09	E-mail chain from M. Wojcik to T. Hart of MOE
40.	18-Dec-09	E-mail to Orgaworld from Journeaux of Ottawa
41.	11-Jan-10	Memo to Mayor relating to pet feces
42.	11-Jan-10	Public Announcement on dog feces
43.	12-Jan-10	Memo to Mayor relating to dog feces
44.	11-Feb-10	E-mail from Orgaworld to Ottawa
London Documents		
45.	27-Jul- 09	CRA source test report (excerpt)

Ministry of the Environment, Conservation and Parks
Eastern Region
1259 Gardiners Road, Unit 3
Kingston ON K7P 3J6
Phone: 613.549.4000
or 1.800.267.0974

Ministère de l'Environnement, de la Protection de la nature et des Parcs
Région de l'Est
1259, rue Gardiners, unité 3
Kingston (Ontario) K7P 3J6
Tél: 613 549-4000
ou 1 800 267-0974

Ontario

M E M O R A N D U M

May 29, 2025

TO: Jordan Hook
Environmental Officer
Ottawa District Office
Eastern Region

FROM: Kyle Stephenson
Hydrogeologist
Technical Support Section
Eastern Region

RE: Convertus Processing Facility
5123 Hawthorne Road, Ottawa
- 2024 Groundwater and Surface Water Monitoring Report
- Groundwater Work Plan

I have reviewed the hydrogeology aspects of the following documents for the Convertus Processing Facility at 5123 Hawthorne Road in Ottawa (the "site"):

- "2024 Groundwater and Surface Water Monitoring Report" dated March 28, 2025 and completed by GHD consultants.

- "Convertus Ottawa Groundwater Workplan" dated July 5, 2024 and completed by Convertus.

2024 Monitoring Report

GHD provided the following (groundwater) conclusions in their 2024 annual report:

- Based on the groundwater elevations gathered in April/May, August and December of 2024, shallow unconfined aquifer flow occurs in an east-northeast direction and groundwater in the deep bedrock aquifer flows in a west-southwest direction, opposite to the direction of the shallow unconfined aquifer.

- Analytical results for the shallow unconfined aquifer samples indicate that groundwater quality at the Site has been historically affected by Facility operations. The distribution of concentrations of ammonia, DOC, iron, and manganese are consistent with an area of impact related to an organic contaminant source in the vicinity of the Facility. Significant improvements in water quality were observed during 2023 and 2024.

- In 2021 and 2022, there were increases in ammonia and DOC in proximity to the Facility (EW107-15 and MW105-13). A damaged knee wall was discovered within the Facility in 2021, which likely contributed to leakage of affected water

into the shallow groundwater. The damage was repaired in 2022 and significant improvements in shallow groundwater quality were observed in the vicinity of the Facility in 2023 and 2024.

- Repair of a failed gasket in a leachate management system manhole in February 2024 eliminated a potential historical source of leakage of leachate to shallow groundwater. Shallow groundwater quality results from 2024 suggest that this repair contributed to improvements in shallow groundwater quality in the vicinity of the Facility.

- Analytical sample results obtained from the deep bedrock aquifer unit monitoring wells indicate that groundwater quality in the deep bedrock aquifer is naturally poor. This observation is consistent with investigations of deep bedrock groundwater quality prior to Facility construction and operation.

Based on these conclusions, GHD recommends the following for 2025:

- The groundwater extraction system at EW107-15 should be operated in such a manner that as much impacted groundwater from the shallow flow system is removed as is feasible.

- The SCADA monitoring system should continue to be used to accurately record the volume of water pumped from EW107-15.

- Groundwater samples should continue to be collected from EW107-15 on a monthly basis during 2025.

- Well condition of bedrock monitoring well TW-4 should be assessed by a licenced well contractor to determine if the well has been compromised. The well should be repaired or replaced, based on the results of the assessment.

- Surveying should be completed in 2025 for monitoring wells MW106-15, MW108-20, MW109-21, MW110-21, and MW111-21. Surveying should also be completed at extraction well EW107-15.

- Wells MW101-13, MW102-09, MW104-13, MW106-15, and MW108-20 should be sampled in duplicate in 2025 as part of a Tier II TLP response.

GHD indicated that a leachate tank inspection was conducted in response to my previous recommendation and the integrity of the tanks was confirmed (no leaks). GHD further indicated that offsite wells MW109-21, MW110-21 and MW111-21 will be included as part of the ongoing monitoring program.

Groundwater Workplan

Convertus indicated the following in the Workplan document:

- Convertus also indicated that monitoring wells MW109-21, MW110-21 and MW111-21 will be included as part of the ongoing monitoring program.

- Convertus agrees that the groundwater extraction well (EW107-15) will be operated to remove as much impacted shallow groundwater as feasible.

- The plan to implement remedial measures at the site (the "Treewell" system) was put on hold in 2022 when concentrations of ammonia and other organic indicators were found to be increasing in wells near the facility. Convertus shifted their focus to identifying and stopping the potential sources of this impact. This led to repair of the receiving area knee wall (June 2022) and a leaking manhole connected to the leachate USTs (March 2024).

- Convertus is exploring transporting impacted water pumped from the extraction well to ROPEC for treatment.

- Convertus will continue to work with Geosyntec and Applied Natural Sciences to evaluate the Treewell system. Convertus will also reconsider the onsite pump and treat option previously proposed by Current Water Technologies.

- Convertus has indicated that they have taken significant steps to control groundwater impacts from the facility and has increased the extraction of impacted groundwater.

Conclusions and Recommendations

Based on my review I offer the following comments for your consideration:

- Repairs to the knee wall and failed manhole gasket have apparently resulted in significant improvements to shallow groundwater quality at the site.

- I am in general agreement with the recommendations presented by GHD in the 2024 annual report.

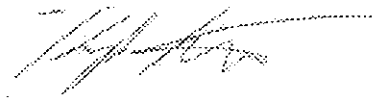
- Monitoring wells MW109-21, MW110-21 and MW111-21 should be included as part of the ongoing monitoring program as agreed to by Convertus and GHD.

- I support the commitment from Convertus to continue assessment of an appropriate remediation approach for the site based on ongoing monitoring results.

- Based on groundwater flow conditions at the site, shallow groundwater impacts extend onto the property north of Somme Street and potentially onto the property east of the site. Supply wells at these properties access water from a deeper aquifer unit that is interpreted to not be hydraulically connected to the shallow groundwater flow system where impacts reside. Groundwater quality at these supply wells is therefore not expected to be adversely impacted by impacts at the site. Despite this I recommend that these property owners should be notified of shallow contamination conditions at the Convertus property just hydraulically upgradient of their properties and likely extending onto their properties. The easiest way to do this may be for Convertus to provide the annual report to adjacent property owners.

- There is potential for impact to surface water resources at this site. As such, I recommend that the documents should be reviewed by the ministry's Surface Water Specialist.

Please contact me if you would like to further discuss these comments.



K. Stephenson, M.Sc., P.Eng.
KMS/FC

ec: J. Hook
B. Simmatis
P. Lalonde
V. Castro

c: KMS/ECHO #1-531728272

From:	David Veinot
To:	Straberger, Kyle (MECP)
Cc:	Ben.Kempel@ghd.com; Michael Leopold
Subject:	Voluntary Groundwater Remediation Plan for Renewi Ottawa
Date:	June 5, 2019 4:09:28 PM
Attachments:	Outlook-1519225495.png 2019-05-13 Renewi Laboratory Study Final Report.pdf 2019-04-12 Renewi Ottawa CWT Groundwater Sample Summary.xlsx Ottawa Extraction Well Map.pdf

Good Afternoon Kyle,

Attached is a copy of the final report from the groundwater pump and treat pilot test at the Renewi Ottawa Facility performed by Current Water Technologies (CWT) in Guelph that we discussed previously. I am also enclosing an Excel file that summarizes the analytical findings. Overall, the test demonstrated that the AmmEL + ESD units would successfully treat impacted groundwater for ammonia and metals to levels below the PWQOs. While the AmmEL + ESD treatment train was effective in significantly reducing the concentration of phosphorus and phenols found in the groundwater, these two lone compounds remained at levels above their respective PWQOs in several treated samples. Addressing these compounds may need to be achieved through alternative means.

As per your recommendation from your email of May 1st, Renewi wishes to amend our existing Industrial Sewage Works ECA (2844-9YNGZC) to include the operation of CWT's remediation equipment. While the treatment equipment from CWT would be installed as described in the report, we think it would be beneficial to install new extraction well, with a 6" casing, in the grassy area shown in the Map attachment. This would provide an extraction well very close to the highest concentrations of ammonia described in GHD's 2018 Annual Monitoring Report, and closer to the property boundary. We found from the trial that the 2" casing in the existing monitoring wells is too small to allow for continual groundwater pumping. We would then pump groundwater from the new well (EW108-19) and EW107-15 simultaneously into CWT's treatment train, discharging the treated effluent to the NE ditch. It is our intention to meter the water inputs and remain below the daily extraction volume requiring a Permit to Take Water.

GHD is performing the Spring 2019 sampling round in Ottawa during the week of June 17th. Before making a final decision on the location of the new extraction well we will review the latest water chemistry data to ensure proper placement.

Renewi will work with GHD to prepare an amendment application. We would like to take you up on your offer to help coordinate pre-submission consultation meetings with Tech Support and provide support for an expedited review once the application is received.

To maximize the volume of groundwater treated next year, we would like to begin pumping

on April 1st, 2020. The ECA amendment would need to be in place prior to that date. Weather permitting, we would then pump and treat impacted groundwater until late Fall 2020. The impact of the pump and treat effort will be monitored during GHD's regular annual groundwater and surface water monitoring program occurring throughout 2020.

I will be in touch shortly to arrange a pre-submission consultation meeting with Tech Support. Representatives will be present from Renewi, GHD, and Current Water Technologies.

Best regards,

David Veinot
Compliance Officer



dveinot@renewi.com
C: (226) 268 6869 | P: (519) 663 4446 ext. 103 | F: (519) 6630830
Renewi Canada Ltd, P.O. Box 21070, London, ON N6K 0C7
* Head Office - 2940 Dingman Drive, London ON N6N 1G4

* London ON Plant - 4675 Wellington Road South London, ON N6E 3W7
* Ottawa ON Plant - 5123 Hawthorne Road, Ottawa, ON K1G 3Y3
* Surrey BC Plant - 9752 192 St, Surrey, BC V4N 4C7
www.renewi.ca

Dit e-mail bericht is uitsluitend bestemd voor de geadresseerde, is vertrouwelijk en kan wettelijk beschermd zijn. Indien u dit bericht onterecht hebt ontvangen, is gebruik, vermenigvuldiging of verspreiding ervan aan derden niet toegestaan. U wordt verzocht om de verzender onmiddellijk op de hoogte te brengen en het e-mail bericht en haar bijlagen te vernietigen. Ons bedrijf noch de verzender aanvaarden enige aansprakelijkheid voor IT virussen en het is uw verantwoordelijkheid om dit e-mail bericht en haar bijlagen te scannen of anderszins te controleren. This email is sent only for the intended recipient and is confidential and may be legally privileged. If you have received this email in error do not use, copy or disclose it. Please notify the sender immediately and permanently delete it and any attachments. Neither the company nor the sender accepts any responsibility for viruses and it is your responsibility to scan or otherwise check this email and any attachments. Renewi plc, Dunedin House, Auckland Park, Milton Keynes, Buckinghamshire, MK1 1BU. Registered office: 16 Charlotte Square, Edinburgh, EH2 4DF. Registered in Scotland, No. SC077438. VAT registration 259547713

316/52. 16 ✓

UTM | 18 Z | 415614010 E
| 9 R | 5011618710 N
Elev. | 9 R | 02910
Basin | 25 | | |

ONTARIO

The Well Drillers Act
Department of Mines, Province of Ontario

15 No 2342

RECEIVED
DEC 10 1951
GEOLOGICAL BRANCH
DEPARTMENT OF MINES

Water Well Record

County or Territorial District CARLETON Township, ~~Village, Town or City~~ Gloucester
(Town or City)
[redacted] ss... Leitrim
Date Completed 20 (day) 11 (month) 51 (year) Cost of Well (excluding pump)

Pipe and Casing Record

Casing diameter(s) 5"
Length(s) of casing(s) WELL DEEPENED
Type of screen FROM 27' TO 57'
Length of screen
Distance from top of screen to ground level
Is well a gravel-wall type?

Pumping Test

Date
Static level 13'
Pumping level 18'
Pumping rate 8 GPM
Duration of test 30 MIN.
Distance from cylinder or bowls to ground level

Water Record

Kind (fresh or mineral) Fresh
Quality (hard, soft, contains iron, sulphur, etc.) hard
Appearance (clear, cloudy, coloured) clear
For what purpose(s) is the water to be used? Farm supply
How far is well from possible source of contamination? 75'
What is the source of contamination? Cow stable
Enclose a copy of any mineral analysis that has been made of water

Depth(s) to Water Horizon(s)	Kind of Water	No. of I Water F
57	Fresh	44'

Well Log

Overburden and Bedrock Record	From	To
Previous well	0 ft.	27 ft.
SANDSTONE	27'	57'

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.

MORRIS HWY 31 OTTAWA

see over

1¼ Miles

See back of record

WELL

Situation: Is well on upland, in valley, or on hillside? hillside
Drilling Firm F.H. [illegible] SON
Address 182 TIMES ST.
Name of Driller M. REINFELD Address
Date Nov. 20/51 Licence Number

Signature of Licensee

FORM 5

Ontario Ministry of the Environment

Well Tag No. for Master Well (Place Sticker and/or Print Below)
A 074584 MW 6-08

Master Well Record for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Page 1 of 2

Master Well Owner's and Land Owner's Information

First Name	Last Name	E-
Orgaworld Canada Real Estate via Tomlinson Environmental Services Inc.		[redacted]

Mailing Address (Street Number/Name, RR)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
5597 Power Road	Ottawa	ON	K1G3NH	6138221867

Location and Construction of the Master Well in the Cluster

Address of Well Location (Street Number/Name, RR)	Township	Lot	Concession
Hawthorne Road at Ridlau Road		26; 27	6

County/District/Municipality	City/Town/Village	Province	Postal Code
	Ottawa	Ontario	

UTM Coordinates	Zone	Easting	Northing	GPS Unit Make	Model	Mode of Operation
NAD 83	18	456400	5016852	Garmin	Etrex	☐ Undifferentiated ☑ Averaged ☐ Differentiated, specify

Overburden and Bedrock Materials *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (Metres) From	To
Grey/Brown	very fine sand + silt		dense, moist	0	0.8
Brown	Fill - sand/silt/clay/gravels			0.8	4.7
Grey/Brown	Sand	with silt	compact oxitized	4.7	6.0
Brown	Till - silty sand, gravel			6.0	7.6

Hole Details

Depth (Metres) From	To	Diameter (Centimetres)
0	7.6	20

Water Use

☐ Public ☐ Industrial ☐ Not used ☐ Other, specify
☐ Domestic ☐ Commercial ☐ Dewatering
☐ Livestock ☐ Municipal ☑ Monitoring
☐ Irrigation ☐ Test Hole ☐ Cooling & Air Conditioning

Method of Construction

☐ Cable Tool ☐ Air Percussion ☐ Digging
☐ Rotary (Conventional) ☐ Diamond ☐ Boring
☐ Rotary (Reverse) ☐ Jetting ☑ Other, specify HSA
☐ Rotary (Air) ☐ Driving

Status of Well

☑ Test Hole ☐ Abandoned, Insufficient Supply
☐ Replacement Well ☐ Abandoned, Poor Water Quality
☐ Dewatering Well ☐ Other, specify
☐ Alteration (Construction) ☐ Abandoned, other, specify

Construction Details

Inside Diameter (Centimetres)	Material (steel, plastic, fibreglass, concrete, galvanized)	Wall Thickness	Depth (Metres) From	To
5.1	PVC	Sched 40	0	3.0

No Casing and Screen Used

Open Hole ☐ Yes ☑ No

Static Water Level Test

1.7 Metres

Screen

☐ Galvanized ☐ Steel ☐ Fibreglass ☐ Concrete ☑ Plastic

Outside Diameter (Centimetres)	Slot No.
5.8	10

Annular Space/Abandonment Sealing Record

Depth Set at (Metres) From	To	Type of Sealant Used (Material and Type)	Volume Used (Cubic Metres)
0.6	2.4	Bentonite	66 kgs

Water Details

Water found at Depth	Kind of Water
Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth	Kind of Water
Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals
Water found at Depth	Kind of Water
Metres ☐ Gas	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals

Disinfected ☐ Yes ☑ No If no, provide reason: Monitoring Well

Date Master Well Completed (yyyy/mm/dd): 2008/07/14

Cluster Information *(Please also fill out the additional Cluster Well Information for Well Construction for each parcel of land and cluster.)*

Total Wells in Cluster	Please indicate Number of Cluster Well Information Log Sheets Submitted
10	1
Total Wells on this Property: unknown	

Location of Well Cluster

Detailed Map must be provided as an attachment no larger than legal size (8.5" x 14"). Sketches are not allowed.

☑ Check box to confirm detailed map is provided as per Section 11.1 (3)

Consent to release additional information concerning the cluster to the Director upon request

Signature of Technician/Contractor: Bruce Downing — Date (yyyy/mm/dd): 2008/10/20

Master Well Owner's/Land Owner's consent to use Cluster Form: [redacted]

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
George Downing Estate Drilling	1814

Business Address (Street No./Name, number, RR)	Municipality
410 Rue Principale	Grenville-sur-la-Rouge

Province	Postal Code	Business E-mail Address
QC	J0V1B0	downing@xplornet.com

Business Phone No. (inc. area code)	Name of Well Technician (Last Name, First Name)	Well Technician's Licence No.	Signature of Technician	Date Submitted (yyyy/mm/dd)
2646909	Downing, Bruce		Bruce Downing	2008/10/20

Ministry Use Only

Audit No.	Well Contractor No.
M 02897	
Date Received (yyyy/mm/dd): NOV 26 2008	Date of Inspection (yyyy/mm/dd)
Remarks	

Ministry's Copy

© Queen's Printer for Ontario, 2006

Ontario — Ministry of the Environment

Well Tag No. for Master Well: **A 074584** (Print Well Tag No.) A074584

Cluster Well Information for Cluster Well Construction

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Property Owner's Information

First Name	Last Name	Mailing Address (Street No./Name, RR)	Municipality
Orgaworld Canada Real Estate via	Tomlinson Environmental Services Inc.	5597 Power Road	Ottawa

Province	Postal Code	E-mail Address	Telephone No. (inc. area code)
Ontario	K1G3N4	rtomlinson@tomlinsongroup.com	6138221867

[redacted]

upon request

Signature of Technician/Contractor: Bruce Downing — Date (yyyy/mm/dd): 2008/10/20

Cluster Well Information

Address of Well Location (Street Number/Name, RR)	Lot	Concession	Township	County/District/Municipality
Hawthorne Road at Rideau Road	26 : 27	6		

City/Town/Village	Province	Postal Code	GPS Unit Make	Model	Unit Mode of Operation
Ottawa	Ontario	~~K1G3N4~~			☐ Undifferentiated ☐ Averaged ☐ Differentiated, specify:

Well # on Sketch	UTM Coordinates Zone	Easting	Northing	Full Depth of Hole (metres)	Hole Diameter (cm)	Method of Construction	Casing Material	Casing Length (metres)	Screen Interval (metres) From	To	Annular Space Sealant Used	Static Water Level (metres)	Abandonment Sealant Used	Comments	Date of Completion (yyyy/mm/dd)
MW 1-08	18	456831	5016712	2.97	20	HSA	PVC	1.5	1.5	2.97	Bentonite	1.3			2008/07/07
MW 2-08	18	456799	5016553	2.77	10	DiA		0.6	0.6	2.77		1.6		overburden from 0 to 0.18	2008/07/08
MW 3-08	18	456533	5016411	17.37	10	DiA		2.13	2.13	17.37		13.2		" " 0 to 0.30	2008/07/09
MW 4-08	18	456474	5016604	2.84	10/20	HSA/DiA		1.22	1.22	2.8		0.7			2008/07/08
MW 5-08	18	456598	5016675	2.77	20	HSA		1.5	1.5	2.77		1.0			2008/07/07
MW 7-08	18	456622	5017219	6.98	20	HSA		3.0	3.0	6.10		3.6			2008/07/14
MW 8-08	18	456687	5017036	4.72	20	HSA		3.0	3.0	4.2		3.0			2008/07/15
MW 9-08	18	457086	5017625	3.66	20	HSA		1.5	1.5	3.0		1.7			2008/07/15
MW 10-08	18	457206	5017303	2.90	20	HSA		1.37	1.37	2.90		1.6			2008/07/15

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
George Downing Estate Drilling LTD.	410 Rue Principale	Grenville-sur-la-Rouge	Qc

Postal Code	Business Telephone No. (inc. area code)	Well Contractor's Licence No.	Business E-mail Address
J0V1B0	8192426469	1844	downing@xplornet.com

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Date Submitted (yyyy/mm/dd)	Signature of Technician
Bruce Downing	2173	2008/10/20	Bruce Downing

Date 1st Well in Cluster Constructed (yyyy/mm/dd)	Date Last Well in Cluster Constructed (yyyy/mm/dd)
2008/07/07	2008/07/15

Ministry Use Only

Date Received (yyyy/mm/dd)	Date Inspected (yyyy/mm/dd)
NOV 26 2008	
Audit No. C 01984	**Remarks** m02897

1991 (11/2006)

Ministry's Copy

© Queen's Printer for Ontario, 2006

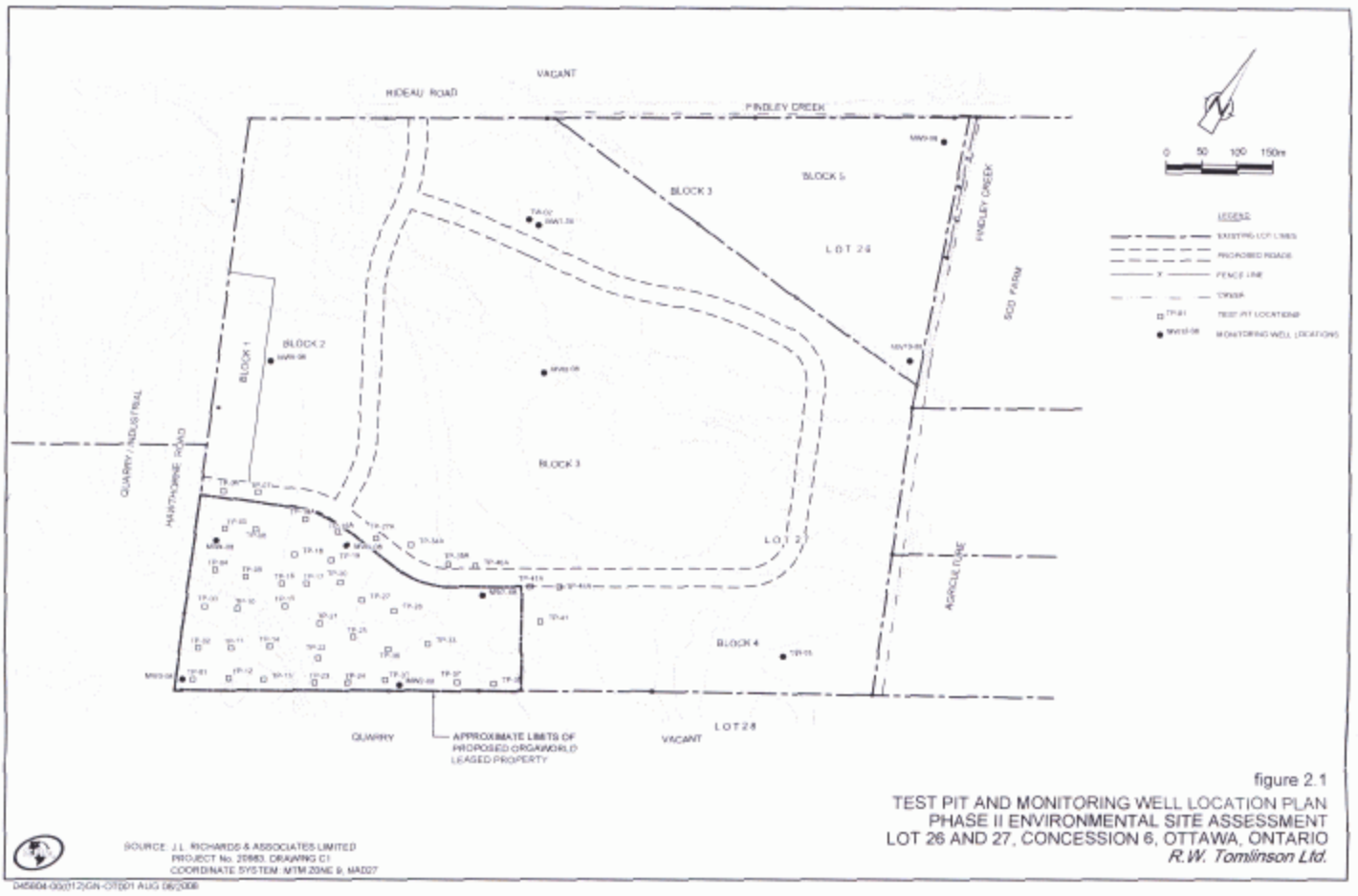


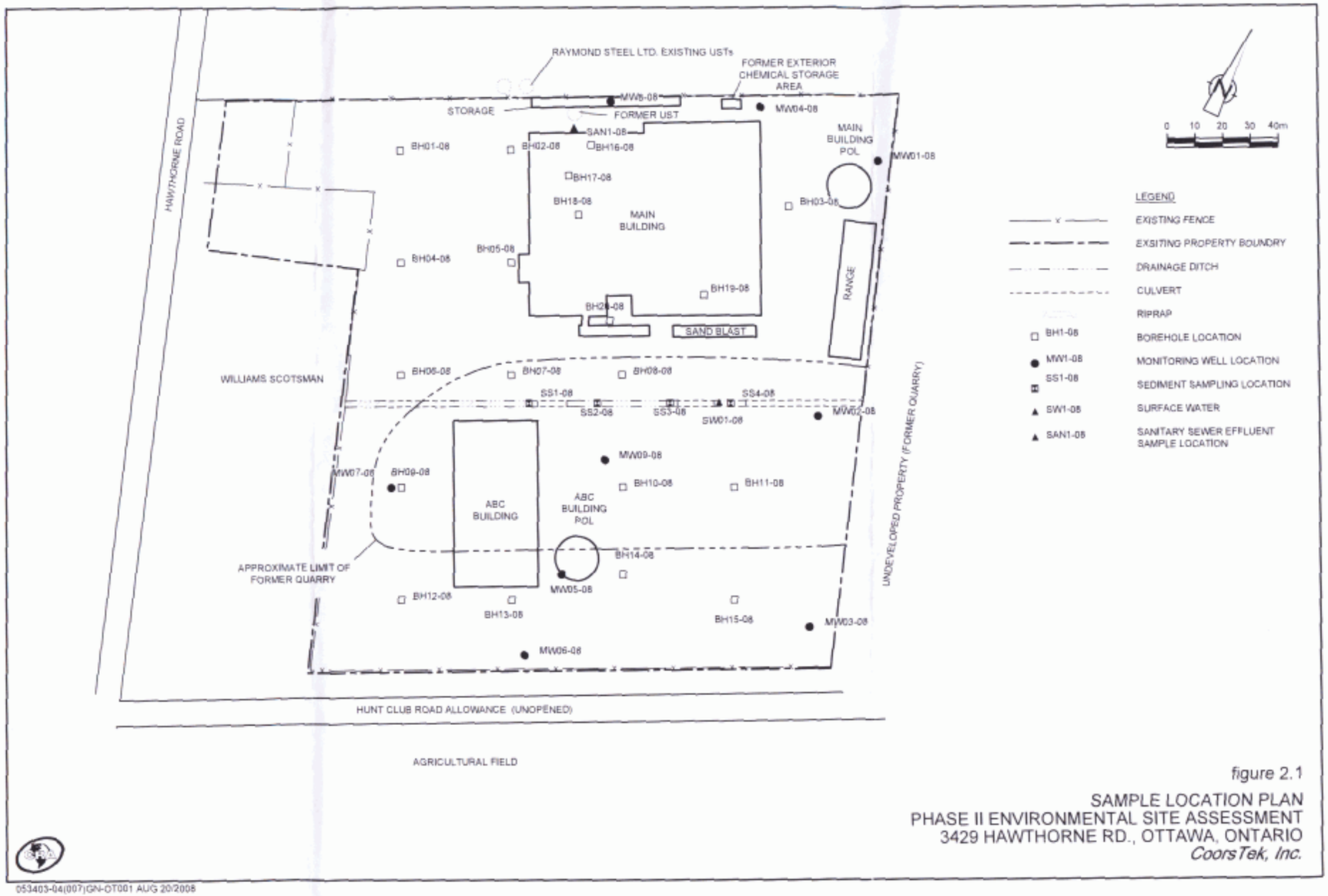
figure 2.1
TEST PIT AND MONITORING WELL LOCATION PLAN
PHASE II ENVIRONMENTAL SITE ASSESSMENT
LOT 26 AND 27, CONCESSION 6, OTTAWA, ONTARIO
R.W. Tomlinson Ltd.

SOURCE: J.L. RICHARDS & ASSOCIATES LIMITED
PROJECT No. 20983, DRAWING C1
COORDINATE SYSTEM: MTM ZONE 9, NAD27

D456804-03(012)GN-CTD01 AUG 06/2008

C-1844 m02897 c01984

NOV 26 2008



053403-04(007)GN-OT001 AUG 20/2008

figure 2.1

SAMPLE LOCATION PLAN
PHASE II ENVIRONMENTAL SITE ASSESSMENT
3429 HAWTHORNE RD., OTTAWA, ONTARIO
CoorsTek, Inc.

NOV 26 2008
C-18441 m02888 C03068

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7370453
Well Audit Number: *Z340902*
Well Tag Number: *A251312*
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location	300 SOMME STREET
Township	GLOUCESTER TOWNSHIP

Lot	026
Concession	RF 06
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	Ottawa
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456685.00 Northing: 5017423.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To
	FILL			0 m	4.62 m

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed
0 m	2.4 m	BENTONITE	

Method of Construction & Well Use

Method of Construction	Well Use
Other Method	
HAS	Monitoring

Status of Well

Observation Wells

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To
5.08 cm	PLASTIC	0 m	3.05 m

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To
5.88 cm	PLASTIC	3.05 m	4.57 m

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1844

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind
2.34 m	

Hole Diameter

Depth From	Depth To	Diameter

0 m	4.62 m	20.3 cm

Audit Number: Z340902

Date Well Completed: May 19, 2020

Date Well Record Received by MOE: October 16, 2020

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario — Ministry of the Environment, Conservation and Parks

Measurements recorded in: ☐ Metric ☒ Imperial

Tag#: A305146 (Print Below)

A305146

Well Record

Regulation 903 Ontario Water Resources Act

Page ____ of ____

Well Owner's Information

First Name	Last Name/Organization	E-mail Address	☐ Well Constructed by Well Owner
	COPART		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
14185 Dallas Parkway Suite 300	Dallas, Texas	USA	75254	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
300 Somme Street	Gloucester	P/L 26 & 27	6 R.F.

County/District/Municipality	City/Town/Village	Province	Postal Code
Ottawa Carleton	Gloucester	Ontario	

UTM Coordinates	Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83	18	456627	5017085	4M-1388	

Overburden and Bedrock Materials/Abandonment Sealing Record (see instructions on the back of this form)

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	Depth (m/ft) To
	Sand	Clay	& Gravel	0'	13'
Grey & White	Sandstone	w/ Grey limestone	Mix	13'	103'
Grey & White	Sandstone	w/ Grey limestone	mix	103'	134'
Grey & White	Sandstone	w/ Grey	Limestone mix	134'	140'

Annular Space

Depth Set at (m/ft) From	Depth Set at (m/ft) To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
60'	50'	Neat cement	9.36
50'	0'	Bentonite slurry	16.8

Method of Construction

☐ Cable Tool ☐ Diamond
☐ Rotary (Conventional) ☐ Jetting
☐ Rotary (Reverse) ☐ Driving
☐ Boring ☐ Digging
☒ Air percussion
☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used
☒ Domestic ☐ Municipal ☐ Dewatering
☐ Livestock ☐ Test Hole ☐ Monitoring
☐ Irrigation ☐ Cooling & Air Conditioning
☐ Industrial
☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	Depth (m/ft) To
6 1/4"	Steel	.188"	+2'	60'
6 1/8"	Open Hole		60'	140'

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	Depth (m/ft) To

Status of Well

☒ Water Supply
☐ Replacement Well
☐ Test Hole
☐ Recharge Well
☐ Dewatering Well
☐ Observation and/or Monitoring Hole
☐ Alteration (Construction)
☐ Abandoned, Insufficient Supply
☐ Abandoned, Poor Water Quality
☐ Abandoned, other, specify
☐ Other, specify

Water Details

Water found at Depth (m/ft)	Kind of Water	Hole Diameter Depth From	Depth To	Diameter (cm/in)
103 (m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	0'	60'	9 3/4"
134 (m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify	60'	140'	6 1/8"
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify			

Results of Well Yield Testing

After test of well yield, water was:
☐ Clear and sand free
☐ Other, specify **Not tested**

If pumping discontinued, give reason: X

Pump intake set at (m/ft): 100

Pumping rate (l/min / GPM): 20

Duration of pumping: 1 hrs + 0 min

Final water level end of pumping (m/ft): 30'8"

If flowing give rate (l/min/GPM): X

Recommended pump depth (m/ft): 100'

Recommended pump rate (l/min/GPM): 20

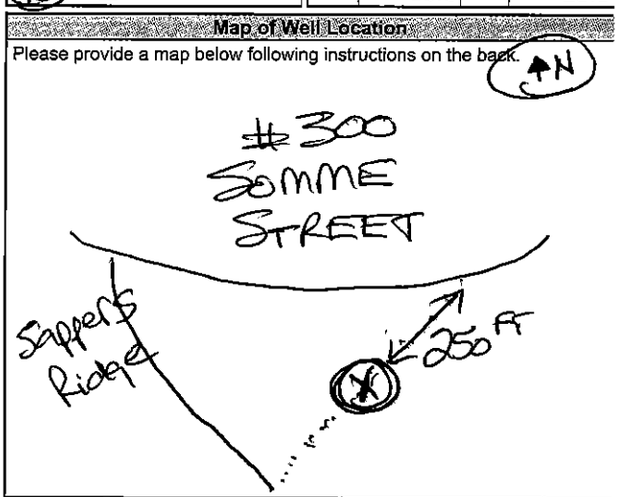
Well production (l/min/GPM): 20

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Draw Down Water Level (m/ft)	Recovery Time (min)	Recovery Water Level (m/ft)
Static Level	25'4"		30'8"
1	27.6	1	25.5
2	28	2	25.5
3	28.2	3	25.5
4	28.3	4	25.5
5	28.4	5	25.5
10	28.6	10	25.5
15	28.7	15	25.5
20	28.8	20	25.5
25	28.9	25	25.8
30	30	30	25.5
40	30.2	40	25.5
50	30.5	50	25.5
60	30'8"	60	25'5"

Map of Well Location

Please provide a map below following instructions on the back.



Comments: 3/4HR 15GPM Set @ 100 FT

Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
Air Rock Drilling Co. Ltd.	7681

Business Address (Street Number/Name)	Municipality
6659 Franktown Road	Richmond

Province	Postal Code	Business E-mail Address
ON	K0A 2Z0	air-rock@sympatico.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
6138382170	Hogan, Dan

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
T3058		2020 09 30

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☒ Yes ☐ No	2020 09 03	2020 09 02

Ministry Use Only

Audit No. Z344053

OCT 30 2020

Received

0506E (2020/06) © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7401540
Well Audit Number: *Z278685*
Well Tag Number: *A290162*
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456485.00 Northing: 5017258.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 1844

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z278685

Date Well Completed: August 06, 2021

Date Well Record Received by MOE: November 02, 2021

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario — Ministry of the Environment, Conservation and Parks

Well Record for Well Cluster – Part 1 of 3

(Only for Multiple Test Holes or Dewatering Wells)

Regulation 903 Ontario Water Resources Act

All measurements recorded in: ☒ Metric ☐ Imperial

Follow instructions on the front and back of this form. Print or Type

Well Tag No. of Deepest Well: *(Print Well Tag No.)* A290221

Well No. on Drawing of Deepest Well: 109-21

☐ Dewatering wells ☒ Test holes

No. of wells reported 3

Page 1 of 1

Well Cluster Location Information

Address of Well Location (Street Number(s)/Name(s), RR, if available)	Lot(s)	Concession(s)	Geographic Township	County/District/Upper Tier Municipality
300 Somme Street, Beside 5123 Hawthorne Road				

City, Town, Village or Hamlet	Province	GPS Unit Make	Model	Unit Mode of Operation
Ottawa	Ontario	Garmin	Etrex	☐ Undifferentiated ☒ Averaged ☐ Differentiated, specify:

Mandatory Attachments/Additional Information

☒ Land Owner Consent Form must be attached.

☒ Detailed Drawing of All Well Locations must be attached.

I, the person constructing the well, will promptly submit to the Director, on request, any additional information in my custody or control related to any well in the well cluster that I have constructed.

Signature of Technician/Contractor — Date (yyyy/mm/dd): 2021/10/22

Well Details

Well # on Drawing	UTM Coordinates Zone	Easting	Northing	Hole Depth (m/ft)	Hole Diameter (cm/in)	Method of Construction	Casing Material; Diameter (cm/in)	Casing (m/ft) From	Casing (m/ft) To	Screen Interval (m/ft) From	Screen Interval (m/ft) To	Annular Space Material (m/ft) From	Annular Space Material (m/ft) To	Annular Space Material:	Overburden/Bedrock or Abandonment Filing Material Intervals (m/ft)	Static Water Level (m/ft)	Date of Completion (yyyy/mm/dd)
109	18	456697	5017052	6.1	20.3	HSA	5.08	0.1	3.05	3.05	6.1	0.25	2.44	Bentonite	0-4.57 Silt Fill w. Sand/Clay/Gravel/Debris, 4.57-6.1 Till	1.465	2021/10/05
110	18	456775	5017046	4.42	20.3	HSA	5.08	0.1	2.9	2.9	4.42	0.25	2.6	Bentonite	" " " "	1.681	2021/10/05
111	18	456825	5017039	3.66	20.3	HSA	5.08	0.1	2.13	2.13	3.66	0.25	1.83	Bentonite	" " " "	1.041	2021/10/05

Well Contractor and Well Technician Information

Business Name of Well Contractor	Business Address (Street Number/Name, RR)	Municipality	Province
George Downing Estate Drilling Ltd	410 ave Principale	Grenville-sur-la-Rouge	QC

Postal Code	Bus. Telephone No.	Well Contractor's Licence No.	Business E-mail Address
J0V1B0	(819) 242-6469	1844	info@georgedowningdrilling.com

Name of Well Technician (First Name, Last Name)	Well Technician's Licence No.	Signature of Well Technician	Date Submitted (yyyy/mm/dd)
Stephen Downing	3326		2021/10/22

Date First Well in Cluster Constructed or Abandoned (yyyy/mm/dd)	Date Last Well in Cluster Completed (yyyy/mm/dd)
2021/10/05	2021/10/05

Well Abandonment

Person Abandoning the Wells:

Name N/A

(Print or Type) - See instruction 11 on the back of this form

Ministry Use Only

Date Received (yyyy/mm/dd)	Audit No.
NOV 08 2021	C 53081

Comments:

 © Queen's Printer for Ontario, 2020

Ministry's Copy

Ontario

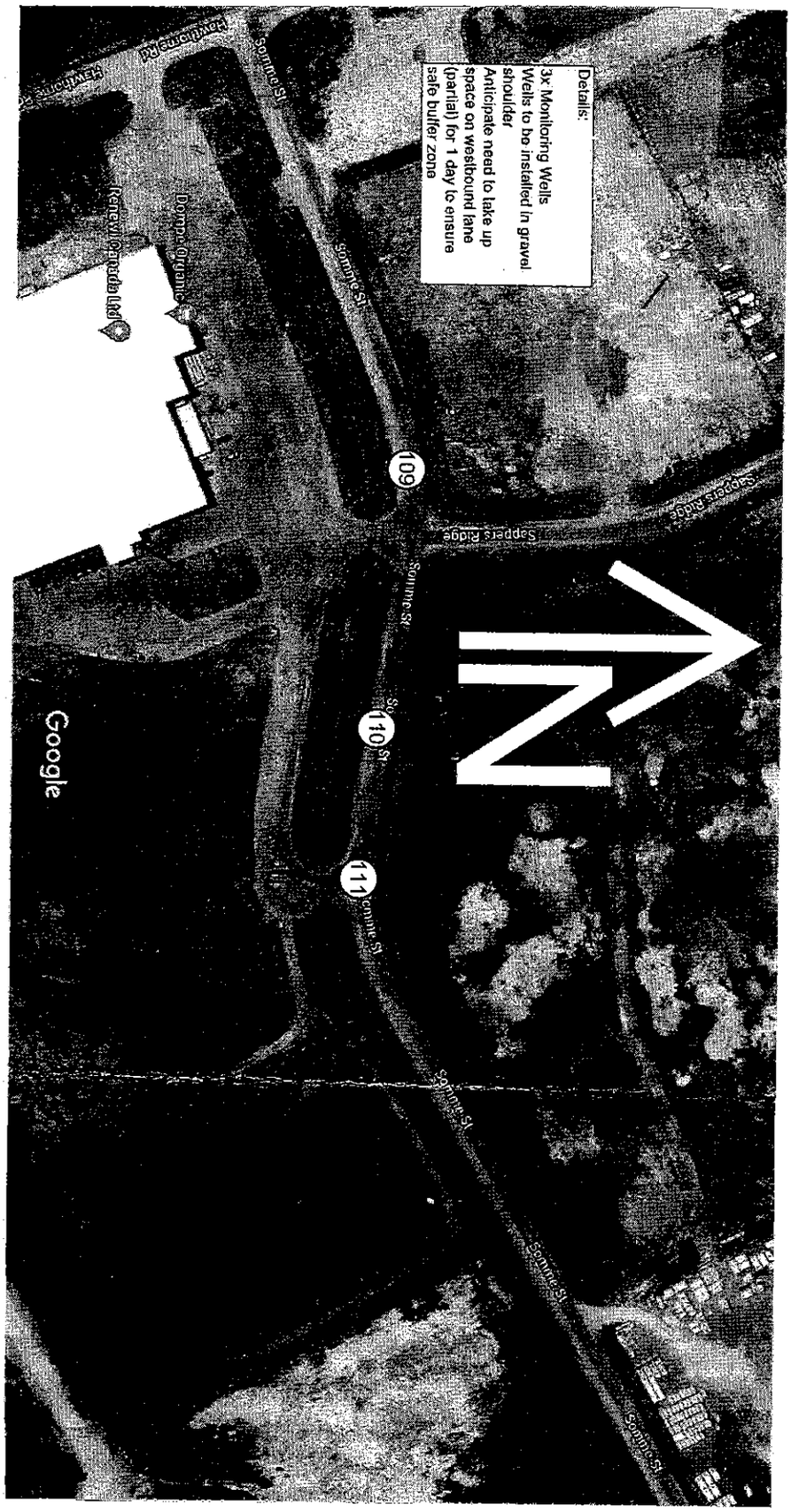
Ministry of the Environment, Conservation and Parks

Well Record for Well Cluster - Part 3 of 3
Detailed Drawing of All Well Locations

Note: This **Well Record for Well Cluster Part 3 - Detailed Drawing of all Well Locations,** must be attached to Parts 1 and 2. The drawing must include all property boundaries, an arrow indicating the North direction, all named roads and sufficient measurements to locate all wells in the cluster in relation to fixed points. The drawing must show the location of each well and each well must be numbered on the drawing to match number used for that well on the **Well Record for Well Cluster Parts 1 and 2.** The well with the well tag must be clearly identified on the Drawing.
UTM coordinates should appear beside each well, if space permits. Additional comments on wells can be included on the drawing

Well Tag Number: # A290221

"Well Record for Well Cluster" Form Audit Number: # C53081



NOV 08 2021

 © Queen's Printer for Ontario, 2020

MINISTRY'S COPY

e-1844
C53081

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7404161
Well Audit Number: *Z354949*
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456686.00 Northing: 5017033.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7148

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z354949

Date Well Completed:

Date Well Record Received by MOE: November 29, 2021

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7404167
Well Audit Number: *Z354952*
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456756.00 Northing: 5016998.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7148

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z354952

Date Well Completed:

Date Well Record Received by MOE: November 29, 2021

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7423059
Well Audit Number: *Z375700*
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	026
Concession	RF 06
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456635.00 Northing: 5017304.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 4875

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z375700

Date Well Completed: June 25, 2022

Date Well Record Received by MOE: July 18, 2022

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7434683
Well Audit Number: *Z379047*
Well Tag Number: *A342117*
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	026
Concession	RF 06
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456582.00 Northing: 5017208.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7681

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z379047

Date Well Completed: July 27, 2022

Date Well Record Received by MOE: November 22, 2022

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Ontario (https://www.ontario.ca/page/government-ontario)

Map: Well records

This map allows you to search and view well record information from reported wells in Ontario.

Full dataset is available in the Open Data catalogue (https://data.ontario.ca/dataset/well-records) .

Go Back to Map

Well ID

Well ID Number: 7434684
Well Audit Number: *Z379044*
Well Tag Number:
This table contains information from the original well record and any subsequent updates.

Well Location

Address of Well Location		
Township	GLOUCESTER TOWNSHIP	

Lot	
Concession	
County/District/Municipality	OTTAWA-CARLETON
City/Town/Village	
Province	ON
Postal Code	n/a
UTM Coordinates	NAD83 — Zone 18 Easting: 456581.00 Northing: 5017210.00
Municipal Plan and Sublot Number	
Other	

Overburden and Bedrock Materials Interval

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

Annular Space/Abandonment Sealing Record

Depth From	Depth To	Type of Sealant Used (Material and Type)	Volume Placed	

Method of Construction & Well Use

Method of Construction	Well Use	

Status of Well

Construction Record - Casing

Inside Diameter	Open Hole or material	Depth From	Depth To	

Construction Record - Screen

Outside Diameter	Material	Depth From	Depth To

Well Contractor and Well Technician Information

Well Contractor's Licence Number: 7681

Results of Well Yield Testing

After test of well yield, water was	
If pumping discontinued, give reason	
Pump intake set at	
Pumping Rate	
Duration of Pumping	
Final water level	
If flowing give rate	

Recommended pump depth	
Recommended pump rate	
Well Production	
Disinfected?	

Draw Down & Recovery

Draw Down Time(min)	Draw Down Water level	Recovery Time(min)	Recovery Water level
SWL			
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	

20		20	
25		25	
30		30	
40		40	
45		45	
50		50	
60		60	

Water Details

Water Found at Depth	Kind

Hole Diameter

Depth From	Depth To	Diameter

Audit Number: Z379044

Date Well Completed: July 28, 2022

Date Well Record Received by MOE: November 22, 2022

Related

How to use a Ministry of the Environment map (https://www.ontario.ca/page/how-use-ministry-environment-map#wells)

Technical documentation: Metadata record (https://data.ontario.ca/dataset/well-records/resource/3031344e-e3f2-48d5-888c-c1deadfd2f77)

Updated: January 10, 2024
Published: March 20, 2014

Joshua Dempsey

From: Public Information Services <publicinformationservices@tssa.org>
Sent: June 20, 2025 10:43 AM
To: Joshua Dempsey
Subject: RE: Search Records Request (PE7096)

External Email: Do not click on links or open attachments unless you trust the sender.

Hello ,

NO RECORD FOUND IN CURRENT DATABASE:

- We confirm that there are NO **fuels records** in our database at the subject address(es).

For a further search in our archives, please go to the **TSSA Client Portal** to complete an Application for Release of Public Information. Please refer to Training (tssa.org) for instructions on how to use the portal. Please refer to How to Submit a Public Information Request (tssa.org) for instructions.

The associated fee must be paid via credit card (Visa or MasterCard).

Once all steps have been successfully completed you will receive your payment receipt via email.

TSSA does not make any representations or warranties with respect to the accuracy or completeness of any records released. The requestor assumes all risk in using or relying on the information provided.

If you have any questions or concerns, please do not hesitate to contact our Public Information Release team at publicinformationservices@tssa.org.

Kind regards,

Aleena Tahir | Public Information & Records Agent
Public Information
345 Carlingview Drive
Toronto, Ontario M9W 6N9
Tel: +1 416-734-3546 | E-Mail: ATahir@tssa.org
www.tssa.org

Winner of 2024 5-Star Safety Cultures Award

From: Joshua Dempsey <JDempsey@patersongroup.ca>
Sent: Thursday, June 19, 2025 2:34 PM
To: Public Information Services <publicinformationservices@tssa.org>
Subject: Search Records Request (PE7096)

[CAUTION]: This email originated outside the organisation.
Please do not click links or open attachments unless you recognise the source of this email and know the content is safe.

Good Afternoon,

Could you please complete a search of your records for **underground/aboveground storage tanks, historical spills, or incidents/infractions** for the following addresses in Ottawa, Ontario:

Somme Street: 290, 300, 301, 331
Sappers Ridge: 100, 115, 135
Rideau Road: 3620, 3748
Hawthorne Road: 5123

Cheers,

PATERSON GROUP
SOLUTION ORIENTED ENGINEERING

JOSHUA DEMPSEY, B.Sc.
ENVIRONMENTAL SCIENTIST
TEL: (613) 226-7381 ext. 108
DIRECT: (343) 996-3150
9 AURIGA DRIVE
OTTAWA ON K2E 7T9
patersongroup.ca

EXPLORE THE POSSIBILITIES WITH US AND VISIT OUR REFRESHED WEBSITE TODAY.

NEW OFFICE OPEN IN THE GREATER TORONTO AREA WITH OUR EXPANSIVE LIST OF SERVICES NOW AVAILABLE!

This electronic message and any attached documents are intended only for the named recipients. This communication from the Technical Standards and Safety Authority may contain information that is privileged, confidential or otherwise protected from disclosure and it must not be disclosed, copied, forwarded or distributed without authorization. If you have received this message in error, please notify the sender immediately and delete the original message.

File Number: D06-03-20-0191

December 23, 2020

Mandy Witteman
Patterson group Inc.
154 Colonnade Road South, Ottawa, ON

*Sent via email [*mwitteman@patersongroup.ca*]*

Dear Ms. Witteman,

Re: Information Request
Part of 5123 Hawthorne Road, Ottawa, Ontario ("Subject Property")

Internal Department Circulation

The Planning, Infrastructure and Economic Development Department has the following information in response to your request for information regarding the Subject Property:

- **Sewer Use Program:** The City's Sewer Use Program has found the following information pertaining to the subject property: Hauled waste approval and inspection.

Search of Historical Land Use Inventory

This acknowledges receipt of the signed Disclaimer regarding your request for information from the City's Historical Land Use Inventory (HLUI 2005) database for the Subject Property.

A search of the HLUI database revealed the following information:

- There is one (1) activity associated with the Subject Property.

The HLUI database was also searched for activity associated with properties located within 250m of the Subject Property. The search revealed the following:

- There is one (1) activity associated with one (1) property located within 250m of the Subject Property.

Please note that certain activities have been identified to have a PIN Certainty of “2”. This identifier acknowledges that there is some uncertainty about the exact location of the land use activity and that the activity may or may not have been located on the property. All database entries with a PIN Certainty of “2” require independent verification as to their precise location.

A **site map** and **table** have been included to show the location of the Subject Property as well as the location of all the activities noted above, including the HLUI database’s location of the Activity Numbers with a PIN Certainty of “2”.

Additional information may be obtained by contacting:

Ontario’s Environmental Registry

The Environmental Registry found at http://www.ebr.gov.on.ca/ERS-WEB-External/ contains "public notices" about environmental matters being proposed by all government ministries covered by the Environmental Bill of Rights. The public notices may contain information about proposed new laws, regulations, policies and programs or about proposals to change or eliminate existing ones. By using keys words i.e. name of proponent/owner and the address one can ascertain if there is any information on the proponent and address under the following categories: Ministry, keywords, notice types, Notice Status, Acts, Instruments and published date (all years).

The Ontario Land Registry Office

Registration of real property is recorded in the Ontario Land Registry Office through the Land Titles Act or the Registry Act. Documents relating to title and other agreements that may affect your property are available to the public for a fee. It is recommended that a property search at the Land Registry Office be included in any investigation as to the historic use of your property. The City of Ottawa cannot comment on any documents to which it is not a party.

Court House
161 Elgin Street 4th Floor
Ottawa ON K2P 2K1
Tel: (613) 239-1230
Fax: (613) 239-1422

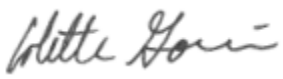
Please note, as per the HLUI Disclaimer, that the information contained in the HLUI database has been compiled from publicly available records and other sources of information. The HLUI may contain erroneous information given that the records used as sources of information may be flawed. For instance, changes in municipal addresses over time may introduce error. Accordingly, all information from the HLUI database is provided on an “as is” basis with no representation or warranty by the City with respect to the information’s accuracy or exhaustiveness in responding to the request.

Furthermore, the HLUI database and the results of this search in no way confirm the presence or absence of contamination or pollution of any kind. This information is provided on the assumption that it will not be relied upon by any person for any purpose whatsoever. The City of Ottawa denies all liability to any persons attempting to rely on any information provided from the HLUI database.

Please note that in responding to your request, the City of Ottawa does not guarantee or comment on the environmental condition of the Subject Property. You may wish to contact the Ontario Ministry of Environment and Climate Change for additional information.

If you have any further questions or comments, please contact Colette Gorni at 613-580-2424 ext. 21239 or HLUI@ottawa.ca

Sincerely,



Colette Gorni

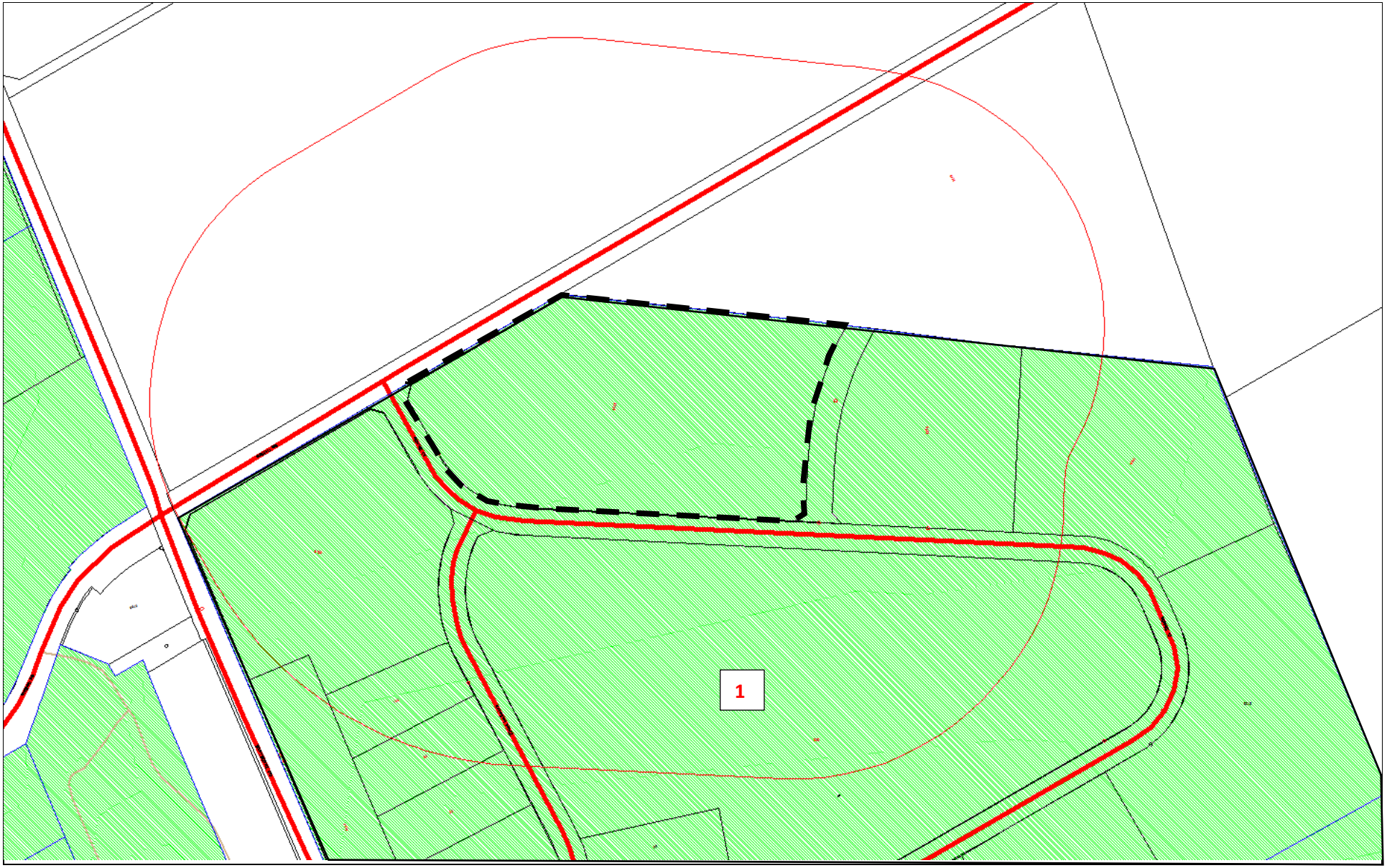
Per:

Michael Boughton, MCIP, RPP
Senior Planner
Development Review East
Planning Services
Planning, Infrastructure and Economic Development Department

MB / CG

Enclosures.

cc: File no. D06-03-20-0191



Address: Part of 5123 Hawthorne Road
Ottawa, ON

File No.: D06-03-20-0191

Prepared By: Colette Gorni

Legend:
- 00 — Area Number
- Subject Site
- 250 m Buffer

Scale: 1 : N/A

Area	Associated HLUI Activities	Associated HLUI Activities with a PIN Certainty of “2” *
Subject Property	14515	
1	14515	

*This identifier acknowledges that there is some uncertainty about the exact location of the land use activity and that the activity may or may not have been located on the property. All database entries with a PIN Certainty of “2” require independent verification as to their precise location.

Historical Land Use Inventory

Activity Numbers –

Subject Property/Properties

CITY OF OTTAWA

HLUI ID: __670HWP

AREA (Square Metres): 700270.204

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Activity ID: 14515

Multiple PINS: Y

PIN Certainty: 1

Previous Activity ID(s) : 6190, 6060, 6064, 6082, 6077, 6084, 6094, 6095, 6098, 6099, 6102, 6103, 6105, 6108, 6109, 6110, 6111, 6112, 6115, 6117, 6121, 6122, 6124, 6125, 6127, 6129, 6130, 6190, 6191, 6192, 6193, 6198, 6200, 6202, 6203, 6238, 6240, 6243, 6245, 6280, 6282, 6284, 62

Related PINS: 041330051

Name: UNNAMED WASTE DISPOSAL SITE

Address: , OTTAWA

Facility Type: Other Utility Industries n.e.c.

Comments 1: UTM = 445870E, 5028130N, map 31G/5. Site #X1102 of closed sites in the MOE inventory (pg134).

Comments 2:

Generator Number:

Storage Tanks:

HL References 1: 1991-WDSI/WMB/MOE; RBE 1992; MC Staff, 19/02/99; 1922DMD-TM-Ottawa-Sheet #14, 1948DND-ASE-NTS-31G/5, 1967-EMR-SMB-NTS-31G/5-7th ed., 1985-EMR-SMB-NTS-31G/5-11th ed., City of Gloucester-File #8-400-Box 130;

HL References 2: City of Gloucester File # 6-79A: Subject-Health/Dumping -Box 75 -28/12/64; 1938-39-DND-ASE-NTS-31B/13W-2nd ed., 1964-DND-MCE-NTS-31B/13-3rd ed., 1976-EMR-SMB-NTS-31B/13-4th ed., 1979-EMR-SMB-NTS-31B/13-5th ed.

HL References 3:

NAICS	SIC
562210	499
221330	499
221320	499
562920	499
562990	499

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Company Name	Year of Operation
Unnamed Waste Disposal Site	c. <1991
Unnamed Waste Disposal Site	c. 1953
Unnamed Waste Disposal Site	c. 1946
Unnamed Waste Disposal Site	c. 1924
Unnamed Waste Disposal Site	c. 1958
Unnamed Waste Disposal Site	c. 1979
Unnamed Waste Disposal Site	c. 1965
Unnamed Waste Disposal Site	c. 1974
Unnamed Waste Disposal Site	c. 1920-1931
Unnamed Waste Disposal Site	c. 1973
Unnamed Waste Disposal Site	c. 1927
Unamed Waste Disposal Site	c. 1966-1991
Unnamed Waste Dispoal Site	c. 1947
Unnamed Waste Disposal Site	c. 1976
Unnamed Waste Disposal Site	c. 1940
Unnamed Waste Disposal Site	c. 1962
Unnamed Waste Disposal Site	c. 1926
Unnamed Waste Disposal Site	c. 1944
Unnamed Waste Disposal Site	c. 1972
Unnamed Waste Disposal Site	c. 1935
Unnamed Waste Disposal Site	c. 1921-1945
Unnamed Waste Disposal Site	c. 1977
Unnamed Waste Disposal Site	c. 1947
Unnamed Waste Disposal Site	c. 1950
Unnamed Waste Disposal Site	c. 1981
Unnamed Waste Disposal Site	c. 1971
Unnamed Waste Disposal Site	c. 1963
Unnamed Waste Disposal Site	c. <1990
Unnamed Waste Disposal Site	c. 1964
Unnamed Waste Disposal Site	c. 1920
Unnamed Waste Disposal Site	c. 1938
Unnamed Waste Disposal Site	c. 1929

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Unnamed Waste Disposal Site c. 1966

Historical Land Use Inventory

Activity Numbers –

Adjacent Properties

Historical Land Use Inventory

Area #1 Activity Numbers

CITY OF OTTAWA

HLUI ID: __670HWP

AREA (Square Metres): 700270.204

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Activity ID: 14515

Multiple PINS: Y

PIN Certainty: 1

Previous Activity ID(s) : 6190, 6060, 6064, 6082, 6077, 6084, 6094, 6095, 6098, 6099, 6102, 6103, 6105, 6108, 6109, 6110, 6111, 6112, 6115, 6117, 6121, 6122, 6124, 6125, 6127, 6129, 6130, 6190, 6191, 6192, 6193, 6198, 6200, 6202, 6203, 6238, 6240, 6243, 6245, 6280, 6282, 6284, 62

Related PINS: 041330051

Name: UNNAMED WASTE DISPOSAL SITE

Address: , OTTAWA

Facility Type: Other Utility Industries n.e.c.

Comments 1: UTM = 445870E, 5028130N, map 31G/5. Site #X1102 of closed sites in the MOE inventory (pg134).

Comments 2:

Generator Number:

Storage Tanks:

HL References 1: 1991-WDSI/WMB/MOE; RBE 1992; MC Staff, 19/02/99; 1922DMD-TM-Ottawa-Sheet #14, 1948DND-ASE-NTS-31G/5, 1967-EMR-SMB-NTS-31G/5-7th ed., 1985-EMR-SMB-NTS-31G/5-11th ed., City of Gloucester-File #8-400-Box 130;

HL References 2: City of Gloucester File # 6-79A: Subject-Health/Dumping -Box 75 -28/12/64; 1938-39-DND-ASE-NTS-31B/13W-2nd ed., 1964-DND-MCE-NTS-31B/13-3rd ed., 1976-EMR-SMB-NTS-31B/13-4th ed., 1979-EMR-SMB-NTS-31B/13-5th ed.

HL References 3:

NAICS	SIC
562210	499
221330	499
221320	499
562920	499
562990	499

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Company Name	Year of Operation
Unnamed Waste Disposal Site	c. <1991
Unnamed Waste Disposal Site	c. 1953
Unnamed Waste Disposal Site	c. 1946
Unnamed Waste Disposal Site	c. 1924
Unnamed Waste Disposal Site	c. 1958
Unnamed Waste Disposal Site	c. 1979
Unnamed Waste Disposal Site	c. 1965
Unnamed Waste Disposal Site	c. 1974
Unnamed Waste Disposal Site	c. 1920-1931
Unnamed Waste Disposal Site	c. 1973
Unnamed Waste Disposal Site	c. 1927
Unamed Waste Disposal Site	c. 1966-1991
Unnamed Waste Dispoal Site	c. 1947
Unnamed Waste Disposal Site	c. 1976
Unnamed Waste Disposal Site	c. 1940
Unnamed Waste Disposal Site	c. 1962
Unnamed Waste Disposal Site	c. 1926
Unnamed Waste Disposal Site	c. 1944
Unnamed Waste Disposal Site	c. 1972
Unnamed Waste Disposal Site	c. 1935
Unnamed Waste Disposal Site	c. 1921-1945
Unnamed Waste Disposal Site	c. 1977
Unnamed Waste Disposal Site	c. 1947
Unnamed Waste Disposal Site	c. 1950
Unnamed Waste Disposal Site	c. 1981
Unnamed Waste Disposal Site	c. 1971
Unnamed Waste Disposal Site	c. 1963
Unnamed Waste Disposal Site	c. <1990
Unnamed Waste Disposal Site	c. 1964
Unnamed Waste Disposal Site	c. 1920
Unnamed Waste Disposal Site	c. 1938
Unnamed Waste Disposal Site	c. 1929

Study Year	PIN	Multi-NAIC	Multiple Activities
1998	043260266	Y	N

Unnamed Waste Disposal Site c. 1966

DATABASE REPORT

Project Property:	*Phase I ESA - 301 Somme Street* *301 Somme Street* *Ottawa ON K1G 3N4*
Project No:	*P.O. #63373 / PE7096*
Report Type:	*Standard Report*
Order No:	*25061900162*
Requested by:	*Paterson Group Inc.*
Date Completed:	*June 24, 2025*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Table of Contents

Table of Contents.....2
Executive Summary.....3
Executive Summary: Report Summary.....4
Executive Summary: Site Report Summary - Project Property.....7
Executive Summary: Site Report Summary - Surrounding Properties.....8
Executive Summary: Summary By Data Source.....10
Map.....13
Aerial.....14
Topographic Map.....15
Detail Report.....16
Unplottable Summary.....36
Unplottable Report.....37
Appendix: Database Descriptions.....40
Definitions.....50

Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as a database review of environmental records.

License for use of information in Report: No page of this report can be used without this cover page, this notice and the project property identifier. The information in Report(s) may not be modified or re-sold.

Your Liability for misuse: Using this Service and/or its reports in a manner contrary to this Notice or your agreement will be in breach of copyright and contract and ERIS may obtain damages for such mis-use, including damages caused to third parties, and gives ERIS the right to terminate your account, rescind your license to any previous reports and to bar you from future use of the Service.

No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Limited Partnership ("ERIS") using various sources of information, including information provided by Federal and Provincial government departments. The report applies only to the address and up to the date specified on the cover of this report, and any alterations or deviation from this description will require a new report. This report and the data contained herein does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein and does not constitute a legal opinion nor medical advice. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

Trademark and Copyright: You may not use the ERIS trademarks or attribute any work to ERIS other than as outlined above. This Service and Report (s) are protected by copyright owned by ERIS Information Limited Partnership. Copyright in data used in the Service or Report(s) (the "Data") is owned by ERIS or its licensors. The Service, Report(s) and Data may not be copied or reproduced in whole or in any substantial part without prior written consent of ERIS.

Executive Summary

Property Information:

Project Property:	*Phase I ESA - 301 Somme Street* *301 Somme Street Ottawa ON K1G 3N4*
Project No:	*P.O. #63373 / PE7096*

Coordinates:

Latitude:	*45.3074071*
Longitude:	*-75.5537779*
UTM Northing:	*5,017,249.50*
UTM Easting:	*456,587.85*
UTM Zone:	*18T*

Elevation: *282 FT*
85.88 M

Order Information:

Order No:	*25061900162*
Date Requested:	*June 19, 2025*
Requested by:	*Paterson Group Inc.*
Report Type:	*Standard Report*

Historical/Products:

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Within 0.25 km	Total
AAGR	*Abandoned Aggregate Inventory*	Y	0	0	0
AGR	*Aggregate Inventory*	Y	0	0	0
AMIS	*Abandoned Mine Information System*	Y	0	0	0
ANDR	*Anderson's Waste Disposal Sites*	Y	0	1	1
AST	*Aboveground Storage Tanks*	Y	0	0	0
AUWR	*Automobile Wrecking & Supplies*	Y	0	0	0
BORE	*Borehole*	Y	0	0	0
CA	*Certificates of Approval*	Y	0	0	0
CDRY	*Dry Cleaning Facilities*	Y	0	0	0
CFOT	*Commercial Fuel Oil Tanks*	Y	0	0	0
CHEM	*Chemical Manufacturers and Distributors*	Y	0	0	0
CHM	*Chemical Register*	Y	0	0	0
CNG	*Compressed Natural Gas Stations*	Y	0	0	0
COAL	*Inventory of Coal Gasification Plants and Coal Tar Sites*	Y	0	0	0
CONV	*Compliance and Convictions*	Y	0	0	0
CPU	*Certificates of Property Use*	Y	0	0	0
DRL	*Drill Hole Database*	Y	0	0	0
DTNK	*Delisted Fuel Tanks*	Y	0	0	0
EASR	*Environmental Activity and Sector Registry*	Y	0	0	0
EBR	*Environmental Registry*	Y	1	0	1
ECA	*Environmental Compliance Approval*	Y	2	1	3
EEM	*Environmental Effects Monitoring*	Y	0	0	0
EHS	*ERIS Historical Searches*	Y	0	2	2
EIIS	*Environmental Issues Inventory System*	Y	0	0	0
EMHE	*Emergency Management Historical Event*	Y	0	0	0
EPAR	*Environmental Penalty Annual Report*	Y	0	0	0
EXP	*List of Expired Fuels Safety Facilities*	Y	0	0	0
FCON	*Federal Convictions*	Y	0	0	0
FCS	*Contaminated Sites on Federal Land*	Y	0	0	0
FOFT	*Fisheries & Oceans Fuel Tanks*	Y	0	0	0
FRST	*Federal Identification Registry for Storage Tank Systems (FIRSTS)*	Y	0	0	0
FST	*Fuel Storage Tank*	Y	0	0	0
FSTH	*Fuel Storage Tank - Historic*	Y	0	0	0
GEN	*Ontario Regulation 347 Waste Generators Summary*	Y	0	1	1
GHG	*Greenhouse Gas Emissions from Large Facilities*	Y	0	0	0
HINC	*TSSA Historic Incidents*	Y	0	0	0
IAFT	*Indian & Northern Affairs Fuel Tanks*	Y	0	0	0

Database	Name	Searched	Project Property	Within 0.25 km	Total
INC	Fuel Oil Spills and Leaks	Y	0	0	0
LIMO	Landfill Inventory Management Ontario	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MNR	Mineral Occurrences	Y	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0	0	0
NCPL	Non-Compliance Reports	Y	0	0	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0	0	0
NDSP	National Defense & Canadian Forces Spills	Y	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0	0	0
NEBI	National Energy Board Pipeline Incidents	Y	0	0	0
NEBP	National Energy Board Wells	Y	0	0	0
NEES	National Environmental Emergencies System (NEES)	Y	0	0	0
NPCB	National PCB Inventory	Y	0	0	0
NPR2	National Pollutant Release Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory - Historic	Y	0	0	0
OGWE	Oil and Gas Wells	Y	0	0	0
OOGW	Ontario Oil and Gas Wells	Y	0	0	0
OPCB	Inventory of PCB Storage Sites	Y	0	0	0
ORD	Orders	Y	0	0	0
PAP	Canadian Pulp and Paper	Y	0	0	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0	0	0
PES	Pesticide Register	Y	0	0	0
PFAS	Ontario PFAS Spills	Y	0	0	0
PFCH	NPRI Reporters - PFAS Substances	Y	0	0	0
PFHA	Potential PFAS Handlers from NPRI	Y	0	0	0
PINC	Pipeline Incidents	Y	0	0	0
PPHA	Potential PFAS Handlers from EASR	Y	0	0	0
PRT	Private and Retail Fuel Storage Tanks	Y	0	0	0
PTTW	Permit to Take Water	Y	0	0	0
REC	Ontario Regulation 347 Waste Receivers Summary	Y	0	0	0
RSC	Record of Site Condition	Y	0	0	0
RST	Retail Fuel Storage Tanks	Y	0	0	0
SCT	Scott's Manufacturing Directory	Y	0	0	0
SPL	Ontario Spills	Y	0	1	1
SRDS	Wastewater Discharger Registration Database	Y	0	0	0
TANK	Anderson's Storage Tanks	Y	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	Y	0	0	0
VAR	Variances for Abandonment of Underground Storage Tanks	Y	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	Y	0	0	0
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	Y	0	1	1
WWIS	Water Well Information System	Y	0	6	6

Database	Name	Searched	Project Property	Within 0.25 km	Total
Total:		3		13	16

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number
5	EBR	Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme Street Ottawa, ON Canada ON	ESE/122.8	-0.25	16
5	ECA	Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme St Ottawa ON	ESE/122.8	-0.25	16
5	ECA	Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme St Ottawa ON	ESE/122.8	-0.25	17

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
1	EHS		Part of 5123 Hawthorne Road Ottawa ON K0A 1V0	W/47.8	0.00	17
2	ANDR	Gloucester Con 6 Dump	Gloucester ON K1G 3N4	WSW/68.3	0.00	17
3	WDSH		25-26 6 GLOUCESTER ON	WSW/92.3	1.00	18
4	WWIS		ON ***Well ID:*** 7401540	W/103.2	1.00	18
6	WWIS		300 SOMME STREET lot 26 con 6 GLOUCESTER ON ***Well ID:*** 7371679	SSE/169.1	0.00	19
7	ECA	Copart Canada Inc.	300 Somme St Ottawa ON L1V 7G5	S/178.6	0.85	26
7	GEN	Copart	300 Somme Street Ottawa ON	S/178.6	0.85	27
8	WWIS		300 SOMME STREET lot 26 con 6 Ottawa ON ***Well ID:*** 7370453	NE/198.8	-1.00	27
9	SPL	ENBRIDGE CONSUMERS GAS	3706 Rideau Rd. Ottawa, ON. OTTAWA ON	NE/201.6	-1.00	29
10	EHS		40 Sappers Ridge Ottawa ON K1G 3Y3	E/220.7	-1.00	30
11	WWIS		lot 26 con 6 ON ***Well ID:*** 1502342	SW/222.4	1.00	31
12	WWIS		lot 26 con 6 ON	SE/225.7	0.00	33

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
			Well ID: 7402444			
13	WWIS		ON ***Well ID:*** 7404161	SSE/237.7	0.72	34

Executive Summary: Summary By Data Source

ANDR - Anderson's Waste Disposal Sites

A search of the ANDR database, dated 1860s-Present has found that there are 1 ANDR site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Gloucester Con 6 Dump	Gloucester ON K1G 3N4	WSW	68.29	2

EBR - Environmental Registry

A search of the EBR database, dated 1994 - May 31, 2025 has found that there are 1 EBR site(s) within approximately 0.25 kilometers of the project property.

Lower Elevation	Address	Direction	Distance (m)	Map Key
Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme Street Ottawa, ON Canada ON	ESE	122.83	5

ECA - Environmental Compliance Approval

A search of the ECA database, dated Oct 2011 - May 31, 2025 has found that there are 3 ECA site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Copart Canada Inc.	300 Somme St Ottawa ON L1V 7G5	S	178.64	7

Lower Elevation	Address	Direction	Distance (m)	Map Key
Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme St Ottawa ON	ESE	122.83	5
Consolidated Fastfrate (Ottawa) Holdings Inc.	301 Somme St Ottawa ON	ESE	122.83	5

EHS - ERIS Historical Searches

A search of the EHS database, dated 1999-Aug 31, 2024 has found that there are 2 EHS site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
	Part of 5123 Hawthorne Road Ottawa ON K0A 1V0	W	47.81	1

Lower Elevation	Address	Direction	Distance (m)	Map Key
	40 Sappers Ridge Ottawa ON K1G 3Y3	E	220.66	10

GEN - Ontario Regulation 347 Waste Generators Summary

A search of the GEN database, dated 1986-Dec 31, 2024 has found that there are 1 GEN site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
Copart	300 Somme Street Ottawa ON	S	178.64	7

SPL - Ontario Spills

A search of the SPL database, dated 1988-Jun 2024; Aug-Feb 2025 has found that there are 1 SPL site(s) within approximately 0.25 kilometers of the project property.

Lower Elevation	Address	Direction	Distance (m)	Map Key
ENBRIDGE CONSUMERS GAS	3706 Rideau Rd. Ottawa, ON. OTTAWA ON	NE	201.59	9

WDSH - Waste Disposal Sites - MOE 1991 Historical Approval Inventory

A search of the WDSH database, dated Up to Oct 1990* has found that there are 1 WDSH site(s) within approximately 0.25 kilometers of the project property.

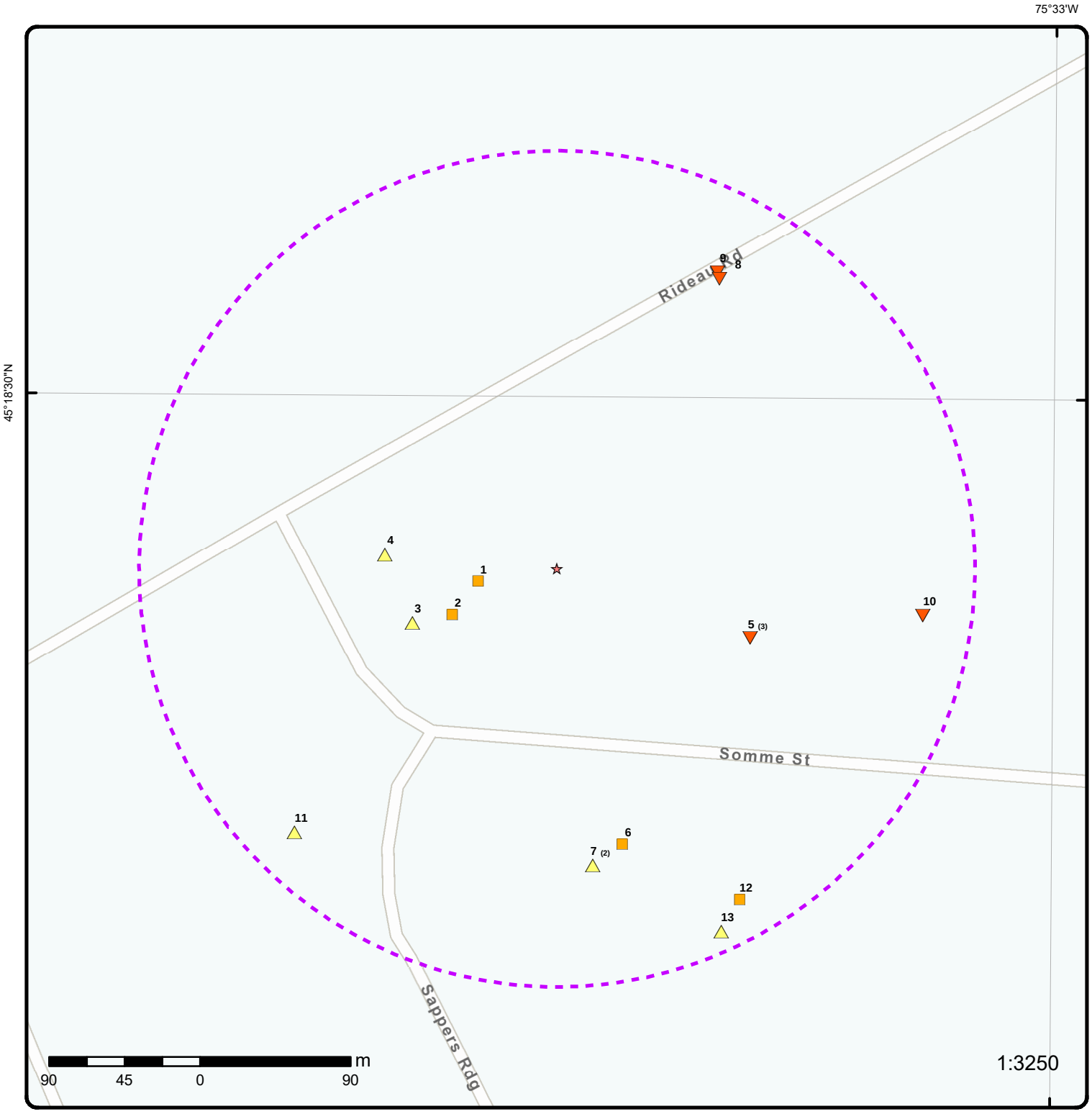
Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
	25-26 6 GLOUCESTER ON	WSW	92.30	3

WWIS - Water Well Information System

A search of the WWIS database, dated Dec 31 2023 has found that there are 6 WWIS site(s) within approximately 0.25 kilometers of the project property.

Equal/Higher Elevation	Address	Direction	Distance (m)	Map Key
	ON ***Well ID:*** 7401540	W	103.21	4
	300 SOMME STREET lot 26 con 6 GLOUCESTER ON ***Well ID:*** 7371679	SSE	169.09	6
	lot 26 con 6 ON ***Well ID:*** 1502342	SW	222.42	11
	lot 26 con 6 ON ***Well ID:*** 7402444	SE	225.65	12
	ON ***Well ID:*** 7404161	SSE	237.71	13

Lower Elevation	Address	Direction	Distance (m)	Map Key
	300 SOMME STREET lot 26 con 6 Ottawa ON ***Well ID:*** 7370453	NE	198.85	8



Map: 0.25 Kilometer Radius

Order Number: 25061900162

Address: 301 Somme Street, Ottawa, ON

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major Arterial; Minor Arterial
- Local Road
- Service Road; Traffic Circle; Ramp
- Rail
- Beach
- Airport
- Industrial Area
- Military Base
- Aircraft Roads
- Native Reservation
- Hospital
- Shopping & Sports Area
- University/College
- Cemetery; Golf Course
- Parkt (National)
- Park (City/County)

Source: © 2021 ESRI StreetMap Premium.

© ERIS Information Limited Partnership

75°33'W



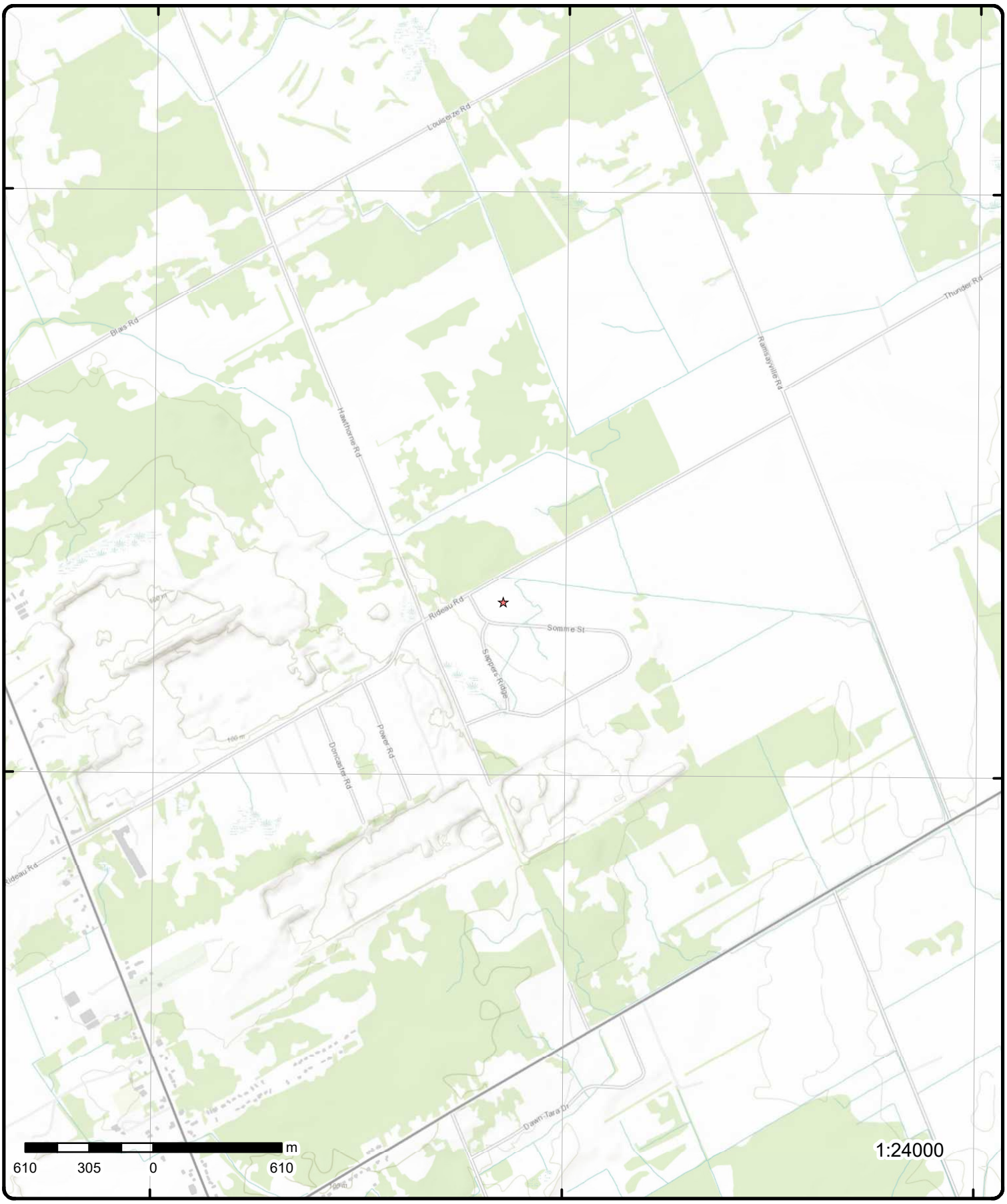
Aerial **Year: 2023**

Order Number: 25061900162

Address: 301 Somme Street, Ottawa, ON

Source: ESRI World Imagery

© ERIS Information Limited Partnership



Topographic Map

Address: 301 Somme Street, ON

Source: ESRI World Topographic Map

Order Number: 25061900162

© ERIS Information Limited Partnership

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	1 of 3	ESE/122.8	85.6 / -0.25	Consolidated Fastfrate (Ottawa) Holdings Inc. 301 Somme Street Ottawa, ON Canada ON	EBR

EBR Registry No: 019-6094
Ministry Ref No: 7463-CGJR5A
Notice Type: Instrument
Notice Stage: Decision
Notice Date:
Proposal Date: October 5, 2022
Year: 2022
Decision Posted: July 6, 2023
Exception Posted:
Section: Part II.1 (20.3 or 20.5)
Act 1: Environmental Protection Act, R.S.O. 1990
Act 2: Environmental Protection Act
Site Location Map: 45.30704,-75.5523

Instrument Type: Environmental Compliance Approval (sewage)
Off Instrument Name: Environmental Compliance Approval (sewage) (OWRA s.53)
Posted By: Ministry of the Environment, Conservation and Parks
Company Name:
Site Address: 301 Somme Street
Ottawa,
ON
Canada
Location Other:
Proponent Name: Consolidated Fastfrate (Ottawa) Holdings Inc.
Proponent Address: Consolidated Fastfrate (Ottawa) Holdings Inc.
9701 Highway 50
Woodbridge,
ON
L4H 2G4
Canada
Comment Period: October 5, 2022 - November 19, 2022 (45 days) Closed
URL: https://ero.ontario.ca/notice/019-6094
Summary:

Site Location Details:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	2 of 3	ESE/122.8	85.6 / -0.25	Consolidated Fastfrate (Ottawa) Holdings Inc. 301 Somme St Ottawa ON	ECA

Approval No: 3493-CSCR6T
Approval Date: June 30, 2023
Status: Revoked and/or Replaced
Record Type: ECA
Link Source: IDS
SWP Area Name:
MOE District: North Bay
City:
Longitude:
Latitude:
Geometry X: -9016878.7543000001
Geometry Y: 5700582.7322999965

Approval Type: ECA-MUNICIPAL AND PRIVATE SEWAGE WORKS
Project Type: MUNICIPAL AND PRIVATE SEWAGE WORKS
Business Name: Consolidated Fastfrate (Ottawa) Holdings Inc.
Address: 301 Somme St
Full Address:
Full PDF Link: https://www.accessenvironment.ene.gov.on.ca/instruments/7463-CGJR5A-13.pdf
PDF Site Location: Fastfrate Ottawa Warehouse and Distribution Facilities
Hawthorne Industrial Park
301 Somme Street
City of Ottawa

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
5	3 of 3	ESE/122.8	85.6 / -0.25	Consolidated Fastfrate (Ottawa) Holdings Inc. 301 Somme St Ottawa ON	ECA

Approval No: 0674-CUWGYD
Approval Date: August 31, 2023
Status: Approved
Record Type: ECA
Link Source: IDS
SWP Area Name:
MOE District: North Bay
City:
Longitude:
Latitude:
Geometry X: -9016878.7543000001
Geometry Y: 5700582.7322999965
Approval Type: ECA-MUNICIPAL AND PRIVATE SEWAGE WORKS
Project Type: MUNICIPAL AND PRIVATE SEWAGE WORKS
Business Name: Consolidated Fastfrate (Ottawa) Holdings Inc.
Address: 301 Somme St
Full Address:
Full PDF Link: https://www.accessenvironment.ene.gov.on.ca/instruments/9099-CTNFCQ-14.pdf
PDF Site Location: Fastfrate Ottawa Warehouse and Distribution Facilities
Hawthorne Industrial Park
301 Somme Street
City of Ottawa

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 1	W/47.8	85.9 / 0.00	Part of 5123 Hawthorne Road Ottawa ON K0A 1V0	EHS

Order No: 20310900348
Status: C
Report Type: Standard Report
Report Date: 12-NOV-20
Date Received: 09-NOV-20
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:
Nearest Intersection:
Municipality:
Client Prov/State: ON
Search Radius (km): .25
X: -75.5543796
Y: 45.3073371

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
2	1 of 1	WSW/68.3	85.9 / 0.00	Gloucester Con 6 Dump Gloucester ON K1G 3N4	ANDR

Legal Description: Gloucester Con 6 Lots 25-26
Location Description: partly wooded site, 350m E of Hawthorne Rd*, 75m S of sideline 25/26
Municipality: Gloucester Township
Current Municipality: Gloucester City
RM: Ottawa-Carleton Region
Facility: Dump
Date Active: pre 1970
Date Begun:
Date Complete:
Area (Ha):
Landfill Type:
Group Name:
Operated By:
Serial: MOEE 9013
NTS: 31G05
Diameter (m):

Historical Summary:

Gloucester Con 6 Dump MOEE 1994 Gloucester Con 6 Lots 25-26 cited as closed waste disposal site (Ontario Ministry of the Environment [1994] Waste disposal site inventory, [Toronto]: Ontario Environment, 1994., i, 196 pp., maps, ISBN 0772984093). 1968 NTS Map 31G05 Not marked, partly wooded site, 350m E of Hawthorne Rd*, 75m S of sideline 25/26 [1968 NTS Map Ottawa-Hull Sheet 31G05 edition 7 (air photos 1967, publication 1968)]. 1973 Military Town Plan MCE 306 Not marked [1973 Military Town Plan Ottawa-Hull MCE 306 Edition 2 (information 1972, produced 1973)]. * [1996] MapArt Publishing Corporation, Ottawa-Hull [& environs, street map] ISBN: 1-55198-358-3.

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Waste Type:
UTM X Nad 27: 456500
UTM Y Nad 27: 5017000
UTM Zone: 18

---

3 **1 of 1** **WSW/92.3** **86.9 / 1.00** **25-26 6 GLOUCESTER ON** **WDSH**

Site No.: X9013
Region: SOUTHEAST
County: OTTAWA CARLETON
Concession: 6
Lot: 25-26
Easting: 456500
Northing: 5017000
Zone: 18
Date Closed:
Status: CLOSED
Classification: A5 - POTENTIAL HUMAN IMPACT-URBAN MUNICIPAL/DOMESTIC WASTE - CLOSED 10-20 YRS
%CommericialWste: n/a
%DomesticWste Rec: n/a
%LiquidWste Rec: n/a
%HazardousWste Rec: n/a
%Non-haz.Wste Rec: n/a
%Sewage/Sludge Rec: n/a
%Other Wste Rec: n/a

---

4 **1 of 1** **W/103.2** **86.9 / 1.00** **ON** **WWIS**

Well ID: 7401540
Construction Date:
Use 1st:
Use 2nd:
Final Well Status:
Water Type:
Casing Material:
Audit No: Z278685
Tag: A290162
Constructn Method:
Elevation (m):
Elevatn Reliabilty:
Depth to Bedrock:
Well Depth:
Overburden/Bedrock:
Pump Rate:
Static Water Level:
Clear/Cloudy:
Municipality: GLOUCESTER TOWNSHIP
Site Info:

Flowing (Y/N):
Flow Rate:
Data Entry Status: Yes
Data Src:
Date Received: 11/02/2021
Selected Flag: TRUE
Abandonment Rec:
Contractor: 1844
Form Version: 7
Owner:
County: OTTAWA-CARLETON
Lot:
Concession:
Concession Name:
Easting NAD83:
Northing NAD83:
Zone:
UTM Reliability:

Additional Detail(s) (Map)

Bore Hole ID: 1008842555
Depth M:
Year Completed: 2021
Well Completed Dt: 08/06/2021
Audit No: Z278685
Path:

Tag No: A290162
Contractor: 1844
Latitude: 45.3074772503744
Longitude: -75.5550906332176
Y: 45.30747724251603
X: -75.55509047160321

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Bore Hole Information

Bore Hole ID:	1008842555	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	18
Code OB:		***East83:***	456485.00
Code OB Desc:		***North83:***	5017258.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	08/06/2021	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Location Method Desc:	on Water Well Record		
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Pipe Information

Pipe ID:	1009976117
Casing No:	0
Comment:	
Alt Name:	

---

6 | ***1 of 1*** | ***SSE/169.1*** | ***85.9 / 0.00*** | ***300 SOMME STREET lot 26 con 6 GLOUCESTER ON*** | ***WWIS***

Well ID:	7371679	***Flowing (Y/N):***	
Construction Date:		***Flow Rate:***	
Use 1st:	Domestic	***Data Entry Status:***	
Use 2nd:		***Data Src:***	
Final Well Status:	Water Supply	***Date Received:***	10/30/2020
Water Type:		***Selected Flag:***	TRUE
Casing Material:		***Abandonment Rec:***	
Audit No:	Z344053	***Contractor:***	7681
Tag:	A305146	***Form Version:***	7
Constructn Method:		***Owner:***	
Elevation (m):		***County:***	OTTAWA-CARLETON
Elevatn Reliabilty:		***Lot:***	026
Depth to Bedrock:		***Concession:***	06
Well Depth:		***Concession Name:***	RF
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	GLOUCESTER TOWNSHIP		
Site Info:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/737\7371679.pdf

Additional Detail(s) (Map)

Well Completed Date:	09/02/2020
Year Completed:	2020
Depth (m):	
Latitude:	45.3059288624844
Longitude:	-75.553264174258
X:	-75.55326401231287
Y:	45.30592885495013
Path:	737\7371679.pdf

Bore Hole Information

Bore Hole ID:	1008497522	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	18
Code OB:		***East83:***	456627.00
Code OB Desc:		***North83:***	5017085.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	09/02/2020	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Location Method Desc:	on Water Well Record		
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	1009646225
Layer:	4
Color:	2
General Color:	GREY
Material 1:	18
Material 1 Desc:	SANDSTONE
Material 2:	15
Material 2 Desc:	LIMESTONE
Material 3:	27
Material 3 Desc:	OTHER
Formation Top Depth:	134.0
Formation End Depth:	140.0
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	1009646223
Layer:	2
Color:	2
General Color:	GREY
Material 1:	18
Material 1 Desc:	SANDSTONE
Material 2:	15
Material 2 Desc:	LIMESTONE
Material 3:	27
Material 3 Desc:	OTHER
Formation Top Depth:	13.0
Formation End Depth:	103.0
Formation End Depth UOM:	ft

Overburden and Bedrock Materials Interval

Formation ID:	1009646222
Layer:	1
Color:	
General Color:	
Material 1:	28
Material 1 Desc:	SAND

Material 2: 05
Material 2 Desc: CLAY
Material 3: 11
Material 3 Desc: GRAVEL
Formation Top Depth: 0.0
Formation End Depth: 13.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 1009646224
Layer: 3
Color: 2
General Color: GREY
Material 1: 18
Material 1 Desc: SANDSTONE
Material 2: 15
Material 2 Desc: LIMESTONE
Material 3: 27
Material 3 Desc: OTHER
Formation Top Depth: 103.0
Formation End Depth: 134.0
Formation End Depth UOM: ft

Annular Space/Abandonment Sealing Record

Plug ID: 1009647358
Layer: 1
Plug From: 60.0
Plug To: 50.0
Plug Depth UOM: ft

Annular Space/Abandonment Sealing Record

Plug ID: 1009647359
Layer: 2
Plug From: 50.0
Plug To: 0.0
Plug Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 1009648616
Method Construction Code: 5
Method Construction: Air Percussion
Other Method Construction:

Pipe Information

Pipe ID: 1009644392
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1009649269

Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	-2.0
Depth To:	80.0
Casing Diameter:	6.25
Casing Diameter UOM:	Inch
Casing Depth UOM:	ft

Construction Record - Casing

Casing ID:	1009649270
Layer:	2
Material:	4
Open Hole or Material:	OPEN HOLE
Depth From:	80.0
Depth To:	140.0
Casing Diameter:	6.125
Casing Diameter UOM:	Inch
Casing Depth UOM:	ft

Results of Well Yield Testing

Pumping Test Method Desc:	
Pump Test ID:	1009650717
Pump Set At:	100.0
Static Level:	25.5
Final Level After Pumping:	30.799999237060547
Recommended Pump Depth:	100.0
Pumping Rate:	20.0
Flowing Rate:	
Recommended Pump Rate:	20.0
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	3
Water State After Test:	OTHER
Pumping Test Method:	0
Pumping Duration HR:	1
Pumping Duration MIN:	0
Flowing:	No

Draw Down & Recovery

Pump Test Detail ID:	1009655155
Test Type:	Draw Down
Test Duration:	5
Test Level:	28.399999618530273
Test Level UOM:	ft

Draw Down & Recovery

Pump Test Detail ID:	1009655175
Test Type:	Recovery
Test Duration:	50
Test Level:	25.5
Test Level UOM:	ft

Draw Down & Recovery

Pump Test Detail ID:	1009655176
Test Type:	Recovery
Test Duration:	60

Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655156
Test Type: Draw Down
Test Duration: 10
Test Level: 28.600000381469727
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655159
Test Type: Draw Down
Test Duration: 25
Test Level: 28.899999618530273
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655173
Test Type: Recovery
Test Duration: 30
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655161
Test Type: Draw Down
Test Duration: 40
Test Level: 30.200000762939453
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655168
Test Type: Recovery
Test Duration: 5
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655169
Test Type: Recovery
Test Duration: 10
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655158
Test Type: Draw Down
Test Duration: 20
Test Level: 28.799999237060547
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655166
Test Type: Recovery
Test Duration: 3
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655174
Test Type: Recovery
Test Duration: 40
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655152
Test Type: Draw Down
Test Duration: 2
Test Level: 28.0
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655153
Test Type: Draw Down
Test Duration: 3
Test Level: 28.200000762939453
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655160
Test Type: Draw Down
Test Duration: 30
Test Level: 30.0
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655163
Test Type: Draw Down
Test Duration: 60
Test Level: 30.799999237060547
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655165
Test Type: Recovery
Test Duration: 2
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655172
Test Type: Recovery

Test Duration: 25
Test Level: 25.799999237060547
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655151
Test Type: Draw Down
Test Duration: 1
Test Level: 27.600000381469727
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655162
Test Type: Draw Down
Test Duration: 50
Test Level: 30.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655164
Test Type: Recovery
Test Duration: 1
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655170
Test Type: Recovery
Test Duration: 15
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655154
Test Type: Draw Down
Test Duration: 4
Test Level: 28.299999237060547
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655157
Test Type: Draw Down
Test Duration: 15
Test Level: 28.700000762939453
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID: 1009655167
Test Type: Recovery
Test Duration: 4
Test Level: 25.5
Test Level UOM: ft

Draw Down & Recovery

Pump Test Detail ID:	1009655171
Test Type:	Recovery
Test Duration:	20
Test Level:	25.5
Test Level UOM:	ft

Water Details

Water ID:	1009650094
Layer:	1
Kind Code:	8
Kind:	Untested
Water Found Depth:	103.0
Water Found Depth UOM:	ft

Water Details

Water ID:	1009650095
Layer:	2
Kind Code:	8
Kind:	Untested
Water Found Depth:	134.0
Water Found Depth UOM:	ft

Hole Diameter

Hole ID:	1009648061
Diameter:	6.125
Depth From:	60.0
Depth To:	140.0
Hole Depth UOM:	ft
Hole Diameter UOM:	Inch

Hole Diameter

Hole ID:	1009648060
Diameter:	9.75
Depth From:	0.0
Depth To:	60.0
Hole Depth UOM:	ft
Hole Diameter UOM:	Inch

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
7	1 of 2	S/178.6	86.7 / 0.85	***Copart Canada Inc.*** ***300 Somme St*** ***Ottawa ON L1V 7G5***	ECA

Approval No:	0150-C73KJ6	***MOE District:***	Unknown
Approval Date:	2021-10-26	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	-9016878.7543000001
SWP Area Name:	Unknown	***Geometry Y:***	5700582.7322999965

Approval Type:	ECA-INDUSTRIAL SEWAGE WORKS
Project Type:	INDUSTRIAL SEWAGE WORKS
Business Name:	Copart Canada Inc.
Address:	300 Somme St
Full Address:	
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/3142-C5ZP6G-14.pdf
PDF Site Location:	Copart Facility

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
				300 Somme Street City of Ottawa	
7	2 of 2	S/178.6	86.7 / 0.85	**Copart** **300 Somme Street** **Ottawa ON**	GEN

Generator Info as of Dec 2024

Generator No:	ON001065402
Generator Company Name:	Copart
Street:	300 Somme Street
City:	Ottawa
Province State:	Ontario
Country:	Canada
Postal Code:	K1G6Y7
Waste Class:	221 I,252 L

Waste Class Decoded:

221 - LIGHT FUELS; 252 - WASTE OILS & LUBRICANTS

8	1 of 1	NE/198.8	84.9 / -1.00	**300 SOMME STREET lot 26 con 6** **Ottawa ON**	WWIS

Well ID:	7370453	***Flowing (Y/N):***	
Construction Date:		***Flow Rate:***	
Use 1st:	Monitoring	***Data Entry Status:***	
Use 2nd:		***Data Src:***	
Final Well Status:	Observation Wells	***Date Received:***	10/16/2020
Water Type:		***Selected Flag:***	TRUE
Casing Material:		***Abandonment Rec:***	
Audit No:	Z340902	***Contractor:***	1844
Tag:	A251312	***Form Version:***	7
Constructn Method:		***Owner:***	
Elevation (m):		***County:***	OTTAWA-CARLETON
Elevatn Reliabilty:		***Lot:***	026
Depth to Bedrock:		***Concession:***	06
Well Depth:		***Concession Name:***	RF
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	GLOUCESTER TOWNSHIP		
Site Info:			

Additional Detail(s) (Map)

Bore Hole ID:	1008491642	***Tag No:***	A251312
Depth M:		***Contractor:***	1844
Year Completed:	2020	***Latitude:***	45.3089747889762
Well Completed Dt:	05/19/2020	***Longitude:***	-75.5525539214746
Audit No:	Z340902	***Y:***	45.30897478194963
Path:		***X:***	-75.55255375931338

Bore Hole Information

Bore Hole ID:	1008491642	***Elevation:***	
DP2BR:		***Elevrc:***	

Spatial Status:		***Zone:***	18
Code OB:		***East83:***	456685.00
Code OB Desc:		***North83:***	5017423.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	05/19/2020	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Location Method Desc:	on Water Well Record		
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	1009645266
Layer:	1
Color:	
General Color:	
Material 1:	01
Material 1 Desc:	FILL
Material 2:	
Material 2 Desc:	
Material 3:	
Material 3 Desc:	
Formation Top Depth:	0.0
Formation End Depth:	4.619999885559082
Formation End Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	1009646752
Layer:	1
Plug From:	0.0
Plug To:	2.4000000953674316
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	1009648230
Method Construction Code:	B
Method Construction:	Other Method
Other Method Construction:	HAS

Pipe Information

Pipe ID:	1009644014
Casing No:	0
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	1009648818
Layer:	1
Material:	5
Open Hole or Material:	PLASTIC

Depth From:	0.0
Depth To:	3.049999952316284
Casing Diameter:	5.079999923706055
Casing Diameter UOM:	cm
Casing Depth UOM:	m

Construction Record - Screen

Screen ID:	1009649471
Layer:	1
Slot:	25
Screen Top Depth:	3.049999952316284
Screen End Depth:	4.570000171661377
Screen Material:	5
Screen Depth UOM:	m
Screen Diameter UOM:	cm
Screen Diameter:	5.880000114440918

Results of Well Yield Testing

Pumping Test Method Desc:	
Pump Test ID:	1009650339
Pump Set At:	
Static Level:	
Final Level After Pumping:	
Recommended Pump Depth:	
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	m
Rate UOM:	LPM
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	0
Pumping Duration HR:	
Pumping Duration MIN:	
Flowing:	No

Water Details

Water ID:	1009649788
Layer:	1
Kind Code:	
Kind:	
Water Found Depth:	2.3399999141693115
Water Found Depth UOM:	m

Hole Diameter

Hole ID:	1009647553
Diameter:	20.299999237060547
Depth From:	0.0
Depth To:	4.619999885559082
Hole Depth UOM:	m
Hole Diameter UOM:	cm

9	***1 of 1***	***NE/201.6***	***84.9 / -1.00***	***ENBRIDGE CONSUMERS GAS 3706 Rideau Rd. Ottawa, ON. OTTAWA ON***	***SPL***

Ref No:	1-13WD26	***Municipality No:***	
Year:		***Nature of Damage:***	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Incident Dt:	8/20/2021 3:41:00 AM	**Discharger Report:**	
Dt MOE Arvl on Scn:		**Material Group:**	
MOE Reported Dt:	8/20/2021 8:27:51 AM	**Impact to Health:**	0 No Impact
Dt Document Closed:	11/9/2021 9:43:58 PM	**Agency Involved:**	
Site No:			
MOE Response:	Desktop Response		
Site County/District:			
Site Geo Ref Meth:			
Site District Office:	Ottawa District Office		
Nearest Watercourse:			
Site Name:			
Site Address:	3706 Rideau Rd. Ottawa, ON.		
Site Region:			
Site Municipality:	OTTAWA		
Site Lot:			
Site Conc:			
Site Geo Ref Accu:			
Site Map Datum:			
Northing:			
Easting:			
Entity Operating Name:			
Client Name:	ENBRIDGE CONSUMERS GAS		
Client Type:	Private Business		
Source Type:	Pipeline/Components		
Incident Cause:			
Incident Preceding Spill:	Line Strike		
Incident Reason:	Human error (Specify)		
Incident Summary:	TSSA/FSB: Riser Damage - Made Safe		
Environment Impact:	1 Minor Impact		
Health Env Consequence:			
Nature of Impact:			
Contaminant Qty:	0 other - see notes		
Contaminant Qty 1:			
Contaminant Unit:			
Contaminant Code:			
Contaminant Name:	NATURAL GAS		
Contaminant Limit 1:			
Contam Limit Freq 1:			
Contaminant UN No 1:			
Receiving Medium:	Air		
Activity Preceding Spill:	Construction or repair		
Property 2nd Watershed:	Lower Ottawa		
Property Tertiary Watershed:	02LB-Lower Ottawa - South Nation		
Sector Type:			
SAC Action Class:			
Call Report Locatn Geodata:	{"integration_ids":["PR00004293482"],"wkts":["POINT (-75.5588763000 45.3057859000)"],"creation_date":"2021-08-20"}		
Time Reported:			
System Facility Address:			

10	1 of 1	E/220.7	84.9 / -1.00	40 Sappers Ridge Ottawa ON K1G 3Y3	EHS

Order No:	22082503382	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Custom Report	**Client Prov/State:**	ON
Report Date:	07-SEP-22	**Search Radius (km):**	.25
Date Received:	25-AUG-22	**X:**	-75.55098346
Previous Site Name:		**Y:**	45.30716895
Lot/Building Size:			
Additional Info Ordered:	City Directory		

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
11	1 of 1	SW/222.4	86.9 / 1.00	lot 26 con 6 ON	WWIS

Well ID: 1502342
Construction Date:
Use 1st: Livestock
Use 2nd: Domestic
Final Well Status: Water Supply
Water Type:
Casing Material:
Audit No:
Tag:
Constructn Method:
Elevation (m):
Elevatn Reliabilty:
Depth to Bedrock:
Well Depth:
Overburden/Bedrock:
Pump Rate:
Static Water Level:
Clear/Cloudy:
Municipality: GLOUCESTER TOWNSHIP
Site Info:

Flowing (Y/N):
Flow Rate:
Data Entry Status:
Data Src: 1
Date Received: 12/06/1951
Selected Flag: TRUE
Abandonment Rec:
Contractor: 3504
Form Version: 1
Owner:
County: OTTAWA-CARLETON
Lot: 026
Concession: 06
Concession Name: RF
Easting NAD83:
Northing NAD83:
Zone:
UTM Reliability:

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/150\1502342.pdf

Additional Detail(s) (Map)

Well Completed Date: 11/30/1950
Year Completed: 1950
Depth (m): 17.3736
Latitude: 45.3059797193166
Longitude: -75.5557673909282
X: -75.55576722900196
Y: 45.30597971208894
Path: 150\1502342.pdf

Bore Hole Information

Bore Hole ID: 10024385
DP2BR:
Spatial Status:
Code OB:
Code OB Desc:
Open Hole:
Cluster Kind:
Date Completed: 11/30/1950
Remarks:
Location Method Desc: Original Pre1985 UTM Rel Code 9: unknown UTM
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation:
Elevrc:
Zone: 18
East83: 456430.80
North83: 5017092.00
Org CS:
UTMRC: 9
UTMRC Desc: unknown UTM
Location Method: p9

Overburden and Bedrock Materials Interval

Formation ID: 930994279
Layer: 2
Color:
General Color:

Material 1: 18
Material 1 Desc: SANDSTONE
Material 2:
Material 2 Desc:
Material 3:
Material 3 Desc:
Formation Top Depth: 27.0
Formation End Depth: 57.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 930994278
Layer: 1
Color:
General Color:
Material 1: 24
Material 1 Desc: PREV. DRILLED
Material 2:
Material 2 Desc:
Material 3:
Material 3 Desc:
Formation Top Depth: 0.0
Formation End Depth: 27.0
Formation End Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 961502342
Method Construction Code: 1
Method Construction: Cable Tool
Other Method Construction:

Pipe Information

Pipe ID: 10572955
Casing No: 1
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 930041542
Layer: 2
Material: 4
Open Hole or Material: OPEN HOLE
Depth From:
Depth To: 57.0
Casing Diameter: 5.0
Casing Diameter UOM: inch
Casing Depth UOM: ft

Construction Record - Casing

Casing ID: 930041541
Layer: 1
Material: 1
Open Hole or Material: STEEL
Depth From:
Depth To: 27.0

Casing Diameter:	5.0
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Results of Well Yield Testing

Pumping Test Method Desc:	PUMP
Pump Test ID:	991502342
Pump Set At:	
Static Level:	13.0
Final Level After Pumping:	18.0
Recommended Pump Depth:	
Pumping Rate:	1.0
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	0
Pumping Duration MIN:	30
Flowing:	No

Water Details

Water ID:	933455121
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	57.0
Water Found Depth UOM:	ft

---

12 | ***1 of 1*** | ***SE/225.7*** | ***85.9 / 0.00*** | ***lot 26 con 6 ON*** | ***WWIS***

Well ID:	7402444	**Flowing (Y/N):**	
Construction Date:		**Flow Rate:**	
Use 1st:		**Data Entry Status:**	Yes
Use 2nd:		**Data Src:**	
Final Well Status:		**Date Received:**	11/08/2021
Water Type:		**Selected Flag:**	TRUE
Casing Material:		**Abandonment Rec:**	
Audit No:	C53081	**Contractor:**	1844
Tag:	A290221	**Form Version:**	8
Constructn Method:		**Owner:**	
Elevation (m):		**County:**	OTTAWA-CARLETON
Elevatn Reliabilty:		**Lot:**	026
Depth to Bedrock:		**Concession:**	06
Well Depth:		**Concession Name:**	RF
Overburden/Bedrock:		**Easting NAD83:**	
Pump Rate:		**Northing NAD83:**	
Static Water Level:		**Zone:**	
Clear/Cloudy:		**UTM Reliability:**	
Municipality:	GLOUCESTER TOWNSHIP		
Site Info:			

Additional Detail(s) (Map)

Bore Hole ID:	1008861783	**Tag No:**	A290221
Depth M:		**Contractor:**	1844
Year Completed:	2021	**Latitude:**	45.3056361503873

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Well Completed Dt:	10/05/2021	**Longitude:**	-75.5523684140988
Audit No:	C53081	**Y:**	45.3056361425567
Path:		**X:**	-75.55236825215884

Bore Hole Information

Bore Hole ID:	1008861783	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	18
Code OB:		**East83:**	456697.00
Code OB Desc:		**North83:**	5017052.00
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	10/05/2021	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Location Method Desc:	on Water Well Record		
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

13	1 of 1	SSE/237.7	86.6 / 0.72	ON	WWIS

Well ID:	7404161	**Flowing (Y/N):**	
Construction Date:		**Flow Rate:**	
Use 1st:		**Data Entry Status:**	Yes
Use 2nd:		**Data Src:**	
Final Well Status:		**Date Received:**	11/29/2021
Water Type:		**Selected Flag:**	TRUE
Casing Material:		**Abandonment Rec:**	Yes
Audit No:	Z354949	**Contractor:**	7148
Tag:		**Form Version:**	7
Constructn Method:		**Owner:**	
Elevation (m):		**County:**	OTTAWA-CARLETON
Elevatn Reliabilty:		**Lot:**	
Depth to Bedrock:		**Concession:**	
Well Depth:		**Concession Name:**	
Overburden/Bedrock:		**Easting NAD83:**	
Pump Rate:		**Northing NAD83:**	
Static Water Level:		**Zone:**	
Clear/Cloudy:		**UTM Reliability:**	
Municipality:	GLOUCESTER TOWNSHIP		
Site Info:			

Additional Detail(s) (Map)

Bore Hole ID:	1008867953	**Tag No:**	
Depth M:		**Contractor:**	7148
Year Completed:		**Latitude:**	45.3054644522719
Well Completed Dt:		**Longitude:**	-75.5525070610114
Audit No:	Z354949	**Y:**	45.30546444490793
Path:		**X:**	-75.55250689900659

Bore Hole Information

Bore Hole ID:	1008867953	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	18
Code OB:		**East83:**	456686.00

Code OB Desc:		***North83:***	5017033.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:		***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Location Method Desc:	on Water Well Record		
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Pipe Information

Pipe ID:	1009935505
Casing No:	0
Comment:	
Alt Name:	

Unplottable Summary

Total: 6 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
AGR	R. W. TOMLINSON LIMITED	Lot 26, Con IV	OTTAWA ON	
AGR	R.W. Tomlinson Limited	Lot 26, Con IV Lot 26, Con IV	GLOUCESTER ON	
CA	Minto Developments Inc.	Pt Lot 26, Con 6, 4R-11232 Parts 1 &2, Kanata Ward 4	Ottawa ON	
LIMO	Rideau River Gloucester	Lot 26 Concession 6 Ottawa	ON	
PTTW	R.W. Tomlinson Limited	Albion Pit Address: Lot: part of lot 26, Concession: IV, Ottawa District Office: Ottawa GLOUCESTER	ON	
SPL	O.C. Transpo <UNOFFICIAL>	Rideau Rd. at the Rideau Shopping Mall <UNOFFICIAL>	Ottawa ON	

Unplottable Report

Site: ***R. W. TOMLINSON LIMITED***
Lot 26, Con IV OTTAWA ON

Database: ***AGR***

ID:	4058	***Effective Date:***	
Current Status:	ACTIVE	***Licenced Area (ha):***	71.5
Authority Type:		***Extraction Area:***	
Section:		***OGF ID:***	320686309
Location Name:	Albion Pit	***Max Tonnage:***	99999999
Address Line 1:	5597 Power Road	***Water Status:***	Below Water
Address Line 2:		***District Name:***	Kemptville Kingston District
Address City:	Ottawa	***Location Accuracy:***	Within 20 metres
Address Pcode:	K1G 3N4	***Geom Updt Datetime:***	2024-11-19T10:04:22.0000000Z
Geographc Township:	GLOUCESTER	***Effective Datetime:***	2024-11-19T10:01:30.0000000Z
District:		***System Datetime:***	2024-11-19T21:59:59.0000000Z
Auth Type Desc:	CLASS A LICENCE > 20000 TONNES	***Refreshed Datetime:***	2024-12-12T03:50:49.0000000Z
Operation Type:	Pit	***Max Annual Tonnage:***	
Unlimited Tonnage:	Yes	***X:***	
Status Date:		***Y:***	
Upper Tier Munici:	OTTAWA-CARLETON R		
Lower Tier Munici:	OTTAWA		
Source Detail:			
Geometry:			
Source:	Aggregate Site Authorized - Active		

Site: ***R.W. Tomlinson Limited***
Lot 26, Con IV Lot 26, Con IV GLOUCESTER ON

Database: ***AGR***

ID:	4058	***Effective Date:***	
Current Status:		***Licenced Area (ha):***	71.5
Authority Type:		***Extraction Area:***	
Section:		***OGF ID:***	
Location Name:	Albion Pit	***Max Tonnage:***	
Address Line 1:		***Water Status:***	
Address Line 2:		***District Name:***	
Address City:		***Location Accuracy:***	
Address Pcode:		***Geom Updt Datetime:***	
Geographc Township:		***Effective Datetime:***	
District:	Kemptville District	***System Datetime:***	
Auth Type Desc:	CLASS A LICENCE > 20000 TONNES	***Refreshed Datetime:***	
Operation Type:	PIT	***Max Annual Tonnage:***	99999999
Unlimited Tonnage:	Yes	***X:***	
Status Date:		***Y:***	
Upper Tier Munici:	OTTAWA-CARLETON R		
Lower Tier Munici:	OTTAWA		
Source Detail:			
Geometry:			
Source:			

Site: ***Minto Developments Inc.***
Pt Lot 26, Con 6, 4R-11232 Parts 1 &2, Kanata Ward 4 Ottawa ON

Database: ***CA***

Certificate #:	5380-6GGNFK
Application Year:	2005
Issue Date:	9/23/2005
Approval Type:	Municipal and Private Sewage Works
Status:	Approved
Application Type:	

Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***Rideau River Gloucester***
Lot 26 Concession 6 Ottawa ON

Database: ***LIMO***

ECA/Instrument No:	X9013	***Natural Attenuation:***	
Operation Status:	Historic	***Liners:***	
C of A Issue Date:		***Cover Material:***	
C of A Issued to:		***Leachate Off-Site:***	
Lndfl Gas Mgmt (P):		***Leachate On Site:***	
Lndfl Gas Mgmt (F):		***Req Coll Lndfll Gas:***	
Lndfl Gas Mgmt (E):		***Lndfll Gas Coll:***	
Lndfl Gas Mgmt Sys:		***Total Waste Rec:***	
Landfill Gas Mntr:		***TWR Methodology:***	
Leachate Coll Sys:		***TWR Unit:***	
ERC Est Vol (m3):		***Tot Aprv Cap Unit:***	
ERC Volume Unit:		***Financial Assurance:***	
ERC Dt Last Det:		***Last Report Year:***	
Landfill Type:		***Region:***	
Source File Type:	Historic and Closed Landfills	***District Office:***	
Fill Rate:		***Site County:***	
Fill Rate Unit:		***Lot:***	
Tot Fill Area (ha):		***Concession:***	
Tot Site Area (ha):		***Latitude:***	
Footprint:		***Longitude:***	
Tot Apprv Cap (m3):		***Easting:***	
Contam Atten Zone:		***Northing:***	
Grndwtr Mntr:		***UTM Zone:***	
Surf Wtr Mntr:		***Data Source:***	
Air Emis Monitor:			
Approved Waste Type:			
Client Site Name:	Rideau River Gloucester		
ERC Methodology:			
Site Name:			
Site Location Details:	Lot 26 Concession 6 Ottawa		
Service Area:			
Page URL:			

Site: ***R.W. Tomlinson Limited***
Albion Pit Address: Lot: part of lot 26, Concession: IV, Ottawa District Office: Ottawa GLOUCESTER ON

Database: ***PTTW***

EBR Registry No:	011-4540	***Decision Posted:***	
Ministry Ref No:	3648-8L7M3P	***Exception Posted:***	
Notice Type:	Instrument Decision	***Section:***	
Notice Stage:		***Act 1:***	
Notice Date:	December 18, 2014	***Act 2:***	
Proposal Date:	September 01, 2011	***Site Location Map:***	
Year:	2011		
Instrument Type:	(OWRA s. 34) - Permit to Take Water		
Off Instrument Name:			
Posted By:			
Company Name:	R.W. Tomlinson Limited		
Site Address:			
Location Other:			
Proponent Name:			
Proponent Address:	5597 Power Road, RR #6, Ottawa Ontario, K1G 3N4		
Comment Period:			
URL:			
Summary:			

Site Location Details:

Albion Pit Address: Lot: part of lot 26, Concession: IV, Ottawa District Office: Ottawa GLOUCESTER

Site: ***O.C. Transpo <UNOFFICIAL>***
Rideau Rd. at the Rideau Shopping Mall <UNOFFICIAL> Ottawa ON

Database: ***SPL***

Ref No:	0358-6FESFG	***Municipality No:***	
Year:		***Nature of Damage:***	
Incident Dt:	8/19/2005	***Discharger Report:***	0
Dt MOE Arvl on Scn:		***Material Group:***	Chemical
MOE Reported Dt:	8/19/2005	***Impact to Health:***	
Dt Document Closed:		***Agency Involved:***	
Site No:			
MOE Response:			
Site County/District:			
Site Geo Ref Meth:			
Site District Office:	Ottawa		
Nearest Watercourse:			
Site Name:	Rideau Rd. at the Rideau Shopping Mall <UNOFFICIAL>		
Site Address:			
Site Region:			
Site Municipality:	Ottawa		
Site Lot:			
Site Conc:			
Site Geo Ref Accu:			
Site Map Datum:			
Northing:			
Easting:			
Entity Operating Name:			
Client Name:	O.C. Transpo <UNOFFICIAL>		
Client Type:			
Source Type:			
Incident Cause:	Pipe Or Hose Leak		
Incident Preceding Spill:			
Incident Reason:	Equipment Failure		
Incident Summary:	O.C. Transpo - 30 L anti-freeze to sewer.		
Environment Impact:	Not Anticipated		
Health Env Consequence:			
Nature of Impact:			
Contaminant Qty:	3785 L		
Contaminant Qty 1:	3785		
Contaminant Unit:	L		
Contaminant Code:			
Contaminant Name:	ETHYLENE GLYCOL (ANTIFREEZE)		
Contaminant Limit 1:			
Contam Limit Freq 1:			
Contaminant UN No 1:			
Receiving Medium:	Land		
Activity Preceding Spill:			
Property 2nd Watershed:			
Property Tertiary Watershed:			
Sector Type:	Transport Truck		
SAC Action Class:	Spills to Watercourses		
Call Report Locatn Geodata:			
Time Reported:			
System Facility Address:			

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Abandoned Aggregate Inventory: Provincial AAGR

The MAAP Program maintains a database of abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.*

Government Publication Date: Sept 2002*

Aggregate Inventory: Provincial AGR

This database of licensed and permitted pits and quarries is maintained by the Ontario Ministry of Natural Resources and Forestry (MNRF), as regulated under the Aggregate Resources Act, R.S.O. 1990. Aggregate site data has been divided into active and inactive sites. Active sites may be further subdivided into partial surrenders. In partial surrenders, defined areas of a site are inactive while the rest of the site remains active.

Government Publication Date: Up to Nov 2024

Abandoned Mine Information System: Provincial AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Government Publication Date: 1800-Apr 2024

Anderson's Waste Disposal Sites: Private ANDR

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the Ontario MOE Waste Disposal Site Inventory, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. Please note that the data is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1860s-Present

Aboveground Storage Tanks: Provincial AST

Historical listing of aboveground storage tanks made available by the Department of Natural Resources and Forestry. Includes tanks used to hold water or petroleum. This dataset has been retired as of September 25, 2014 and will no longer be updated.

Government Publication Date: May 31, 2014

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-Apr 30, 2025

Borehole: Provincial BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc. For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Government Publication Date: 1875-Jul 2018

Certificates of Approval: Provincial CA

This database contains the following types of approvals: Air & Noise, Industrial Sewage, Municipal & Private Sewage, Waste Management Systems and Renewable Energy Approvals. The MOE in Ontario states that any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste, must have a Certificate of Approval before it can operate lawfully. Fields include approval number, business name, address, approval date, approval type and status. This database will no longer be updated, as CofA's have been replaced by either Environmental Activity and Sector Registry (EASR) or Environmental Compliance Approval (ECA). Please refer to those individual databases for any information after Oct.31, 2011.

Government Publication Date: 1985-Oct 30, 2011*

Dry Cleaning Facilities: Federal CDRY

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.

Government Publication Date: Jan 2004-Dec 2023

Commercial Fuel Oil Tanks: Provincial CFOT

Locations of commercial underground fuel oil tanks. This is not a comprehensive or complete inventory of commercial fuel tanks in the province; this listing is a copy of records of registered commercial underground fuel oil tanks obtained under Access to Public Information.
Note that the following types of tanks do not require registration: waste oil tanks in apartments, office buildings, residences, etc.; aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Oct 2023

Chemical Manufacturers and Distributors: Private CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

Government Publication Date: 1999-Jan 31, 2020

Chemical Register: Private CHM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999-Apr 30, 2025

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 2012 -Apr 2025

Inventory of Coal Gasification Plants and Coal Tar Sites: Provincial COAL

This inventory includes both the "Inventory of Coal Gasification Plant Waste Sites in Ontario-April 1987" and the Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario-November 1988) collected by the MOE. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, land use, information on adjoining properties, soil condition, site operators/occupants, site description, potential environmental impacts and historic maps available. This was a one-time inventory.*

Government Publication Date: Apr 1987 and Nov 1988*

Compliance and Convictions: Provincial CONV

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Government Publication Date: 1989-Apr 2025

Certificates of Property Use: Provincial CPU

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include CPU's on the registry such as (EPA s. 168.6) - Certificate of Property Use.

Government Publication Date: 1994 - May 31, 2025

Drill Hole Database: Provincial DRL

The Ontario Drill Hole Database (ODHD) is offered by the Province of Ontario's Ministry of Mines. The dataset contains information for over 164,000 percussion, overburden, sonic and diamond-drill holes. The presence of assay results with cutoff values for gold, silver, copper, zinc, lead, nickel and platinum group elements is noted. Drill hole data are compiled from assessment files that have been submitted to the ministry in accordance with the Ontario Mining Act (OMA). Source assessment file numbers are captured for cross reference with the Ontario Assessment File Database (OAFD). Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Government Publication Date: 1886 - Aug 2024

Delisted Fuel Tanks: Provincial DTNK

List of fuel storage tank sites that were once found in - and have since been removed from - the list of fuel storage tanks made available by the regulatory agency under Access to Public Information.

Government Publication Date: Oct 2023

Environmental Activity and Sector Registry: Provincial EASR

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. The EASR allows businesses to register certain activities with the ministry, rather than apply for an approval. The registry is available for common systems and processes, to which preset rules of operation can be applied. The EASR is currently available for: heating systems, standby power systems and automotive refinishing. Businesses whose activities aren't subject to the EASR may apply for an ECA (Environmental Compliance Approval), Please see our ECA database.

Government Publication Date: Oct 2011 - May 31, 2025

Environmental Registry: Provincial EBR

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, license, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes: Approval for discharge into the natural environment other than water (i.e. Air) - EPA s. 9, Approval for sewage works - OWRA s. 53(1), and EPA s. 27 - Approval for a waste disposal site. For information regarding Permit to Take Water (PTTW), Certificate of Property Use (CPU) and (ORD) Orders please refer to those individual databases.

Government Publication Date: 1994 - May 31, 2025

Environmental Compliance Approval: Provincial ECA

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. In the past, a business had to apply for multiple approvals (known as certificates of approval) for individual processes and pieces of equipment. Today, a business either registers itself, or applies for a single approval, depending on the types of activities it conducts. Businesses whose activities aren't subject to the EASR may apply for an ECA. A single ECA addresses all of a business's emissions, discharges and wastes. Separate approvals for air, noise and waste are no longer required. This database will also include Renewable Energy Approvals. For certificates of approval prior to Nov 1st, 2011, please refer to the CA database. For all Waste Disposal Sites please refer to the WDS database.

Government Publication Date: Oct 2011 - May 31, 2025

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Aug 31, 2024

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Emergency Management Historical Event: Provincial EMHE

List of locations of historical occurrences of emergency events, including those assigned to the Ministry of Natural Resources by Order-In-Council (OIC) under the Emergency Management and Civil Protection Act, as well as events where MNR provided requested emergency response assistance. Many of these events will have involved community evacuations, significant structural loss, and/or involvement of MNR emergency response staff. These events fall into one of ten (10) type categories: Dam Failure; Drought / Low Water; Erosion; Flood; Forest Fire; Soil and Bedrock Instability; Petroleum Resource Center Event, EMO Requested Assistance, Continuity of Operations Event, Other Requested Assistance. EMHE record details are reproduced by ERIS under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.

Government Publication Date: Apr 30, 2022

Environmental Penalty Annual Report: Provincial EPAR

This database contains data from Ontario's annual environmental penalty report published by the Ministry of the Environment, Conservation and Parks (MECP). These reports provide information on environmental penalties for land or water violations issued to companies in one of the nine industrial sectors covered by the Municipal Industrial Strategy for Abatement (MISA) regulations.

Government Publication Date: Jan 1, 2011 - Dec 31, 2024

List of Expired Fuels Safety Facilities: Provincial EXP

List of facilities and tanks for which there was once a fuel registration. This is not a comprehensive or complete inventory of expired tanks/tank facilities in the province; this listing is a copy of previously registered tanks and facilities obtained under Access to Public Information. Includes private fuel outlets, bulk plants, fuel oil tanks, gasoline stations, marinas, propane filling stations, liquid fuel tanks, piping systems, etc; includes tanks which have been removed from the ground.
Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Oct 2023

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government. Includes fire training sites and sites at which Per- and Polyfluoroalkyl Substances (PFAS) are a concern.

Government Publication Date: Jun 2000-Jan 2025

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sep 2019

Federal Identification Registry for Storage Tank Systems (FIRSTS): Federal FRST

A list of federally regulated Storage tanks from the Federal Identification Registry for Storage Tank Systems (FIRSTS). FIRSTS is Environment and Climate Change Canada's database of storage tank systems subject to the Storage Tank for Petroleum Products and Allied Petroleum Products Regulations. The main objective of the Regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and aboriginal lands. Storage tank systems that do not have a valid identification number displayed in a readily visible location on or near the storage tank system may be refused product delivery.

Government Publication Date: Oct 31, 2021

Fuel Storage Tank: Provincial FST

List of registered private and retail fuel storage tanks. This is not a comprehensive or complete inventory of private and retail fuel storage tanks in the province; this listing is a copy of registered private and retail fuel storage tanks, obtained under Access to Public Information.
Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Oct 2023

Fuel Storage Tank - Historic: Provincial FSTH

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks. Public records of private fuel storage tanks are only available since the registration became effective in September 1989. This information is now collected by the Technical Standards and Safety Authority.

Government Publication Date: Pre-Jan 2010*

Ontario Regulation 347 Waste Generators Summary: Provincial GEN

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. As of January 1, 2023, businesses and institutions subject to the amended Reg. 347: General – Waste Management are required to report their activities and pay fees through Resource Productivity & Recovery Authority (RPRA) online Hazardous Waste Program Registry (HWPR) rather than the Hazardous Waste Information Network (HWIN) system previously operated by the Ministry of the Environment, Conservation and Parks (MECP). Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Government Publication Date: 1986-Dec 31, 2024

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Apr 2024

TSSA Historic Incidents: Provincial HINC

List of historic incidences of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen recorded by the TSSA in their previous incident tracking system. The TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, the TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. Records are not verified for accuracy or completeness. This is not a comprehensive or complete inventory of historical fuel spills and leaks in the province. This listing is a copy of the data captured at one moment in time and is hence limited by the record date provided here.

Government Publication Date: 2006-June 2009*

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Fuel Oil Spills and Leaks: Provincial INC

Listing of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen reported to the Spills Action Centre (SAC). This is not a comprehensive or complete inventory of fuel-related leaks, spills, and incidents in the province; this listing in a copy of incidents reported to the SAC, obtained under Access to Public Information. Includes incidents from fuel-related hazards such as spills, fires, and explosions. Records are not verified for accuracy or completeness.

Government Publication Date: 31 Oct, 2023

Landfill Inventory Management Ontario: Provincial LIMO

The Landfill Inventory Management Ontario (LIMO) database is updated every year, as the Ministry of the Environment, Conservation and Parks compiles new and updated information. Includes small and large landfills currently operating as well as those which are closed and historic. Operators of larger landfills provide landfill information for the previous operating year to the ministry for LIMO including: estimated amount of total waste received, landfill capacity, estimated total remaining landfill capacity, fill rates, engineering designs, reporting and monitoring details, size of location, service area, approved waste types, leachate of site treatment, contaminant attenuation zone and more. The small landfills include information such as site owner, site location and certificate of approval # and status.

Government Publication Date: Mar 31, 2022

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Mineral Occurrences: Provincial MNR

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the plan metric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Government Publication Date: 1846-Feb 2025

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

The Ministry of the Environment Conservation and Parks (MECP) provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act. MECP publicly releases the Environmental Compliance Report (ECR) on the Ontario Data Catalogue. In Ontario, all facilities with regulated wastewater discharges or air emissions under the Ontario Water Resources Act and the Environmental Protection Act must monitor and report any cases where approved operating limits have been exceeded.

Government Publication Date: Dec 31, 2023

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Nov 2023

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the Canada Energy Regulator (CER) - previously the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-May 31, 2025

National Energy Board Wells: Federal NEBP

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPR2

The National Pollutant Release Inventory (NPRI) is Canada's public inventory of pollutant releases (to air, water and land), disposals, and transfers for recycling. The inventory, managed by Environment and Climate Change Canada, tracks over 300 substances. Under the authority of the Canadian Environmental Protection Act (CEPA), owners or operators of facilities that meet published reporting requirements are required to report to the NPRI.

Government Publication Date: Feb 2024

National Pollutant Release Inventory - Historic: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances. This data holds historic records; current records are found in NPR2.

Government Publication Date: 1993-May 2017

Oil and Gas Wells: Private OGWE

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-Feb 28, 2025

Ontario Oil and Gas Wells: Provincial OOGW

In 1998, the Ministry of Natural Resources (MNR) handed over to the Ontario Oil, Gas and Salt Resources (OGSR) Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database includes well owner/operator, location, permit issue date, and well cap date, license number, status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provided for each well record.

Government Publication Date: 1800-Aug 2024

Inventory of PCB Storage Sites: Provincial OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Government Publication Date: 1987-Oct 2004; 2012-Dec 2013

Orders: Provincial ORD

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include Orders on the registry such as (EPA s. 17) - Order for remedial work, (EPA s. 18) - Order for preventative measures, (EPA s. 43) - Order for removal of waste and restoration of site, (EPA s. 44) - Order for conformity with Act for waste disposal sites, (EPA s. 136) - Order for performance of environmental measures.

Government Publication Date: 1994 - May 31, 2025

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

The Ontario Ministry of the Environment and Climate Change maintains a database of licensed operators and vendors of registered pesticides.

Government Publication Date: Oct 2011 - May 31, 2025

Ontario PFAS Spills: Provincial PFAS

This specific list of spills includes those incidents where one or more of the listed contaminants are identified in the PFAS Structure List and/or PFAS Chemicals Without Explicit Structure List made available by the United States Environmental Protection Agency (US EPA), is originally sourced from the Ministry of the Environment, Conservation and Parks spills related data. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Government Publication Date: 1988-Jun 2024; Aug 2024; Oct-Nov 2024

NPRI Reporters - PFAS Substances: Federal PFCH

The National Pollutant Release Inventory (NPRI) is Canada's public inventory of releases, disposals, and transfers, tracking over 320 pollutants. Per - and polyfluoroalkyl substances (PFAS) are a group of over 4,700 human-made substances for which adverse environmental and health effects have been observed. This listing of PFAS substance reporters includes those NPRI facilities that reported substances that are found in either: a) the Comprehensive Global Database of PFASs compiled by the Organisation for Economic Co-operation and Development (OECD), b) the US Environmental Protection Agency (US EPA) Master List of PFAS Substances, c) the US EPA list of PFAS chemicals without explicit structures, or d) the US EPA list of PFAS structures (encompassing the largest set of structures having sufficient levels of fluorination to potentially impart PFAS-type properties).

Government Publication Date: Feb 2024

Potential PFAS Handlers from NPRI: Federal PFHA

The National Pollutant Release Inventory (NPRI) is Canada's public inventory of releases, disposals, and transfers, tracking over 320 pollutants. Per - and polyfluoroalkyl substances (PFAS) are a group of over 4,700 human-made substances for which adverse environmental and health effects have been observed. This list of potential PFAS handlers includes those NPRI facilities that reported business activity (NAICS code) included in the US Environmental Protection Agency (US EPA) list of Potential PFAS-Handling Industry Sectors, further described as operating in industry sectors where literature reviews indicate that PFAS may be handled and/or released. Inclusion of a facility in this listing does not indicate that PFAS are being manufactured, processed, used, or released by the facility - these are facilities that potentially handle PFAS based on their industrial profile.

Government Publication Date: Feb 2024

Pipeline Incidents: Provincial PINC

List of pipeline incidents (strikes, leaks, spills). This is not a comprehensive or complete inventory of pipeline incidents in the province; this listing in an historical copy of records previously obtained under Access to Public Information. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2021

Potential PFAS Handlers from EASR: Provincial PPHA

The Ontario Environmental Activity and Sector Registry (EASR), described in Ontario Regulation 245/11, allows businesses with less complex operations - and hence not requiring an Environmental Compliance Approval - to register their activities with the Ontario Ministry of the Environment, Conservation and Parks (MECP). This list of potential PFAS handlers includes those EASR facilities that reported business activity (NAICS code) included in the US Environmental Protection Agency (US EPA) list of Potential PFAS-Handling Industry Sectors, further described as operating in industry sectors where literature reviews indicate that PFAS may be handled and/or released. Inclusion of a facility in this listing does not indicate that PFAS are being manufactured, processed, used.

Government Publication Date: Jun 30, 2024

Private and Retail Fuel Storage Tanks: Provincial PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Government Publication Date: 1989-1996*

Permit to Take Water: Provincial PTTW

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include PTTW's on the registry such as OWRA s. 34 - Permit to take water.

Government Publication Date: 1994 - May 31, 2025

Ontario Regulation 347 Waste Receivers Summary: Provincial REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Government Publication Date: 1986-1990, 1992-2021

Record of Site Condition: Provincial RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use (such as residential) proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up. RSCs filed after July 1, 2011 will also be included as part of the new (O.Reg. 511/09). The Government of Ontario states that it is not responsible for the accuracy of the information in this Registry.

Government Publication Date: 1997-Sept 2001, Oct 2004-May 2025

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Apr 30, 2025

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Ontario Spills: Provincial SPL

List of spills and incidents made available by the Ministry of the Environment, Conservation and Parks. This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X.

Government Publication Date: 1988-Jun 2024; Aug-Feb 2025

Wastewater Discharger Registration Database: Provincial SRDS

Facilities that report either municipal treated wastewater effluent or industrial wastewater discharges under the Effluent Monitoring and Effluent Limits (EMEL) and Municipal/Industrial Strategy for Abatement Regulations. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment keeps record of direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation, Mining, Petroleum Refining, Organic Chemicals, Inorganic Chemicals, Pulp & Paper, Metal Casting, Iron & Steel, and Quarries.

Government Publication Date: 1990-Dec 31, 2021

Anderson's Storage Tanks: Private TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1915-1953*

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970 - Apr 2024

Variances for Abandonment of Underground Storage Tanks: Provincial VAR

Listing of variances granted for storage tank abandonment. This is not a comprehensive or complete inventory of tank abandonment variances in the province; this listing is a copy of tank abandonment variance records previously obtained under Access to Public Information. In Ontario, registered underground storage tanks must be removed within two years of disuse; if removal of a tank is not feasible, an application may be sought for a variance from this code requirement.
Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Waste Disposal Sites - MOE CA Inventory: Provincial WDS

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. All new Environmental Compliance Approvals handed out after Oct 31, 2011 for Waste Disposal Sites will still be found in this database.

Government Publication Date: Oct 2011 - May 31, 2025

Waste Disposal Sites - MOE 1991 Historical Approval Inventory: Provincial WDSH

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Government Publication Date: Up to Oct 1990*

Water Well Information System: Provincial WWIS

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Government Publication Date: Dec 31 2023

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

NO MUNICIPAL ADDRESS
TREED LAND

3748 RIDEAU ROAD
VACANT LAND

RIDEAU ROAD

TREED AREA

GRASSED

APEC 1

SOMME STREET

301 SOMME STREET
VACANT / UNDEVELOPED

GRAVEL PAD

GRAVEL / DIRT ROAD

VACANT LAND

351 SOMME STREET
VACANT LAND

290 SOMME STREET
VACANT LAND

SAPPERS RIDGE

SOMME STREET

300 SOMME STREET
COMMERCIAL / INDUSTRIAL

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN :

ID #	PCA ID	DESCRIPTION
1	30	IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY

LEGEND:

PHASE I & II PROPERTY BOUNDARY

SCALE: 1:2000

0 25 50 75 100 125 150m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

W.O. STINSON & SONS LTD.

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
301 SOMME STREET

OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:2000	Date: 08/2025
Drawn by: YA	Report No.: PE7096-LET.01
Checked by: JD	Dwg. No.: PE7096-1
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe70xx\pe7096\pe7096-1-site plan.dwg

PHASE I - ENVIRONMENTAL SITE ASSESSMENT STUDY AREA

TREED LAND

VACANT LAND

SITE
1

VACANT LAND

VACANT LAND

VACANT LAND

COMMERCIAL / INDUSTRIAL

POTENTIALLY CONTAMINATING ACTIVITIES :

ID #	PCA ID	ADDRESS	DESCRIPTION
1	30	ON-SITE	IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY

LEGEND:

PHASE I & II PROPERTY BOUNDARY

SCALE: 1:4000

0 50 100 150 200 250m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

W.O. STINSON & SONS LTD.

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
301 SOMME STREET

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:4000	**Date:** 08/2025
Drawn by: YA	**Report No.:** PE7096-LET.01
Checked by: JD	**Dwg. No.:** PE7096-2
Approved by: MSD	**Revision No.:**

p:\autocad drawings\environmental\pe70xx\pe7096\pe7096-2-surrounding land use plan.dwg

11x17